CURRICULUM AND SYLLABUS
CHOICE BASED CREDIT SYSTEM

B.TECH – CIVIL ENGINEERING
(FULL TIME)
I – VIII SEMESTERS

SEMESTER I

Code No.	Category	Course Title	L	T	P	C
THEORY						
BEN101	HS	English – I	3	1	0	3
BMA101	BS	Mathematics – I	3	1	0	3
BPH101	BS	Engineering Physics – I	3	0	0	3
BCH101	BS	Engineering Chemistry – I	3	0	0	3
BCS101	ES	Fundamentals of Computing and Programming	3	0	0	3
BBA101	HS	Personality Development	1	1	0	2
BBT 102	BS	Biology for Engineers	2	0	0	2
BME101	ES	Engineering Graphics – E	2	3	0	4
BME103	ES	Basic Mechanical Engineering	2	0	0	2
PRACTICAL						
BCM1L1	ES	Basic Civil and Mechanical Engineering Practices Laboratory	0	0	3	1
BPC1L1 #	BS	Physics and Chemistry Laboratory	0	0	3	0
BSS1L4/ BSS1L5/ BSS1L6	HS	NCC/NSS?NSO to be conducted during week ends				1
Total No. of Contact Hours: 34					**Total No. of Credits: 27**	

Laboratory Classes on alternate weeks for Physics and Chemistry. The Lab examinations will be held only in the second semester (including the first semester experiments also).

SEMESTER II						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BEN201	HS	English – II	3	1	0	3
BMA201	BS	Engineering Mathematics – II	3	1	0	3
BPH201	BS	Engineering physics – II	3	0	0	3
BCH201	BS	Engineering Chemistry – II	3	0	0	3
BFI 201*	HS	Foreign / Indian Language	3	0	0	3
BME202	ES	Engineering Mechanics	4	0	0	3
BEE201	ES	Basics Electrical and Electronics Engineering	2	0	0	2
PRACTICAL						
BCS2L2	ES	Computer Practices Lab	0	0	3	1
BEE2L1	ES	Basics Electrical and Electronics Engineering Practices Laboratory	0	0	3	1
BPC2L1	BS	Physics and Chemistry Laboratory	0	0	3/3	1
BSS1L7/BSS2L7	HS	Yoga				1
Total No. of Contact Hours: 32					**Total No. of Credits: 24**	

*Any one of the following courses: BFR201 – French, BGM201-German, BJP201 – Japanese, BKR201 – Korean, BCN201 – Chinese, BTM201 – Tamil.

SEMESTER III						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BMA301	BS	Mathematics III	3	2	0	4
BCE301	PC	Applied Mechanics	4	0	0	4
BCE302	PC	Surveying I	3	0	0	3
BCE303	PC	Building Construction Technology	3	0	0	3
BCE304	PC	Fluid Mechanics	3	0	0	3
BCE305	PC	Engineering Earth Science	3	0	0	3
PRACTICAL						
BCE3L1	PC	Surveying Practical – I	0	0	3	2
BCE3L2	PC	Strength Of Materials Lab	0	0	3	2
Total No. of Contact Hours: 27					**Total No. of Credits: 24**	

SEMESTER IV						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BMA402	BS	Numerical Methods	3	2	0	4
BCE401	PC	Theory Of Structures	4	0	0	4
BCE402	PC	Surveying II	3	0	0	3
BCE403	PC	Soil Mechanics	3	0	0	3
BCE404	PC	Basic Structural Design	4	0	0	4
BCE405	PC	Transportation Engineering	3	0	0	3
BCE406	HS	Environmental Studies	3	0	0	3
PRACTICAL						
BCE4L1	PC	Surveying Practical II	0	0	3	2
BCE4L2	PC	Soil Mechanics Lab	0	0	3	2
Total No. of Contact Hours: 31					**Total No. of Credits: 28**	

SEMESTER V						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BMA501	BS	Probability and Statistics for Civil Engineers	4	1	0	4
BCE501	PC	Structural Analysis – I	4	0	0	4
BCE502	PC	Applied Hydraulic Engineering	3	0	0	3
BCE503	PC	Foundation Engineering	3	0	0	3
BCE504	PC	Reinforced Concrete Structures - I	4	0	0	4
BCE505	PC	Environmental Engineering	3	0	0	3
	CE	Core Elective – I	3	0	0	3
PRACTICAL						
BCE5L1	PC	Construction Engineering Lab	0	0	3	2
BCE5L2	PC	Fluid Mechanics and Machinery Lab	0	0	3	2
BCE5C1	PR	Comprehension I	0	0	0	1
Total No. of Contact Hours: 29					**Total No. of Credits: 29**	

SEMESTER VI						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BCE601	PC	Structural Analysis – II	4	0	0	4
BCE602	PC	Reinforced Concrete Structures - II	4	0	0	4
BCE603	PC	Irrigation Engineering	3	0	0	3
BSS601	HS	Value Education and Professional Ethics	3	0	0	3
	CE	Core Elective –II	3	0	0	3
	NE	Non Major Elective –I	3	0	0	3
Practical						
BCE6L1	PC	Computer Aided Building Drawing	0	0	3	2
BCE6L2	PC	Environmental Engineering Lab	0	0	3	2
BCE6P1	PR	Term Paper	0	0	4	2
Total No. of Contact Hours: 30			**Total No. of Credits: 26**			

SEMESTER VII						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
Theory						
BCE701	PC	Estimation & Costing	3	0	0	3
BCE702	PC	Computer Aided Design of Structures	4	0	0	4
BCE703	PC	Design of Steel Structures	4	0	0	4
BCE704	PC	Management Concepts For Civil Engineers	3	0	0	3
	CE	Core Elective – III	3	0	0	3
	OE	Open Elective – I	3	0	0	3
Practical						
BCE7L1	PC	Computer Aided Design Of Structures Laboratory	0	0	3	2
BCE7L2	PC	Computer Aided Design and Drafting Laboratory(R.C.C, Steel, Irrigation & Environment)	0	0	3	2
BCE7V1	PR	In-plant Training (End of 6th Semester -30days)	0	0	0	1
Total No. of Contact Hours: 26			**Total No. of Credits: 25**			

SEMESTER VIII						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
Theory						
	NE	Non Major Elective – II	3	0	0	3
	OE	Open Elective – II	3	0	0	3
Practical						
BCE8C1	PR	Comprehension I	0	0	0	1
BCE8P1	PR	Project Work and Viva Voce	0	0	18	9
Total No. of Contact Hours: 24			**Total No. of Credits: 16**			

OVERALL CREDITS FOR THE PROGRAMME: 199

SUMMARY OF CURRICULUM STRUCTURE AND CREDIT & CONTACT HOUR DISTRIBUTION

S.No	Sub Area	Credit as per Semester								No. of Credit	% of credit
		I	II	III	IV	V	VI	VII	VIII		
1	Humanities & Social Sciences (HS)	6	7	-	3	-	3		-	19	9.55
2	Basic Sciences (BS)	11	10	4	4	4	-	-	-	33	16.58
3	Engineering Sciences (ES)	10	7	-	-	-	-	-	-	17	8.54
4	Professional Core (PC)	-	-	20	21	21	15	18	-	95	47.74
5	Core Electives (PE)	-	-	-	-	3	3	3		9	4.52
6	Non major Electives (NE)	-	-	-	-	-	-	3	3	6	3.02
7	Open Electives (OE)	-	-	-	-	-	-	3	3	6	3.02
8	Project Work, Seminar, Internship, Term Paper, etc. (PR)	-	-	-		1	2	1	10	14	7.03
	Total Credits	27	24	24	28	28	26	25	16	199	100
	Total Contact Hours	34	32	27	31	29	30	26	24	233	

LIST OF ELECTIVES

List of Core Elective (CE) -I:

Code No.	Course Title	L	T	P	C
BCE051	Concrete Technology	3	0	0	3
BCE052	Industrial Structures	3	0	0	3
BCE053	Advanced Construction Techniques	3	0	0	3
BCE054	Construction Planning, Scheduling and Control	3	0	0	3
BCE055	Industrial Waste Treatment and Disposal	3	0	0	3
BCE056	Solid and Hazardous Waste Management	3	0	0	3

List of Core Elective (CE) -II:

Code No.	Course Title	L	T	P	C
BCE057	Design of R.C. Framed Structures	3	0	0	3
BCE058	Tall Structures	3	0	0	3
BCE059	Safety Practices in Construction	3	0	0	3
BCE060	Modern Construction Materials	3	0	0	3
BCE061	Air and Noise Pollution	3	0	0	3
BCE062	Environmental Impact Assessment	3	0	0	3

List of Core Elective(CE) -III:

Code No.	Course Title	L	T	P	C
BCE063	Pre stressed Concrete Structures	3	0	0	3
BCE064	Advanced Concrete Design	3	0	0	3
BCE065	Construction Equipment	3	0	0	3
BCE066	Prefabrication and Construction Techniques	3	0	0	3
BCE067	Environmental Health Engineering	3	0	0	3
BCE068	Indoor Air Quality	3	0	0	3

List of Non Major Elective (NE) - I:

Code No.	Course Title	L	T	P	C
BCE069	Matrix Methods of Structural Analysis	3	0	0	3
BCE070	Concrete Structures	3	0	0	3
BCE071	Shoring, Scaffolding and Formwork	3	0	0	3
BCE072	Construction Project Management	3	0	0	3
BCE073	Ground Water Contamination and Transport Modeling	3	0	0	3
BCE074	Physical and Chemical Treatment of Water and Wastewater	3	0	0	3
BCE075	Ground Water Engineering	3	0	0	3
BCE076	Coastal Engineering	3	0	0	3

List of Non Major Elective (NE) -II:

Code No.	Course Title	L	T	P	C
BCE077	Finite Element Analysis	3	0	0	3
BCE078	Structures on Expansive Soil	3	0	0	3
BCE079	Quality Control and Assurance in Construction	3	0	0	3
BCE080	Construction Personnel Management	3	0	0	3
BCE081	Water and Sewage Conveyance	3	0	0	3
BCE082	Environmental Engineering Structures	3	0	0	3
BCE083	Soil Dynamics and Machine Foundation	3	0	0	3
BCE084	Hydrology	3	0	0	3

List of Open Elective (OE) -I:

Code No.	Course Title	L	T	P	C
BCE093	Remote Sensing and GIS	3	0	0	3
BBA008	Total Quality Management	3	0	0	3
BCE094	Optimization Techniques	3	0	0	3

List of Open Elective (OE) -II:

Code No.	Course Title	L	T	P	C
BCE095	Geographic Information System	3	0	0	3
BCE096	Engineering Economics	3	0	0	3
BCE097	Renewable Sources of Energy	3	0	0	3

SYLLABUS
B.TECH – CIVIL ENGINEERING

BEN101	ENGLISH - I	L	T	P	C
	Total Contact Hours – 60	3	1	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Dept of English				

OBJECTIVES

To make the students learn the basic modes of communication for fluency and attainment of confidence in speech, reading and writing.

COURSE OUTCOMES (COs)

CO1	Understand the importance of being responsible, logical, and thorough.
CO2	Respond to the situations where short reports and instructions are required.
CO3	Explain "how things work", and what to suggest when "things don't work
CO4	Develop our confidence and authority in the practical use of language.
CO5	Understand the importance of being responsible, logical, and thorough.
CO6	Able to Face interviews and competitive examinations

	Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	H	H	H	H	M	L	L	H	H	H
	CO2							L				
	CO3	H						H		H		
	CO4	H	M				M	L	H	H		
	CO5							L				
	CO6	H		H	H	H	H	L		H	H	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I STRUCTURES 12

Parts of speech - Active and passive voices - Subject verb agreement. - Writing about School life, Hobbies, Family and friends – Word formation with prefixes and suffixes - Tenses - Concord - Summarizing - Note-making

UNIT II TRANSCODING 12

Cause and effect relations – Punctuations –Differences between verbal and nonverbal communication -E - mail communication – Homophones - Etiquettes of E mail communication. Interpreting graphic representation - Flow chart and Bar chart.

UNIT III REPORTING 12

Degrees of comparison – Positive, Comparative, Superlative - questions- SI units -Lab reports - Physics chemistry, workshop and Survey report for introducing new product in the market.

UNIT IV FORMAL DOCUMENTATION 12

Writing project proposals - Presentation skills - Prefixes and suffixes - If conditions - Writing a review-Preparing minutes of the meeting, Agenda, official circulars.

UNIT V METHODOLOGY 12

Accident reports (due to flood and fire) - Hints development - Imperatives - Marking the stress Connectives , prepositional relatives.

TEXT BOOK

1. Department Of Humanities and Social Sciences Division, Anna University, Oxford University Press, 2013.

REFERENCES:

1. S.P.Danavel, English and Communication for Students of Science and Engineering, Orient Blackswan, Chennai, 2011.
2. Rizvi, M.Asharaf, Effective Technical Communication, New Delhi, Tata McGraw Hill Publishibg Company, 2007.
3. Murali Krishna and Sunitha Moishra, Communication Skills for Engineers . Pearson, New Delhi, 2011.

BMA101	**MATHEMATICS I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	1	0	3
	Prerequisite – + 2 Level Mathematics				
	Course Designed by – Dept of Mathematics				

OBJECTIVES

To make the students learn Mathematics in order to formulate and solve problems effectively in their respective fields of engineering.

COURSE OUTCOMES (COs)

CO1	Study the fundamentals of mathematics
CO2	Students learn multiple integral techniques
CO3	Students gain knowledge in application of variables
CO4	Find area and volume based on a function with one or more variables.
CO5	Apply matrix operations to solve relevant real life problems in engineering.

CO6	Formulate a mathematical model for three dimensional objects and solve

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H										
	CO2			M		H						
	CO3		H				M					
	CO4								L			
	CO5							H			L	
	CO6											L
3	Category	Humanities & Social Studies	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)			
			√									
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT 1 MATRICES 12

Characteristic equations- Eigen values and eigen vectors of the real matrix- Properties- Cayley-Hamilton theorem(Excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form- Quadratic form- Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 12

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

UNIT III DIFFERENTIAL CALCULUS 12

Curvature in Cartesian coordinates- Centre and radius of curvature- Circle of curvature- Evolutes- Envelopes- Applications of Evolutes and Envelopes.

UNIT 1V FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives- Euler's theorem for homogeneous functions- Total derivatives- Differentiation of implicit functions- Jacobians- Taylor's expansion- Maxima and Minima- Method of Lagrangian multipliers.

UNIT V MULTIPLE INTEGRALS 12

Double integration- Cartesian and Polar coordinates- Change of order of integration- Change of variables between Cartesian and Polar coordinates- Triple integration in Cartesian coordinates-Area as double integral- Volume as triple integral.

TEXT BOOK:

1. Ravish R.Singh and Mukkul Bhatt, "Engineering Mathematics-I" First Reprint, Tata McGraw Hill Pub Co., New Delhi. 2011.
2. Grewal.B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi. 2007.

REFERENCES:

1. Ramana.B.V. "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Glyn James, "Advanced Engineering Mathematics", 7thEdition, Pearson Education, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley and Sons, New York, 2003.
4. Murray R.Spiegel, "Advanced Calculus", Schaum's Outline Series, First Edn, McGraw Hill Intl Book Co.,New Delhi, 1981.

BPH101	**ENGINEERING PHYSICS I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite – +2 level Physics				
	Course Designed by – Department of Physics				

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various strea of Engineering and Technology

COURSE OUTCOMES (COs)

CO1	Understand the Principles and Laws of Physics
CO2	To understand the impact of Crystal Physics
CO3	Learn the Properties of Elasticity and Heat transfer.
CO4	Acquire Knowledge on Quantum Physics.
CO5	Understand the concepts on Laser & Ultrasonic's and its Applications
CO6	Understand the Principle of Laser and its Applications in Engineering and Medicine.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H						M			H	
	CO2		L	H		M				M		L
	CO3											
	CO4	H		M	L						L	
	CO5		L	L								L
	CO6											

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematic (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I CRYSTAL PHYSICS 9

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)- Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS 9

Elasticity-Hooke's law - Relationship between three modulii of elasticity (qualitative) – stress -strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders Modes of heat transfer- thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel).

UNIT III QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment-Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

UNIT IV ACOUSTICS AND ULTRASONICS 9

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

UNIT V PHOTONICS AND FIBRE OPTICS 9

Spontaneous and stimulated emission- Population inversion –Einstein's A and B coefficients - derivation. Types of lasers – Nd:YAG, CO2, Semiconductor lasers (homo junction & hetero junction)- Industrial and Medical Applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

TEXT BOOKS:

1. Jayaraman D Engineering Physics I. Global Publishing House, 2014.
2. Arumugam M. Engineering Physics. Anuradha publishers, 2010.
3. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai Publishers, 2009.
4. Mani Naidu S. Engineering Physics, Second Edition, PEARSON Publishing, 2011.

REFERENCES:

1. Searls and Zemansky. University Physics, 2009
2. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
3. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.

BCH101	ENGINEERING CHEMISTRY - I	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 Level Chemistry				
	Course Designed by – Department of Chemistry				

OBJECTIVES

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

COURSE OUTCOMES (COs)

CO1	Understand the principles of water characterization and treatment for portable industrial purposes.
CO2	To impart knowledge on the essential aspects of Principles of polymer chemistry engineering applications of polymers
CO3	Having a sound knowledge in the Field of the Conventional and non-Conventic energy
CO4	To impart knowledge on the essential aspects of electrochemical cells, emf applications of EMF measurements
CO5	To make the students understand the Principles of corrosion and corrosion control .
CO6	To impart knowledge about the Conventional and non-conventional energy sources energy storage devices

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	J	k
2	CO1	H						H				
	CO2		L	H		M						
	CO3		M		H							
	CO4	H		M	L			H				
	CO5		L	L								
	CO6	H						H				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I WATER TECHNOLOGY 9

Introduction-Characteristics : Hardness of water – types - temporary and permanent hardness - estimation by EDTA method Alkalinity – types of alkalinity - Phenolphthalein and Methyl orange alkalinity - determination –Domestic water treatment – disinfection methods (Chlorination, Ozonation , UV treatment) Boiler feed water – requirements – disadvantages of using hard water in boilers Internal conditioning (Calgon Conditioning method) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II POLYMERS 9

Introduction-Polymers- definition – polymerization – degree of polymerization - types of polymerization– Addition polymerization and Condensation polymerization – Mechanism of Polymerization - free radical polymerization mechanism only, Plastics: Classification – thermoplastics and thermosetting plastics – difference between thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, Teflon, nylon-6,6, PET, Rubber :Types – drawbacks of natural rubber -vulcanization of rubber - properties and uses of vulcanized rubber Synthetic rubbers – butyl rubber and SBR

UNIT III ELECTRO CHEMISTRY 9

Introduction CELLS: types of Electrochemical cells , Electrolytic cells – Reversible and irreversible cells EMF – measurement of EMF– Single electrode potential – Nernst equation Reference electrodes : Standard Hydrogen electrode -Calomel electrode Ion selective electrode :Glass electrode and measurement of pH using Glass electrode Electrochemical series – significance Titrations :Potentiometer titrations (redox - Fe^{2+}vs dichromate titrations) Conduct metric titrations (acid-base – HCI vs, NaOH titrations)

UNIT IV CORROSION AND CORROSION CONTROL 9

Introduction: Chemical corrosion Definition - Chemical Corrosion - Electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – mechanism of Chemical and Electrochemical corrosion factors influencing corrosion control – sacrificial anode and impressed cathodic current methods – Protective coatings :Paints– constituents of the paint and their functions Metallic coatings – electroplating of Gold and electro less plating of Nickel.

UNIT V NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES 9

Introduction : Nuclear fission and nuclear fusion reactions – differences between nuclear fission and nuclear fusion reactions – nuclear chain Reactions – nuclear energy critical mass - super critical mass - sub - critical mass Light water nuclear reactor for power generation (block diagram only) – breeder reactor Solar energy conversion – solar cells – wind energy Fuel cells – hydrogen – oxygen fuel cell Batteries :Primary and secondary Batteries – differences between Primary and secondary Batteries Secondary batteries :Lead–acid storage battery –working –uses Nickel–cadmium battery - working – uses Solid – state battery : Lithium battery

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S. Dara "A text book of engineering chemistry" S.Chand & Co.Ltd., New Delhi (2006).
3. P. J. Lucia, M. Subhashini, "Engineering Chemistry, Volume 1", Crystal Publications, Chennai, (2007).

REFERENCES :

1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

BCS101	**FUNDAMENTALS OF COMPUTING AND PROGRAMMING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 level Physics				
	Course Designed by – Department of Physics				

OBJECTIVES

Students will understand the basics of computers and solve computer oriented problems using various computing tools.

COURSE OUTCOMES (COs)

CO1	Learn the fundamental principles in computing.
CO2	Learn to write simple programs using computer language
CO3	To enable the student to learn the major components of a computer system.
CO4	Computing problems
CO5	To learn to use office automation tools.
CO6	To interpret and relate programs

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	J	k
2	CO1	H					H					
	CO2		L	H		M						
	CO3		L		S							
	CO4	M		M	W		M					
	CO5		L	L								
	CO6	H					H					

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION TO COMPUTER 9

Introduction- Characteristics of computer-Evolution of Computers-Computer Generations - Classification of Computers- Basic Computer Organization-Number system. Computer Software: Types of Software—System software-Application software-Software Development Steps

UNIT II PROBLEM SOLVING AND OFFICE AUTOMATION 9

Planning the Computer Program – Purpose – Algorithm – Flowcharts– Pseudo code Introduction to Office Packages: MS Word, Spread Sheet, Power Point, MS Access, Outlook.

UNIT III INTRODUCTION TO C 9

Overview of C-Constants-Variables-Keywords-Data types-Operators and Expressions. Managing Input and Output statements-Decision making-Branching and Looping statements.

UNIT IV ARRAYS AND STRUCTURES 9

Overview of C-Constants, Variables and Data types-Operators and Expressions -Managing Input and Output operators-Decision making-Branching and Looping.

UNIT V INTRODUCTION TO C++ 9

Overview of C++ - Applications of C++-Classes and objects-OOPS concepts -Constructor and Destructor- A simple C++ program –Friend classes and Friend Function.

TEXT BOOKS:

1. Ashok, N.Kamthane,"Computer Programming", Pearson Education (2012).
2. Anita Goel and Ajay Mittal,"Computer Fundamentals and Programming in C", Dorling V Kindersley (India Pvt Ltd).,Pearson Education in South Asia,(2011).
3. Yashavant P. Kanetkar, "Let us C",13th Edition,BPB Publications(2013).
4. Yashavant P. Kanetkar,"Let us C++"10th Edition, BPB Publications (2013**).**

REFERENCES:

1. Pradeep K.Sinha, Priti Sinha "Foundations of Computing", BPB Publications (2013).
2. Byron Gottfried, "Programming with C", 2nd edition, (Indian Adapted Edition), TMH Publication.
3. Pradip Dey, Manas Ghosh, Fundamentals of Computing and Programming in 'C' First Edition, Oxford University Press(2009).
4. The C++ Programming Language , 4th Edition, Bjarne Stroustrop, Addison-Wesley Publishing Company (2013).

BBA101	**PERSONALITY DEVELOPMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	1	1	0	2

	Prerequisite – +2 Level Knowledge
	Course Designed by – Department of Management Studies

OBJECTIVES

To make students groom their personality and prove themselves as good Samaritans of the society.

COURSE OUTCOMES (COs)

CO1	Individual or in-group class presentations pertaining to the applications of conce theories or issues in human development..
CO2	Scores obtained from essay and or objective tests.
CO3	Attendance, classroom participation, small group interactions.
CO4	Research and write about relevant topics.
CO5	Design and complete a research project that can take the form of a developme interview, an observation or assessment through service learning.
CO6	Develop and maintain a Reflection

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	I	J	k
2	CO1	L		H				M				
	CO2		H	H				M				
	CO3							M	H			
	CO4									H	H	
	CO5							M			H	H
	CO6							M				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION TO PERSONALITY DEVELOPMENT 6

The concept personality- Dimensions of theories of Freud & Erickson- personality – significant of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analyses.

UNIT II ATTITUDE & MOTIVATION 6

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude - Advantages – Negative attitude - Disadvantages - Ways to develop positive attitude - Difference between personalities having positive and negative attitude. Concept of motivation - Significance - Internal and external motives - Importance of self-motivation- Factors leading to de-motivation

UNIT III SELF-ESTEEM 6

Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self esteem - Positive and negative self-esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours - Lateral thinking.

UNIT IV OTHER ASPECTS OF PERSONALITY DEVELOPMENT 6

Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader - Character-building -Team-work - Time management -Work ethics –Good manners and etiquette.

UNIT V EMPLOYABILITY QUOTIENT 6

Resume building- The art of participating in Group Discussion – Acing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

TEXT BOOKS:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition, Prentice Hall.

REFERENCE BOOKS:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988.
2. Heller, Robert. Effective leadership. Essential Manager series. Dk Publishing, 2002
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

BBT102	BIOLOGY FOR ENGINEERS	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – Basic Science				
	Course Designed by – Department of Industrial Bio Technology				
OBJECTIVES Gain vivid knowledge in the fundamentals and uses of biology, human system and plant system.					
COURSE OUTCOMES (COs)					

CO1	Graduates within the first five years will be able to grasp and apply biological engineering principles, procedures needed to solve real-world problems.
CO2	To understand the fundamentals of living things, their classification, cell structure and biochemical constituents
CO3	To apply the concept of plant, animal and microbial systems and growth in real life situations
CO4	To comprehend genetics and the immune system
CO5	To know the cause, symptoms, diagnosis and treatment of common diseases
CO6	To give a basic knowledge of the applications of biological systems in relevant industries

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H						M				
	CO2		H							H		
	CO3			H							M	
	CO4										H	
	CO5											
	CO6						H					

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathemati	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION TO LIFE 6

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome.

UNITII BIODIVERSITY 6

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions-Microbial System: history-types of microbes-economic importance and control of microbes.

UNITIII GENETICS AND IMMUNE SYSTEM 6

Evolution: theories of evolution-**Mendel's** cell division–mitosis and meiosis-evidence of e **laws of inheritance**-variation and speciation- nucleic acids as a genetic material-central dogma immunity-antigens-antibody-immune response.

UNIT IV HUMAN DISEASES 6

Definition- causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis

UNIT V BIOLOGY AND ITS INDUSTRIAL APPLICATION 6

Transgenic plants and animals-stem cell and tissue engineering-bioreactors-biopharming-recombinant vaccines-cloning-drug discovery-biological neural networks-bioremediation-biofertilizer-biocontrol-biofilters-biosensors-biopolymers-bioenergy-biomaterials-biochips-basic biomedical instrumentation.

TEXT BOOKS:

1. A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013
2. Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company, 2011.
3. Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004

REFERENCE BOOKS

1. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
2. Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008
3. Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012

BME 101	**ENGINEERING GRAPHICS- E**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	2	0	3	4
	Prerequisite – +2 Level Mathematics & Physical Science				
	Course Designed by – Department of Mechanical Engineering				

OBJECTIVES

To understand techniques of drawings in various fields of engineering

COURSE OUTCOMES (COs)	
CO1	To know about different types of lines & use of different types of pencils in an Engineering Drawing
CO2	To know how to represents letters & numbers in drawing sheet
CO3	To know about different types of projection
CO4	To know projection of points ,straight lines, solids etc.
CO5	To know development of different types of surfaces.
CO6	To know about isometric projection.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H										
	CO2	M	H									
	CO3			L								
	CO4						L		H	H		
	CO5			L						H		
	CO6			L							H	
3	Category	Humanities & Social Studies		Basic Sciences &Mathemat	Engineering Sciences (ES)		Professiona l Core (PC)	Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)	Project/Ter m Paper/ Seminar/ Internship (PR)
					√							
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I BASIC CURVES, PROJECTION OF POINTS AND STRAIGHT LINES 6+6

Conics-construction of ellipse, parabola and hyperbola by eccentricity method-construction of cycloids- construction of involutes of square and circle-Drawing of tangent and normal to the above curves-Scales-Basic drawing conventions and standards-Orthographic projection principles- Principal planes-First angle projection- Projection of points. Projection of straight lines (only first angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces.

UNIT II PROJECTIONS OF PLANES AND SOLIDS 6+6

Projection of planes (Polygonal and circular surfaces) inclined to both the principal planes. Projection of simple solids like prisms, pyramids, cylinder, cone, tetrahedron and truncated solids when the axis is inclined to one of the principal planes/ both principal planes by rotating object method and auxiliary plane method.

UNIT III ORTHOGRAPHIC PROJECTIONS, ISOMETRIC PROJECTIONS & FREEHANDSKETCHING 6+6

Orthographic projection of Simple parts from 3D diagram-Principles of isometric projection and isometric view-isometric scale- Isometric projections of simple solids and truncated solids- Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems Free hand sketching of orthographic & Isometric projection

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other-obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids- Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

.

UNIT V PERSPECTIVE PROJECTION, BUILDING DRAWING AND COMPUTER AIDED DRAFTING 6+6

Perspective projection of simple solids-Prisms, Pyramids and cylinders by visual ray method. Introduction- components of simple residential or office building-specifications-plan and elevation of different types of Residential buildings and office buildings. Introduction to drafting packages and basic commands used in AUTO CAD. Demonstration of drafting packages.

TEXT BOOKS:

1. N.D.Bhatt and V.M.Panchal, "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. K.V.Natarajan "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

REFERENCES:

1. K.R.Gopalakrishna, "Engineering drawing",(Vol-I & II combined) Subhas stores, Bangalore,2007.
2. K.Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International Private limited,2008.
3. Luzzader, Warren.J., and Duff, John.M.,, "Fundamentals of Engineering Drawing with an introduction to Interactive computer graphics for design and production", Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi,2005.

Special points applicable to University Examinations on Engineering Graphics

1) There will be five questions, each of either or type covering all units of the syllabus.
2) All questions will carry equal marks of 20 each making a total of 100.

BME103	**BASIC MECHANICAL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – +2 Level Mathematics & Physical Science				
	Course Designed by – Dept of Mechanical Engineering				

OBJECTIVES

- The program educational objectives (PEOs) for the mechanical-engineering program are to educate graduates who will be ethical, productive, and contributing members of society.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- The ability to apply principles of engineering, basic science, and mathematics to design and realize physical systems, components, or processes

COURSE OUTCOMES (COs)

CO1	an ability to apply knowledge of mathematics
CO2	an ability to apply knowledge of science, and engineering
CO3	Ability to design and conduct experiments, as well as to analyze and interpret data.

CO4	an ability to function on multi-disciplinary teams											
CO5	To provide basic Knowledge of basic manufacturing process.											
CO6	ability to identify, formulate, and solve engineering problems											
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	M	M	H	M		M			L	L
	CO2	H	M	M	H	H		M			L	L
	CO3	H	M		H	H		M			L	L
	CO4	H	M		H	H		M			L	L
	CO5	H	M	M	H	H		M			L	L
	CO6	H			H	H		M			L	L
3	Category	Humanities & Social Studies (HS)										

UNIT I ENERGY RESOURCES AND POWER GENERATION 6

Renewable and Non-renewable resources- solar, wind, geothermal, steam, nuclear and hide power plants- Layout, major components and working. Importance of Energy storage, Environmental constraints of power generation using fossil fuels and nuclear energy.

UNIT II IC ENGINES 6

Classification, working principles of petrol and diesel engines- two stroke and four stroke cycles, functions of main components of I.C engine. Alternate fuels and emission control.

UNIT III REFRIGERATION AND AIR-CONDITIONINGSYSTEM 6

Terminology of Refrigeration and Air-Conditioning, Principle of Vapor Compression & Absorption system- Layout of typical domestic refrigerator- window & Split type room air conditioner.

UNIT IV MANUFACTURING PROCESSES 6

Brief description of Mould makes and casting process, Metal forming, Classification types of forging, forging operations, Brief description of extrusion, rolling, sheet forging, and drawing. Brief description of welding, brazing and soldering. Principal metal cutting processes and cutting tools, Brief description of Centre lathe and radial drilling machine.

UNIT V MECHANICAL DESIGN 6

Mechanical properties of material-Yield strength, ultimate strength, endurance limit etc., Stress-Strain curves of materials. Stresses induced in simple elements. Factor of safety - Design of Shafts and belts. Types of bearings and its applications. Introduction to CAD/CAM/CIM & Mechatronics.

TEXTBOOKS:

1. T.J.Prabhuetal, "Basic Mechanical Engineering", SciTech Publications(p)Ltd,2000

REFERENCES:

1. NAGPAL,G.R,"PowerplantEngineering",KhannaPublishers,2004.
2. RAO.P.N,"ManufacturingTechnology",TataMcGraw-HillEducation,2000.
3. Kalpakjian,"ManufacturingEngineeringandTechnology",AdissoWesleypublishers,1995.
4. Ganesan.V,"Internalcombustionengines",TataMcGraw-HillEducation,2000.
5. C.P.Arora, "Refrigeration and Air Conditioning",TataMcGraw-HillEducation,2001.
6. V.B.Bhandari, "Design of Machine elements", Tata McGraw-HillEducation,2010.

BCM1L1	**BASIC CIVIL & MECHANICALENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	2	1
	Prerequisite – Basic Civil and Mechanical Engineering				
	Course Designed by – Department of Mechanical Engineering& Civil Engineering				

OBJECTIVES

To provide exposure to the students with hands on experience on various basic Civil & Mechanical Engineering practices.

COURSE OUTCOMES (COs)

CO1	Learn Basic concepts
CO2	Students will get exposure regarding pipe connection for pumps & turbines and to study the joint used in roofs, doors, windows and furniture's.
CO3	Students will get exposure regarding smithy, foundry operations and in latest welding operations such as TIG, MIG, CO2, spot welding etc.,
CO4	Students will get hands on experience on basic welding techniques, machining and sheet metal works.
CO5	Students will get hands on experience on basic machining techniques
CO6	Students will get hands on experience on basic sheet metal techniques

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2				H							
	CO3					H	L	L				
	CO4		H				M		L			H
	CO5		H				M		L			H
	CO6		H				M		L			H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathema	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS

I. CIVIL ENGINEERING PRACTICE

Buildings:

a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b) Study of pipe connections requirements for pumps and turbines.
c) Preparation of plumbing line sketches for water supply and sewage works.
d) Hands-on-exercise: Basic pipe connection of PVC pipes & G.I. Pipes – Mixed pipe material connection – Pipe connections with different joining components.
e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Hand tools and Power tools:

a) Study of the joints in roofs, doors, windows and furniture.
b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.
c) Preparation of half joints, Mortise and Tenon joints.

II MECHANICAL ENGINEERING PRACTICE

Welding:

a) Preparation of butt joints, lap joints and tee joints by arc welding

Basic Machining:

a) Simple Turning and Taper turning

b) Drilling Practice

Sheet Metal Work:

a) Forming & Bending:
b) Model making – Trays, funnels, etc.
c) Different type of joints
d) Preparation of air-conditioning ducts
e) Preparation of butt joints, lap joints and tee joints by arc welding

Machine assembly practice:

a) Assembling, dismantling and Study of centrifugal pump
b) Assembling, dismantling and Study of air conditioner
c) Assembling, dismantling and Study of lathe

Moulding:

a) Moulding operations like mould preparation for gear and step cone pulley etc

Fitting:

a) Fitting Exercises – Preparation of square fitting and vee – fitting models.

Demonstration:

a) Smithy operations, upsetting, swaging, setting down and bending. Example–Exercise – Production of hexagonal headed bolt.

b) Gas welding.

REFERENCES:

1. K. Jeyachandran, S. Nararajan& S, Balasubramanian, "A Primer on Engineering Practices Laboratory" ,Anuradha Publications, (2007).
2. T.Jeyapoovan, M. Saravanapandian& S. Pranitha, "Engineering Practices Lab Manual",Vikas Publishing House Pvt. Ltd. (2006)
3. H. S. Bawa, "Workshop Practice", Tata McGraw–Hill Publishing Company Limited, (2007).
4. A. Rajendra Prasad & P. M. M. S Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. P. Kannaiah& K.L. Narayana, "Manual on Workshop Practice", Sci tech Publication, (1999).

BEN 201	**ENGLISH II**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	3
	Prerequisite – English I				
	Course Designed by – Department of English				

OBJECTIVES

Students will be able to actively participate in group discussions. Students will have Telephonic Skills, Giving Directions and Information Transfer

COURSE OUTCOMES (COs)

CO1	To make the students aware to different kinds of Learner-friendly modes of language to a variety of self- instructional learning (Computer based)
CO2	To make students comprehend the habit of intelligent Reading as well as Computer-based competitive exams glob
CO3	To achieve a reasonably good level of competency in Report Writing.
CO4	To make the students aware to different kinds of Learner-friendly modes of language to a variety of self- instructional learning (Computer based)
CO5	To achieve a reasonably good level of competency in group discussions
CO6	To achieve a reasonably good level of competency in public speaking

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	L	H	L	M			H		M	L
	CO2			H	L				H		M	L
	CO3			H	L	M			H		H	L
	CO4			H	L	M			H		M	L
	CO5			H	L	M			H		M	L
	CO6			H	L	M			H		M	L

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ORIENTATION 12

Numerical adjectives - Meanings in context - Same words used as different parts of speech -Paragraph writing - Non- verbal communication - Regular and Irregular verbs.

UNIT II ORAL SKILL 12

Listening to audio cassettes - C.Ds, News bulletin - Special Lectures, Discourse - Note taking - Sentence patterns - SV, SVO, SVC, SVOC, SVOCA - and Giving Instructions - Reading Comprehension answering questions. Inferring meaning.

UNIT III THINKING SKILL 12

Self- introduction describing –Group Discussion – Debate –Role play- Telephone- Things- etiquette- Recommendation and Sequencing jumbled sentences to make a suggestions-paragraph-advertisement and notice, Designing or drafting posters, writing formal and informal invitations and replies.

UNIT IV WRITING SKILL 12

Definitions - Compound nouns - Abbreviations and acronyms – (a) business or official letters(for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies): (b) Letters to the editor (giving suggestions on an issue) .

UNIT V FORMAL INFORMATION 12

Editing – Prepositions - Articles - Permission letter for undergoing practical training , Essay writing - Application for a job , letter to the principal authorities regarding admissions, other issues, requirement or suitability of course etc.

TEXT BOOK:

1. Meenakshi Raman, Sangeetha Sharma , Technical English for Communication: Principle and Practice, OUP, 2009.

REFERENCE BOOKS:

1. Sumanth , English for Engineers, Vijay Nicole , Imprints pvt ltd.2013.
2. Meenakshi Raman and SangeethaSharma , Technical Communication Principles and Practice, Oxford University Press, 2009.
3. Sangeetha Sharma, Binodmishra , Communication skills for engineers and scientists , PHI Learning Pvt Ltd, New Delhi, 2010.

BMA 201	**MATHEMATICS – II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	1	0	3
	Prerequisite – Mathematics I				
	Course Designed by – Department of Mathematics				

OBJECTIVES

Ability to apply these principles of mathematics in projects and research works.

COURSE OUTCOMES (COs)

CO1	Student shall be able to Solve differential equations, simultaneous linear equations, and so special types of linear equations related to engineering.
CO2	Relate the use of mathematics in applications of various fields namely fluid flow, heat fl solid mechanics, electrostatics, etc.
CO3	Ability to test hypothesis
CO4	Find intensity of degree of relationship between two variables and also bring out regress equations.
CO5	Understand to solve matrix problems related to real life problems.
CO6	Formulate mathematical models

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		L								
	CO2		H				H		L	L		M
	CO3		H				H		L	L		M
	CO4					M						M
	CO5										M	M
	CO6										M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ORDINARY DIFFERENTIAL EQUATION 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters **– Cauchy's** and L**egendre's linear equations** - simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 12

Gradient, divergence and curl –Directional derivatives –Irrotational and solenoidal vector fields – vector integration– **Green's theorem in a plane , Gauss divergence theorem and** S**toke's theorem (**without proofs) **–** simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS 12

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equation and sufficient conditions (without proofs) – Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – construction of analytic functions – conformal mapping: W= Z+C, CZ, 1/Z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Complex integration **– Statement and application of Cauchy's integral theorem and Cauchy's integral formula** –Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of Residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding poles on boundaries).

UNIT V STATISTICS 12

Mean, Median, Mode – Moments –Skewness and Kurtosis – Correlation – Rank Correlation – Regression –Chi square test for contingency tables.

TEXT BOOK:

1. R.M.Kannan and B.Vijayakumar" Engineering Mathematics–II "2nd Edition, SRB Publication, Chennai 2007.
2. Bali.N.P and Manish Goyal , "Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Lltd, 2008 .
3. Grewal .B/S "Higher Engineering Mathematics", 40th Editon, Khanna Publications, Delhi, 2007

REFERENCES :

1. Ramana.B.V, "Higher Engineering Mathematic", Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Gupta SC, and VK.Kapoor, "Fundamentals Mathematical Statistics", 11th edition, Sultan Chand Sons, New Delhi, 2014.

BPH201	**ENGINEERING PHYSICS -II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – ENGINEERING PHYSICS -I				
	Course Designed by – Department of Physics				

OBJECTIVES

- To expose the students to multiple areas of science of engineering materials which have direct relevance to different Engineering applications
- To understand the concepts and applications of conducting, Semiconducting, magnetic & dielectric materials as well as their optical properties.

COURSE OUTCOMES (COs)

CO1	Understand about properties and advancements of conducting materials.
CO2	Understand the principle and properties semiconducting materials.
CO3	Acquire Knowledge on Magnetic and dielectric Materials.
CO4	To Know about the creation of new materials with novel properties
CO5	To Understand the impact of modern materials in technical uses.
CO6	Learn new engineering materials and its characteristics

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H										
	CO2		L	H		M						
	CO3		M		H							
	CO4	H		M	L							
	CO5		L	L								
	CO6	H										

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I CONDUCTING MATERIALS 9

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

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors -direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications Superconductivity : properties – Type I and Type II superconductors

– BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications.

TEXT BOOKS:

1. Jayaraman D Engineering Physics II. Global Publishing House, 2014.
2. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
3. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011.

REFERENCES:

1.Arumugam M., Materials Science. Anuradha publishers, 2010
2. Pillai S.O., Solid State Physics. New Age International(P) Ltd., publishers, 2009
3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009

BCH 201	**ENGINEERING CHEMISTRY-II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – ENGINEERING CHEMISTRY –I				
	Course Designed by – Department of Chemistry				

OBJECTIVES

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

COURSE OUTCOMES (COs)

CO1	Students will understand the concepts and further industrial applications of surface chemis
CO2	To impart knowledge about the Industrial importance of Phase rule and alloys
CO3	To make the students to be conversant with Analytical techniques of chemistry and t importance
CO4	To have an idea and knowledge about the Chemistry of Fuels and
CO5	Understanding of engineering materials
CO6	All about bonding and molecular structures

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	H	L		H		H				M
	CO2		H			H		H				
	CO3	H		L		H		H				M
	CO4			L		H		H				
	CO5			L		H		H				
	CO6			L		H		H		H		M
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathemati		Engineering Sciences (ES)		Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√								
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I SURFACE CHEMISTRY 9

Introduction **:** Adsorption , absorption , desorption , adsorbent , adsorbate and sorption – (definition only) Differences between adsorption and absorption Adsorption of gases on solids – factors affecting adsorption of gases on solids – Adsorption isotherms –Frendlich adsorption isotherm and Langmuir adsorption isotherm Role of adsorbents in catalysis, Ion-exchange adsorption and pollution abatement.

UNIT II PHASE RULE AND ALLOYS 9

Introduction **:**Statement of Phase Rule and explanation of terms involved – one component system – water system – Construction of phase diagram by thermal analysis - Condensed phase rule [Definition only] Two Component System : Simple eutectic systems (lead-silver system only) – eutectic temperature – eutectic composition – Pattinsons Process of desilverisation of Lead Alloys: Importance, ferrous alloys –nichrome and stainless steel – 18/8 stainless steel -heat treatment of steel – annealing – hardening – tempering normalizing – carburizing - nit riding . Non- ferrous alloys: Brass and Bronze

UNIT III ANALYTICAL TECHNIQUES 9

Introduction: Type of Spectroscopy - Atomic spectroscopy – molecular spectroscopy - Explanation IR spectroscopy – principles – instrumentation (block diagram only) – applications - finger print region UV-visible spectroscopy –– principle – instrumentation (block diagram only) – Beer-**Lambert's law**- – estimation of iron by colorimetry– Atomic absorption spectroscopy- principle - instrumentation (block diagram only) - estimation of Nickel by Atomic absorption spectroscopy Flame photometry– principles – instrumentation (block diagram only) - estimation of sodium ion by Flame photometry

UNIT IV FUELS 9

Introduction **:** Calorific value – types of Calorific value - gross calorific value – net calorific value Analysis of Coal –- Proximate and ultimate analysis – hydrogenation of coal - Metallurgical coke –

manufacture by Otto-Hoffmann method Petroleum processing and fractions – cracking – catalytic cracking – types – fixed bed catalytic cracking method- Octane number and Cetane number (definition only) Synthetic petrol – Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG (definition and composition only) Flue gas analysis – importance - Orsat apparatus

UNIT V ENGINEERING MATERIALS 9

Introduction: Refractory's – classification – acidic, basic and neutral refractory's – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) Manufacture of Refractory's: alumina bricks and Magnesite bricks, Abrasives – natural and synthetic abrasives Natural type : Siliceous - quartz ; Non –siliceous – diamond Synthetic Abrasives : silicon carbide and boron carbide. Lubricants: Liquid lubricants - Properties – viscosity index, flash and fire points, cloud and pour points, oiliness) Solid lubricants – graphite and molybdenum sulphide

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S.Dara "A text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2006).
3. P. J. Lucia, M. Subhashini, "Engineering Chemistry, Volume 1", Crystal Publications, Chennai, (2007).

REFERENCES:

1. B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub. Co.Ltd, New Delhi,(2008)
2. B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
3. http://ocw.mit.edu/courses/find-by-topic

BFR 201	**FRENCH**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

Language gives access and insights into another culture. It is a fundamental truth that cultures de themselves through languages.

COURSE OUTCOMES (COs)	
CO1	Introduce the basics of the language to beginners
CO2	Understand a dialogue and dialogue presentation
CO3	To develop their knowledge as well as their communicative skills so as to be able to resp in simple everyday contexts.
CO4	Synchronies I includes documents which initiate the learners to another world, another cul and which acclimatize them to the authentic use of the French language through exploitation of written and iconographic documents. The Indian context has been used.
CO5	Grammatical and lexical notions as well as activities required for communication are learn the students.
CO6	Interpreting skills and confidence in the language.

CO6	Interpreting skills and confidence in the language.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2			H	L				H	H	M	L
	CO3			H	L				H	H	M	L
	CO4			H					H	H	M	L
	CO5			H	L				H	H	M	
	CO6			H					H	H	M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 8

At the airport: Savoir– faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs 'to be', 'to call oneself', subject pronouns, interrogation

UNIT II GRAMMAR 8

At the University: Savoir-faire: enquiring after one's welfare, taking leave, expressing appreciation - Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular 'er' verbs, 'to have', 'to learn', negation, irregular verbs

UNIT III CONVERSATION 8

At the café: Savoir –faire: speaking about one's likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

UNIT IV PROPOSAL WRITING 7

At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs

UNIT V FORMAL LETTERS 7

A concert: Savoir –faire: inviting, accepting, expressing one's inability to accept an invitation

UNIT VI REGULAR & IRREGULAR VERBS 7

Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs, **At Nalli's** Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, Exclamative adjectives, imperative tense

REFERENCES:

1. Course Material: Synchronie I –Méthode de Français
2. Madanagobalane -Samita Publications, Chennai, 2007

BGM 201	**GERMAN**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

At the end of this course, students shall be able to obtain good knowledge of the language, to r write and speak German, whereby the emphasis is laid on speech.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.
CO4	Will understand German lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2			H	L				H	H	M	L
	CO3			H	L				H	H	M	L
	CO4			H					H	H	M	L
	CO5			H	L				H	H	M	
	CO6			H					H	H	M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

Course structure:

A. German Language (speaking, reading, writing, grammar and test)
B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
C. The German Way (introduction, doing business, conversation, meetings, dining)
D. Germany (Culture, Climate)

UNIT I PRONOUNCIATION 9

Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers) Greetings, ordering, requesting, saying thank you - Grammar **– the article "the", conjugation** of verbs

UNIT II SELF INTRODUCTION 9

Shopping - Grammar **–** adjectives, endings before nouns, practice. Self introduction

UNIT III TRAINING 9

Addresses, Occupations, Studies - Grammar **- 'to be', the definite/indefinite** articles, individual Training

UNIT IV ORAL 9

Leisure Time, Sports, Hobbies - Grammar **–** position of a verb in a main clause , oral practice

UNIT V NARRATION 9

At a Restaurant, Food and Drink - Grammar **–** the personal pronoun in the Nominative and Accusative, Narrating an event

RESOURCES:

1. Sprachkurs Deutsch 1 (Verlag Diesterweg), New Delhi Learning Centre

BJP 201	**JAPANESE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Japanese language, Japanese culture and heritage
To impart knowledge Japanese lifestyle.
To give sufficient exposure to develop basic conversational skills.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.

CO4	Will understand Japanese lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2			H	L				H	H	M	L
	CO3			H	L				H	H	M	L
	CO4			H					H	H	M	L
	CO5			H	L				H	H	M	
	CO6			H					H	H	M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CULTURAL HERITAGE 9

Introduction-history and origin of Japanese language-Japan and its cultural heritage-Self introduction-counting numbers (1-100)-time-conversation with the use of audio devices, grammar– usage of particles wa, no, mo and ka

UNIT II USAGE 9

Greetings, seasons, days of the week and months of the year-numbers (up to 99,999)-grammar– usage of kore, sore, are, kono, sono, ano, koko and kochira, arimasu and imasu-i-ending and na-ending adjectives-use of audio and drills for practice

UNIT III ORAL 9

Asking the price–associated vocabulary-usage of particles ni, ga and ne- use of audio and drills for practice-Introduction to basic Kanji characters- use of audio and drills for practice

UNIT IV ART AND CULTURE 9

Family relationships- colours-Kanji (numbers) and festivals of Japan-religion-Japanese art and culture-ikebana, origami-introduction to hiragana- use of audio and drills for practice

UNIT V DRILLS AND PRACTICE 9

Vocobulary associated with directions-asking way-particles – e, de, mo, koko, soko, asoko, doko, nani, mae, ushiro, ue, shita- use of audio and drills for practice-introduction to katakana

TEXT BOOKS

1. Japanese Hiragana and Katakana for beginners, Timothy G. Stout, 2011
2. Genki I: An integrated course in elementary Japanese, Eri Banno and Yuko Ikeda, 2011

REFERENCE BOOKS

1. Japanese Reader collection Volume I, Yumi Boutwell and Clay Boutwell, Kotoba books, 2013
2. Living Language Japanese Complete Edition beginners through advanced course, Living Language, 2012

BKR 201	**KOREAN**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	1	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Korean language, Korean culture and heritage
To impart knowledge on Korean lifestyle and heritage.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.
CO4	Will understand Korean lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2			H	L				H	H	M	L
	CO3			H	L				H	H	M	L
	CO4			H					H	H	M	L
	CO5			H	L				H	H	M	
	CO6			H					H	H	M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PLANNING 9

Asking/giving reasons for studying Korean, making plans for the holiday, writing letters, describing past travel experiences and future travel plans, shopping in a grocery store, shopping in electronics store, storytelling Grammar: would like to (do), want to (do), construct future tense.

UNIT II MODIFIERS 9

Asking about feelings, asking about problems and giving advice, brief introductions - Grammar: Noun modifier, please try doing (something), irregular adjective/verb

UNIT III PLACING ORDERS 9

Asking about hobbies, asking about abilities (sports), job requirements, Ordering things for delivery, ordering a meal at a restaurant - Grammar: Sentence ending for the honorific form, please do something for me, have tried (something),

UNIT IV DESCRIPTIONS 9

Asking about evening plans, making plans with others, making preparations - Asking about rooms, describing your room to your classmates, describing your house. Grammar: to know/not know how to do something, must (do), have to (do), should,

UNIT V GRAMMAR 9

Describing your plans and giving reasons, cancelling appointments. Grammar: Shall we~? / Should we~?, with, and, irregular verbs/adjective, so, because, cannot, intend to, plan to, or hope to, (more) than, the most, tag question/is n't it? ,will (do)

COURSE MATERIAL:

Korean for Non-Native Speakers (Student Book 1B) Korean Language Education Center, Sogang University

BCN 201	**CHINESE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Chinese language, Chinese culture and heritage

To impart knowledge on Chinese lifestyle and heritage.

COURSE OUTCOMES (COs)	
CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.

CO4	Will understand Chinese lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L									
	CO2			H	L				H	H	M	L
	CO3			H	L				H	H	M	L
	CO4			H					H	H	M	L
	CO5			H	L				H	H	M	
	CO6			H					H	H	M	

3	Category	Humanities & Social Studies	Basic Sciences	Engineering Sciences (ES)	Professional Core (PC)	Core	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT 1 RISE OF DIALECTS **9**

History, Origins, Old and middle Chinese, Rise of northern dialects

UNIT II VARIETIES **9**

Influences 3 Varieties of Chinese. 1.Classification 2.Standard Chinese and 3.Nomenclature

UNIT III CHARACTERS **9**

Chinese characters, Homophones, Phonology

UNIT IV TRANSCRIPTIONS **9**

Tones, Phonetic transcriptions, Romanization, Other phonetic transcriptions

UNIT V GRAMMAR **9**

Grammar and morphology, Vocabulary, Loanwords, Modern borrowings and loanwords

REFERENCES:

1. Hannas, William C. (1997), Asia's Orthographic Dilemma, University of Hawaii Press, ISBNHYPERLINK "http://en.wikipedia.org/wiki/Special:BookSources/978-0-8248-1892-0" 978-0-8248- 1892-0.
2. Qiu, Xigui (2000), Chinese Writing, trans. Gilbert Louis Mattos and Jerry Norman, Society for the Study of Early China and Institute of East Asian Studies, University of California, Berkeley, ISBN HYPERLINK http://en.wikipedia.org/wiki/Special:BookSources/978-1-55729-071-7,978-1-55729-071-7.
3. Ramsey, S. Robert (1987), The Languages of China, Princeton University Press, ISBNHYPERLINK "http://en.wikipedia.org/wiki/Special:BookSources/978-0-691-01468-5" 978-

0-691-01468-5.
4. Schuessler, Axel (2007), ABC Etymological Dictionary of Old Chinese, Honolulu: University of Hawaii Press, ISBNHYPERLINK "http://en.wikipedia.org/wiki/Special:BookSources/978-0-8248-2975-9"978-0-8248-2975-9.
5. R. L. G. " Language borrowing Why so little Chinese in English?" The Economist. June 6, 201

BME 202	**ENGINEERING MECHANICS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	3
	Prerequisite – Engineering Mathematics I , II, Engineering. Physics				
	Course Designed by – Department of Mechanical Engineering				

OBJECTIVES: To understand the concept of basic engineering mechanism

COURSE OUTCOMES (COs)

CO1	Students will understand the concepts of engineering mechanics
CO2	Students will understand the vectorial representation of forces and moments
CO3	Students will gain knowledge regarding center of gravity and moment of inertia and apply them for practical problems.
CO4	Students will gain knowledge regarding various types of forces and reactions and tom draw free body diagram to quicker solutions for complicated problems.
CO5	Student will gain knowledge in solving problems involving work and energy
CO6	Student will gain knowledge on friction on equilibrium and its application.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	H	L	H		H		L		H	H
	CO2						H	H	L			
	CO3						H	H	L		M	
	CO4						H	H	L		M	
	CO5						H	H	L		M	
	CO6						H	H	L		M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathemati	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I BASICS AND STATICS OF PARTICLES 12

Introduction - Units and Dimensions - Laws of Mechanics – **Lame's theorem, Parallelogram and triangular Law** of forces – Vectors –Vectorial representation of forces and moments – Vector operations on forces - Coplanar Forces – Resolution and Composition of forces – Resultant of several concurrent forces - Equilibrium of a forces – Forces in space - Equilibrium of particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES 12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis –Vectorial representation of moments and couples– Scalar components of a moment – **Varignon's theorem** - Equilibrium of Rigid bodies in two dimensions -Equilibrium of Rigid bodies in three dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS 12

Determination of areas – First moment of area and the Centroid of standard sections – T section, I section, Composite figures, Hollow section – second moments of plane area – Rectangle, triangle, circle - T section, I section, Hollow section – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Basic concept of Mass moment of inertia.

UNIT IV FRICTION 12

Frictional force – Laws of Coloumb friction – Cone of friction – Angle of repose – Simple contact friction – Sliding of blocks – Wedge friction - Ladder friction – Screw Jack – Belt friction - Rolling resistance.

UNIT V DYNAMICS OF PARTICLES 12

Displacements, Velocity and acceleration, their relationship – Relative motion – Relative acceleration – Curvilinear motion of particles – **Newton's law** – work energy equation – impulse and Momentum – Impact of
elastic bodies.

TEXT BOOK:

1. Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers: Vol. 1 Statics and vol. 2 Dynamics**"**, McGraw-Hill International Edition, 2013.
2. Rajasekaran, S, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt., Ltd., 2011.

REFERENCES :

1. Kumar, K. L Kumar, V., Engineering Mechanics, Tata McGraw – Hill, New Delhi, 2010
2. Palanichamy, M.S., Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw - Hill, 2013.
3. Timoshenko, and Young, Engineering Mechanics, Tata McGraw-Hill, New Delhi, 2013.
4. Irving H. Shames, Engineering Mechanics – Statics and Dynamics, IV Edition – Pearson Education Asia Pvt., Ltd., 2006.

BEE 201	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	2	0	0	2
	Prerequisite – Engineering Mathematics, Engineering Physics-I & II				
	Course Designed by – Department of Electrical & Electronics Engineering				

OBJECTIVES: To understand the laws of electrical engineering.

COURSE OUTCOMES (COs)

CO1	Students will gain knowledge regarding the various laws and principles associated with electrical systems.
CO2	Students will gain knowledge regarding electrical machines and apply them for practical problems.
CO3	Students will gain knowledge regarding various types semiconductors.
CO4	Student will gain knowledge digital electronics.
CO5	Student will gain knowledge on electronic systems.
CO6	Students will acquire knowledge in using the concepts in the field of electrical Engineerin projects and research.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H	M			L		L	L		
	CO2		H	M			L		L	L		
	CO3		H	M			L		L			
	CO4	M	H	M			L		L	L		
	CO5	M	H	M			L		L			
	CO6		H				L		L	H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ELECTRIC CIRCUITS 6

Ohm's law – Kirchoff's Laws, V – I Relationship of Resistor (R) Inductor (L) and capacitor (C). Series parallel combination of R, L&C – Current and voltage source transformation – mesh current & node voltage method –superposition theorem –Thevenin's and Norton's Theorem -Problems.

UNIT II ELECTRICAL MACHINES 6

Construction, principle of operation, Basic Equations and applications - D.C.Generators and D.C.Motors**.** -Single phase Induction Motor - Single Phase Transformer.

UNIT III BASIC MEASUREMENT SYSTEMS 6

Introduction to Measurement Systems, Construction and Operating principles of PMMC, Moving Iron, Dynamometer Wattmeter, power measurement by three-watt meter and two watt method – and Energy meter.

UNIT IV SEMICONDUCTOR DEVICES 6

Basic Concepts of semiconductor devices – PN Junction Diode Characteristics and its Applications – HWR, FWR –Zener Diode – BJT (CB, CE, CC) configuration & Characteristics.

UNIT V DIGITAL ELECTRONICS 6

Number system – Logic Gates – Boolean Algebra– De-**Morgan's Theorem** – Half Adder & Full Adder – Flip Flops.

TEXT BOOKS:

1. N.Mittal "Basic Electrical Engineering". Tata McGraw Hill Edition, New Delhi, 1990.
2. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2004.
3. Jacob Millman and Christos C-Halkias, "Electronic Devices and Circuits", Tata McGraw Hill

REFERENCE BOOKS:

1. Edminister J.A. "Theory and Problems of Electric Circuits" Schaum's Outline Series. McGrawHill Book Compay, 2nd Edition, 1983.
2. Hyatt W.H and Kemmerlay J.E. "Engineering Circuit Analysis", McGraw Hill Internatinal Editions, 1993.
3. D. P. Kothari and I. J. Nagrath" Electric Machines"Tata McGraw-Hill Education, 2004
4. Millman and Halkias, "Integrated Electronics", Tata McGraw Hill Edition, 2004.

BCS 2L2	**COMPUTER PRACTICE LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	0	0	3	1
	Prerequisite – Fundamentals of Computer				
	Course Designed by – Department of Computer Science &Engineering				
OBJECTIVES: To impart basic computer knowledge					
COURSE OUTCOMES (COs)					
CO1	Demonstrate major algorithms and data				
CO2	Implementation of array operations				
CO3	Implementation of binary tree.				

CO4	Implementation of linked list
CO5	Students will able to do analyse data using spread sheet
CO6	Student will able to understand the basics of C programming.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	H	L	H		H		L		H	H
	CO2						H	H	L			
	CO3						H	H	L		M	
	CO4						H	H	L		M	
	CO5						H	H	L		M	
	CO6						H	H	L		M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

A) WORD PROCESSING **6**

Document creation, Text manipulation with Scientific Notations. Table creation, Table formatting and Conversion. Mail merge and Letter Preparation. Drawing-Flow Chart

B) SPREAD SHEET **9**

Chart-Line Xy Bar and Pie – Formula-Formula Editor-Spread sheet-Inclusion of Object, Picture and Graphics Protecting the document and sheet-Sorting and Import/Export features.

C) SIMPLE C PROGRAMMING* **15**

Data types, Expression Evaluation, Condition Statement. Arrays structures and Unions – Functions

D) SIMPLE C++PROGRAMMING **15**

-Classes and Objects
-Constructor and Destructor

***For Programming exercises Flow chart and Pseudo code are essential.**

BEE2L1	**BASIC ELECTRICAL AND ELECTRONIC ENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	3	1
	Prerequisite – Basic Electrical and Electronics Engineering				
	Course Designed by – Department of Electrical & Electronics Engineering				

OBJECTIVES: To enhance the student with knowledge on electrical and electronic equipments.

COURSE OUTCOMES (COs)

CO1	Students will able to handle basic electrical equipments.
CO2	Students will able to do staircase wiring.
CO3	Students will able to understand domestic wiring procedures practically.
CO4	Student will able to assemble electronic systems.
CO5	Students will understand all the fundamental concepts involving electrical engineering
CO6	Students will understand all the fundamental concepts involving electronics engineering

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H	M			L		L	L	M	H
	CO2		H	M			L		L	L		H
	CO3		H	M			L		L			H
	CO4	M	H	M			L		L	L	M	H
	CO5	M	H	M			L		L		M	H
	CO6		H				L		L	H		H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematic	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					

4	Approval		37th Meeting of Academic Council, May 2015

I LIST OF EXPERIMENTS FOR ELECTRICAL ENGINEERING LAB

1. Fluorescent lamp wiring
2. Stair case wiring
3. Measurement of electrical quantities-voltage current, power & power factor in RLC circuit
4. Residential house wiring using fuse, switch, indicator, lamp and energy meter
5. Measurement of energy using single phase energy meter
6. Measurement of resistance to earth of electrical equipment

II LIST OF EXPERIMENTS FOR ELECTRONICS ENGINEERING LAB

1. Study of electronic components and equipments.
   a. Resistor colour coding using digital multi-meter.
   b. Assembling electronic components on bread board.
2. Measurement of ac signal parameters using cathode ray oscilloscope and function generator.
3. Soldering and desoldering practice.
4. Verification of logic gates (OR, AND, OR, NOT, NAND, EX-OR).
5. Implementation of half adder circuit using logic gates.

BPC 2L1	**PHYSICS AND CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	3	1
	Prerequisite – Physics and Chemistry				
	Course Designed by – Department of Physics & Chemistry				

OBJECTIVES: To impart knowledge to the students in practical physics and chemistry

COURSE OUTCOMES (COs)

CO1	Students will understand the concept of hall effect
CO2	Students will understand the concept of semiconductors. .
CO3	Student will understand the working of spectrometer.
CO4	Student will able practically understand the chemical reactions.
CO5	Students will Study the magnetic hysteresis and energy product
CO6	Students understand the Determination of Band gap of a semiconductor

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H	M			L		L	L	M	H
	CO2		H	M			L		L	L		H
	CO3		H	M			L		L			H
	CO4	M	H	M			L		L	L	M	H
	CO6		H				L		L	H		H

3	Category	Humanities & Social Studies	Basic Sciences	Engineering Sciences (ES)	Professional Core (PC)	Core Elective	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

I -LIST OF EXPERIMENTS – PHYSICS

1. Determination of Wavelength, and particle size using Laser
2. Determination of acceptance angle in an optical fiber.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of thermal conductivity of a bad conductor – Lee‟s Disc method.
6. Determination of Young‟s modulus by Non uniform bending method
7. Determination of specific resistance of a given coil of wire – Carey Foster‟s Bridge
8. Determination of Young‟s modulus by uniform bending method
9. Determination of band gap of a semiconductor
10. Determination of Coefficient of viscosity of a liquid –Poiseuille‟s method
11. Determination of Dispersive power of a prism - Spectrometer
12. Determination of thickness of a thin wire – Air wedge method
13. Determination of Rigidity modulus – Torsion pendulum

II-LIST OF EXPERIMENTS – CHEMISTRY

1. Estimation of hardness of Water by EDTA
2. Estimation of Copper in brass by EDTA
3. Determination of DO in water (Winkler's method)
4. Estimation of Chloride in Water sample (Argentometry)
5. Estimation of alkalinity of Water sample
6. Determination of molecular weight
7. Conduct metric titration (Simple acid base)
8. Conduct metric titration (Mixture of weak and strong acids)
9. Conduct metric titration using $BaCl_2$vs Na_2SO_4
10. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
11. pH titration (acid & base)
12. Determination of water of crystallization of a crystalline salt (Copper Sulphate)
13. Estimation of Ferric iron by spectrophotometer.

BMA301	MATHEMATICS – III	L	T	P	C
	Total Contact Hours - 75	4	0	0	4
	Prerequisite – Mathematics II				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To introduce Fourier series analysis this is central to many applications in engineering apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
4. To develop Z transform techniques for discrete time systems.

COURSE OUTCOMES (COs)

CO1	To learn the problem solving methods in linear differential equations
CO2	To learn Dirichlet's condition and operations using Fourier series
CO3	To have a clear understanding about 2nd order equations and wave equations
CO4	Properties of Laplace transform and problem solving using it
CO5	Properties of Fourier transform and problem solving using it

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M										
	CO2		M	H		H						
	CO3		M		H							
	CO4	H			M							
	CO5	H			M	H						

3	Category	Humanities & Social	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT 1 PARTIAL DIFFERENTIAL EQUATIONS 9+6

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

UNIT II FOURIER SERIES 9+6

Dirichlet's conditions – General Fourier series- Half range sine and cosine series – Parse Val's identity – Harmonic analysis

UNIT III BOUNDARY VALUE PROBLEMS 9+6

Classification of second order linear partial differential equations – solution of one – dimensional wave equations, one dimensional heat equations.

UNIT IV LAPLACE TRANSFORMS 9+6

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 equation up to second order with constant coefficients and simultaneous equations of first order with constant coefficients.

UNIT V FOURIER TRANSFORMS 9+6

Statement of Fourier integral theorem – Fourier transform pairs – Fourier sine and cosine transforms – properties – transforms of simple functions – convolution theorem – Parse Val's identity

TEXT BOOKS:

1. Kandasamy, P., Thilakavathy, K. and Gunavathy.K. "Engineering Mathematics ", Vol II& III (4^{th} revised edition) S Chand and co. , New Delhi, 2001.
2. Narayanan.S , Manicavachangam pillay ,.T.K., Ramanaiah, G. " Advanced Mathematicsfor Engineering Students ", Vol II & III (2^{nd} Edition), S.Viswanathan (Printers and Publishers Pvt Ltd) 1992.
3. Venkatraman, M.K. " Engineering Mathematics" Vol III – A&B , 13^{th}Edition National Publishing Company , Chennai 2002

BCE301	APPLIED MECHANICS	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Engineering Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.
2. To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
3. To understand the effect of torsion on shafts and springs.
4. To analyze a complex two dimensional state of stress and plane trusses

COURSE OUTCOMES (COs)

CO1	Toapply the fundamental concepts of stress and strain in the design of various structural components and machines

CO2	Toanalyze and design shafts to transmit required power
CO3	To analyze about the force in member Truss with different methods
CO4	To determine the bending, shear stresses and deflection produced in a beam subjected to system of loads
CO5	To determine stresses due to impact and suddenly applied loads

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		M	M					L		
	CO2	H	M	M	M	H				L		
	CO3	H	M	M	M					L		
	CO4	H		M	M					L		
	CO5	H		M	M	H				L		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I SIMPLE STRESSES AND STRAINS 12

Tension, compression and shear stress - Hook's law - simple problems -compound bars - Relationship between elastic constants - Thermal stresses.

UNIT II PRINCIPAL STRESSES& TORSION 12

Combined stresses – Principles stress and principal planes – Mohr's circle - stresses in thin cylinders and shells. Theory of torsion – Strain energy in torsion – Torsion of circular shafts – shear stresses due to torsion of Closed and Open coiled helical springs.

UNIT III ANALYSIS OF PLANE TRUSSES 12

Stability and Equilibrium of plane frames, Perfect Frames, Types of trusses – Analysis of forces in truss members - Method of joints – Methods of sections – Tension coefficient method – Graphical method.

UNIT IV BEAMS & BENDING 12

Beams and support conditions - Types of supports - Shear force and bending moment – Dynamics for simply supported beams, cantilevers and overhanging beams with concentrated and / distributed loads. Theory of simple bending – bending stress distribution – shear stress distribution - leaf springs.

UNIT V STRAIN ENERGY **12**

Strain energy due to axial force, bending moment, flexural and torsional shear – Resilience stresses due to impact and suddenly applied loads.

TEXT BOOKS:

1. Ramamurtham S & Narayanan R, Strength of Materials , Dhanpat Rai Publication 2008
2. Bansal R.K, Engineering Mechanics and Strength of Materials, Laxmi Publications (P) Ltd. New Delhi 2010

REFERENCE:

1. Egor P, Popov, Introduction of Mechanics of Solids,1998.
2. Ryder G.H. Strength of Materials, Macmillan India,2002.
3. Khurmi R.S, A Text Book of Engineering Mechanics S.Chand& Co, 2012.
4. Srinath L S, Advanced Mechanics of Solids, Tata McGraw Hill Co, 2009.
5. Jain O.P. &.Jain B.K, Theory and Analysis of Structures Vol I & II 2012,2011

BCE302	**SURVEYING – I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite – Basic Civil and Mechanical Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To introduce the principles of various surveying methods and applications to Civil Engineering projects.

COURSE OUTCOMES (COs)

CO1	Carry out preliminary surveying in the field of civil engineering applications
CO2	Plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse using various conventional instruments
CO3	Plan a survey for applications such as road alignment and height of building.
CO4	Take horizontal and vertical angles precisely by an optical distance measurement using Theodolite.
CO5	Set out curves, buildings, culverts and tunnels

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	M		M	H						
	CO2		H			M						
	CO3	H				H						
	CO4	H			M							

	CO5						M																
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)		Core Elective (CE)		Non-Major Elective (NE)		Open Elective (OE)		Project/Term Paper/ Seminar/ Internship (PR)							
							√																
4	Approval	37th Meeting of Academic Council, May 2015																					

UNIT I INTRODUCTION AND CHAIN SURVEYING 9

Definition – Principles – classification-field & office work-scales-conventional signs – survey instruments – care & adjustment – ranging & chaining – Reciprocal Ranging – setting perpendiculars – well- conditioned triangles – traversing – plotting – enlarging & reducing figures.

UNIT II COMPASS & PLANE TABLE SURVEYING 9

Prismatic compass – Surveyors compass - bearing systems & conversions- local attraction-magnetic declination – Dip – Traversing – Plotting – adjustment – Plane table Surveying - Methods of Radiation – intersection, Resection – traversing – Adjustments- Errors in plane tabling.

UNIT III LEVELING APPLICATION 9

Level line-Horizontal line-levels & Staves – sprit level – sensitiveness-bench marks – temporary and permanent adjustments– fly & check leveling – Booking – reduction – Curvature and refraction reciprocal leveling – longitudinal and cross sectioning – plotting – calculation of areas and volumes – contouring – methods – characteristics – and uses of contours – plotting-earth work volume – capacity of reservoirs.

UNIT IV THEODOLITE SURVEYS 9

Thedolite-vernier and microptic-description and uses – temporary and permanent adjustments of vernier transit – Horizontal angles – vertical angles – closing error and distribution – Gale's. table- Omitted measurement

UNIT V ENGINEERING SURVEYS 9

Reconnaissance-preliminary and location surveys for Engineering Projects – Layout – Setting out work- Route surveys for highways, railways and water ways – curve ranging – Horizontal and vertical curves – Simple Curves – setting with chain and tapes, tangential angles by theodolite, double theodolite-compound and reverse curves - Transition curves-functions and requirements-sight distances- mine surveying- instruments – tunnels correlation of underground and surface surveys .

TEXT BOOKS:

1. Punmia B.C."Surveying" Vols I and II & III Laxmi Publications, 1999.

REFERENCE:

1. Kanekar T.P."Surveying and Levelling" VOls. I and II, united book corporation, Pune, 1994.

2. Chandra A.M, "Plane Surveying and Higher Surveying", New Age International (P)
3. Limited, Publishers, Chennai, 2002.
4. Heribert Kahmen and wolfgang Faig "surveying" Walter de Gruyter, 1995
5. Bannister A and Raymonds. "Surveying" ELBS. Sixth Edition, 1992.

BCE303	BUILDING CONSTRUCTION TECHNOLOGY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Basic Civil and Mechanical Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To introduce students to various materials and methods commonly used in civil engineering construction and their properties.
2. To give a detailed explanation of the tests performed on the fresh concrete and the harden concrete.
3. To give a vision of the basics to be followed in the construction site .

COURSE OUTCOMES (COs)

CO1	Have a fundamental knowledge on the planning, different codes of practice, details and sequence of building construction
CO2	Have knowledge on temporary structures such as scaffolding, underpinning and formwork structures in construction
CO3	To know the types of the paint, Plastering, GFRP and geotextile
CO4	To know about all the amenities to be provided in a building
CO5	Will acquire knowledge on handling of different types of construction equipments

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1		M		H	M	M		M	M	M	
	CO2	H		M	H	M	M			M		
	CO3	H		H	M	M			M	H	M	
	CO4	L	M			L						
	CO5	M		H	L	M			L	L	L	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I PLANNING & PREFABRICATION 9

Principles of Planning - regulations and byelaws, different codes of practice – Indian, American, & British codes of practice – Preparation of layouts – Orientation and marking of Buildings- details and sequence of construction – co-ordination – site clearance - Earthwork excavations – timbering – Dewatering Principles of prefabrication – Types – materials for prefabrication.

UNIT II TEMPORARY STRUCTURE & SHELL STRUCTURES 9

Temporary shed - centering and shuttering – sheet piles, scaffoldings, shuttering forms – special forms for shells – slip form, moving form- shoring, and under pinning.

UNIT III PRESERVATIVES & SPECIAL MATERIALS 9

Plastering - types – Paints – varnishes – distempers – wall cladding. Polymers (PVC Sheets, Pipes GFRP) ceramics & Clay Products - Refractory – Special Concrete - FRC, ferrocement& polymeric concrete – geotextiles.

UNIT IV BUILDING SERVICES 9

Electric Wiring – Water Supply – Drainage- Air Conditioning – Ventilation – ramps, Escalators, Lifts, Stairs. Water Proofing - Thermal Insulation - Termite proofing - Acoustic Treatment (Sound Conditioning) - Fire Protection - Intelligent Buildings

UNIT V CONSTRUCTION EQUIPMENTS 9

Selection of equipment for earth work, concreting, paving, pile erection- Material handling, hauling and erection of structures – Dewatering and pumping equipments.

TEXT BOOKS:

1. Arora S.P.and Bindra S.P. "Building Construction, Planning Techniques and Materials of Construction". DhanapatRai and Sons.
2. Sheety, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005.

REFERENCE:

1. Chudley R "Construction Technology", (Vol.I,II,III,&IV) ELBS / Longman (2nd Edition).
2. Jha J and Sinha S.K. "Construction and Foundation Engineering" Khanna Publishers, 1993.
3. Peurifoy R.L.,"Formwork for concrete structures", McGrew Hill Co., 1999

BCE304	FLUID MECHANICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Engineering Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.
2. To introduce the basics of hydrostatic forces involved in fluid mechanics and also to

acquaint the students to learn about the theorems on Pascal's law and buoyancy

3. To understand the various types of fluid flow and to practice the problems based on Bernoullis equations and its applications
4. To provide basic ideas on the boundary layer theorem and its classification along with problems underlying the subjects.
5. To develops similitude and model studies for the basics of fluid mechanics with buckinghum pi theorem as the basic concept.

COURSE OUTCOMES (COs)

CO1	To learn about the basics of fluid mechanics and various properties of fluids
CO2	To learn about the various forces on plane and curved surfaces and the concepts of buoyancy
CO3	To have a clear understanding about fluid kinematics and dynamics
CO4	To study the basics of boundary layer flow and flow through pipes
CO5	To study about various models like distorted models and various dimensionless numbers

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			M						L	
	CO2						H		L			M
	CO3				H					M		
	CO4						M			H	L	
	CO5					M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internshi
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I DEFINITIONS &FLUID PROPERTIES 9

Definitions – Fluid and Fluid Mechanics – Dimensions and units – Fluid properties continuum Concept of system and control volume.

UNIT II FLUID STATICS 9

Pascal's law and hydrostatic equation – Forces on plane and curved surfaces – Buoyancy-Pressure measurement.

UNIT III FLUID DYNAMICS & KINEMATICS 9

Fluid Kinematics - Stream, steak and path lines, Classification of flows-continuity equation, Stream and Potential functions, Flow nets, Velocity measurement. Euler and Bernoulli's

equations- Application of Bernoulli's equation-Discharge measurement-laminar flows through pipes and between plates – Hagen Poisuille equation – Turbulent flow, Dancy Weisbach formula - moody Diagram – Momentum Principle- Impact of jets on plane and curved plates.

UNIT IV BOUNDARY LAYER AND FLOW THROUGH PIPES 9

Definition of boundary layer – Thickness and classification - Displacement and momentum thickness. Development of laminar and Turbulent flows in circular pipes, Major and Minor losses of Flow in Pipes in series and in parallel pipe network.

UNIT V SIMILITUDE AND MODEL STUDY 9

Dimensional analysis – Rayleigh's method – Buckingham PI-Theorem- Similitude and Models – Scale effect and distorted models.

TEXT BOOKS:

1. Kumar K.L "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi.

REFERENCES :

1. Streeter, Victor, L, and Benjamin., "Fluid Mechanics", McGraw-Hill Ltd., 1998
2. Natarajan M.K. "Principles of Fluid Mechanics", Agencies, Vidayal Karuppur, Kumbakonam, 1995.
3. Fox Robert W. and McDonald. Man T., Introduction Fluid Mechanics", John Wiley & Sons,1995.

BCE305	**ENGINEERING EARTH SCIENCE**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite – +2 level science				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To understand the importance of geological knowledge such as earth, earthquake and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundations.
2. An ability to function on multi-disciplinary teams.
3. Graduates will be capable of utilizing their backgrounds in engineering and earth science to provide solutions to engineering problems within the context of the natural world.
4. Areas of geological engineering practice might include fluid flow and contaminant transport in the subsurface; geo-mechanics (i.e., the behavior of earth materials), geo-engineering (i.e., design with earth materials); and discovery, development, and utilization of energy resources.

COURSE OUTCOMES (COs)

CO1	To understand the role of geology in the design and construction process of underground openings in rock
CO2	Be able to apply geologic concepts and approaches on rock engineering projects.
CO3	Be able to identify and classify rock using basic geologic classification systems.
CO4	Be able to use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.

CO5	To assign projects which test student knowledge and application of intact rock and rock mass properties in geotechnical engineering

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			H		H	H		M		
	CO2	H			H		H	H		M		
	CO3	H			H		H	H		M		
	CO4	H			H		H	H		M		
	CO5	H			H		H	H		M		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
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UNIT I GENERAL GEOLOGY 9

Geology in Civil Engineering - Branches of geology - Earth Structure and Composition - Elementary knowledge on continental drift and plate tectonics. Earth processes - Weathering - Work of rivers, wind and sea and their engineering importance – origin, occurrence of earthquake- Mode of occurrence - prospecting –Ground water - Importance in civil engineering.

UNIT II MINERALOGY 9

Elementary knowledge on symmetry elements of crystallographic systems - physical properties of minerals - study of the following rock forming minerals - Quartz family. Feldspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet - properties, process of formation of all minerals - Coal and Petroleum - Their origin and occurence in India.

UNIT III PETROLOGY 9

Classification of rocks - Distinction between Igneous, Sedimentary and Metamorphic rocks. Description – occurrence, properties and distribution of following rocks. Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt. Sedimentary rocks - sandstone, Limestone, Shale, Conglomerate and breccia. Metamorphic rocks - Quartzite, Marble, Slate, Gniess and Schist.

UNIT IV STRUCTURAL GEOLOGY AND ROCK MECHANICS 9

Attitude of beds - Outcrops - Geological maps - study of structures - Folds, Faults and Joints - Their bearing on Engineering Construction -Rock mechanics - physical properties and mechanical properties of rocks – porosity – permeability - density – strength – hardness – elasticity – plasticity - dynamic property of rocks - types of wave theory – factors influencing wave velocity - static and dynamics moduli of elasticity – grouting.

UNIT V GEOLOGICAL AND GEOPHYSICAL INVESTIGATION IN CIVIL ENGINEERING 9

Site investigations - Geological methods - Exploration techniques - geophysical methods – Seismic and electrical methods – direct penetration – core boring – logging of cores – geological condition necessary for construction of dams – tunnels – building – Road cutting.

TEXT BOOKS:

1. Parbin Singh, “Engineering and General Geology ", Katson Publication House.
2. P. C. Varghese, “Engineering Geology for Civil Engineers”. PHI Learning Pvt. Ltd.,

REFERENCES:

1. Legeet, " Geology and Engineering ", McGraw Hill Book Company, 1998.
2. Blyth, " Geology for Engineers ", ELBS, 1995.

BCE3L1	SURVEYING PRACTICAL – 1	L	T	P	C
	Total Contact Hours - 45	**0**	**0**	**3**	**2**
	Prerequisite – Survey I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES: To understand and posses the knowledge about field techniques in Surveying

COURSE OUTCOMES (COs)

CO1	To know how to do chain surveying, ranging and its importance
CO2	Study about types of compass, local attractions and its errors
CO3	To study plane table surveying and its various methods of finding inaccessible points
CO4	To study about leveling and its types, LS and CS sections of alignment

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H	M								
	CO2	M	H	M								
	CO3	M	H	M								
	CO4	M	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS

1. a) Simple chain survey - problems involving instruments such as optical and prism Square - cross staff.
   b) Overcoming obstacles in chaining and ranging.
2. a) Measurement of bearing of survey lines by prismatic compass.
   b) Running closed and open compass traverse.
   c) Plotting and Adjustments of traverse.
3. a) Plane table survey of building or a park or a road by different methods.
   b) Field solution of two and three point problems.
4. Problems in leveling.

BCE3L1	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
	Total Contact Hours - 45	**0**	**0**	**3**	**2**
	Prerequisite – Engineering Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.

COURSE OUTCOMES (COs)

CO1	To study the failure due to tensile force subjected to a material
CO2	To study the failure due to shear force subjected to a material
CO3	To study hardness properties of materials and its types
CO4	To study impact intensity of materials and its properties
CO5	To study ductility properties of materials
CO6	To study fatigue properties of materials
CO7	To study the deflections in springs
CO8	To study the behavior of different types of columns

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H			M						
	CO2	M	H			M						
	CO3	M	H			M						
	CO4	M	H			M						
	CO5	M	H			M						
	CO6	M	H			M						
	CO7	M	H			M						
	CO8	M	H			M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
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LIST OF EXPERIMENTS

I.**TESTS ON STEEL**

1. Tension Test to find yield stress, ultimate stress, nominal and actual breaking stress and % age elongation and reduction in area of cross section, work done in breaking the specimen and calculation of Young's modulus using different extensometers (test on mild steel, High tensile steel Rods & flats).
2. Shear test: Double Shear
3. Hardness test Vicket, Brunell, and Rockwell.
4. Impact Test using Charpy and Izod Testing machines
5. Cold Bend Test
6. Ductility Test: sheet Ductility, Reverse bending on works.
7. Fatigue Test.

II **TESTS ON TIMBER**:

Compression test both parallel and perpendicular to the grains, deflection

III **OTHER TESTS:**

1. Springs: Leaf spring and helical spring
2. Columns: Long and short columns
3. Beams: Steel and timber beams with different cross sections of different and conditions (simply supported, cantilever, propped, continuous) Test under elastic and Ultimate stages.

REFERENCES:

1. Davis H.E. Trophell.G.E & Hanck, G.F.W. , The Testing Of Engineering Materials – McGrew Hill, International Book Co.
2. Timoshenko S.P, &Young, D.H. Strength of Materials – East West Press Ltd.
3. Relevant 813 code. Venon john, Engineering Materials, 3rt Edition, McMillan Co.Ltd.,

BMA402	**NUMERICAL METHODS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 75	**3**	**2**	**0**	**4**
	Prerequisite – Mathematics I, II & III				
	Course Designed by – Dept of English				

OBJECTIVES

This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

COURSE OUTCOMES (COs)

CO1	Have a fundamental knowledge of the basic solutions of equations and eigen value problems
CO2	Have a well-founded knowledge of standard numerical differentiation and integration which can describe real life phenomena.

CO3	Acquire skills in handling situations involving first and second order differential equations
CO4	Understand boundary value problems on ordinary and partial differential equations
CO5	Be able to analyze the interpolation techniques.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			M	H		H			M	
	CO2											
	CO3	M			H						M	
	CO4	H				H		H				
	CO5	H			H						H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNITI SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS 9+6

Iterative method Newton - Raphson method for single variable. Solutions of Linear system by Gaussian Gauss – Jordan, Jacobi and Gauss – Seidel methods, Inverse of a matrix by Gauss – Jordan method. Eigen value of a matrix by power and Jacobi methods.

UNITII INTERPOLATION (FINITE DIFFERENCES) 9+6

Newton's Divided Difference Formula – Lagrange's Interpolation Newton forward and backward difference formulae – Stirling's Bessel's central difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+6

Numerical Differentiation with interpolation polynomials, Numerical integration by Trapezoidal Simpson's (Both 1/3" and 3/8") rules. Double Integrals using Trapezodial and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+6

Single step methods – Taylors series, Euler's and Modified Euler, Runge – Kutta method of first and second order differential equations. Multiple step methods – Milne and Adam's – Bashforth predict and Corrected Method.

UNIT V BOUNDARY VALUE PROBLEMS FOR ODE AND PDE 9+6

Finite difference for the second order ordinary differential equations. Finite difference solutions for one dimensional heat Equations. Finite difference solutions for one dimensional heat Equations(both implicit and Explicit) one dimensional wave equation and two dimensional Laplace and Poisson Equation.

REFERENCES:

1. Srinivasan, "Numerical Methods for Engineering" CBS Publishers.Chennai.1994.
2. Datta, "Numerical Methods for Linear Control Systems" CBS Publishers. Chennai 2005.
3. Yang, "Applied Numerical Methods Using MATLAB" CBS Publishers. Chennai 2005.

BCE401	THEORY OF STRUCTURES	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite -Basic Structural Design				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analysing indeterminate beam.
2. To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

COURSE OUTCOMES (COs)

CO1	To find the deflection in beams and frames using Energy theorems.
CO2	To analyze indeterminate beams like continuous beams and fixed beams
CO3	To analyze the long and short columns and determine the design loads
CO4	To assess the state of stress in three dimensions
CO5	To solve problems involving unsymmetrical bending structural members

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		H	M							
	CO2	M		H	M							
	CO3	M		H	M							
	CO4	H		H	M							
	CO5	H		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ENERGY THEOREM 12

Conservative and non-conservative systems – Strain energy and complimentary energy – Principle of virtual displacement and virtual forces, castigliano's first theorem, Engesser's theorem, castigliano's second theorem, Maxwell's theorem

UNIT II IDEFLECTION OF BEAM 12

Determination of deflection and slope – Double integration method – Macaulay's method-Area moment method-conjugate beam method, strain energy and dummy unit load approaches.

UNIT III STATICALLY INDETERMINATE BEAMS 12

Axially load members - composite bars – Beams: Propped, fixed and continuous beams - Theorem of three moments-calculations of reactions, Bending Moment and Shear forces - shear force and bending moment diagrams.

UNIT IV THEORY OF COLUMNS 12

Axial load - combined bending and axial – Euler's formula for long struts-practical applications – Rankine's Gordon's formula – beam columns.

UNIT V THICK CYLINDERS 12

Lame's equation - shrink fit- compound cylinders – wire wound cylinders.

DEFLECTION OF TRUSSES

Castigliano's Theorem, dummy unit load method, Williotmohr's diagram.

TEXT BOOKS:

1. Gupta S.P, Pandit G.S, Gupta R. , Theory of Structures, Vol.I&II .Tata McGraw HillCo,1981

REFERENCES:

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. Beer and Johnson. Mechanics of Materials, S.I Metric Edition, McGraw Hill Co, 2002
3. Punmia B.C.Theory of Structures (SMTS) Vol 1&II, Laxmi publishing Pvt Ltd, NewDelhi, 2004.
4. Jain O.P. and.Jain B.K., Theory and analysis of structures, Mechanics of Materials Nem Chand & Brothers, Roorkee, 2001

BCE402	SURVEYING – II	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Surveying I				
	Course Designed by – Dept of Civil Engineering				
OBJECTIVES					

This subject deals with geodetic measurements and Control Survey methodology and its adjustments. The student is also exposed to the Modern Surveying	
COURSE OUTCOMES (COs)	
CO1	Have the fundamental knowledge to measure both horizontal distance and elevations without the use of sophisticated instruments
CO2	Acquires knowledge aboutthe principle of control surveying
CO3	Have knowledge on the survey errors and its adjustments
CO4	Have knowledge in the advanced topics in astronomy.
CO5	Have knowledge to modern methods of surveying like Photogrammetry, Total station, Hydrographic survey and cartography

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			M							
	CO2	H				M						
	CO3	H			M							
	CO4	H	M	M	M							M
	CO5	H			M							H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I TACHEOMETRIC SURVEYING 6

Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anellactic lens – Subtense bar.

UNIT II CONTROL SURVEYING 8

Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trigonometric leveling – Single and reciprocal observations - Modern trends

UNIT III SURVEY ADJUSTMENTS 8

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of Equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks

UNIT IV ASTRONOMICAL SURVEYING 11

Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - Nautical almanac - Star constellations -Practical astronomy - Field observations and calculations for azimuth

UNIT V MISCELLANEOUS 12

Photogrammetry - Introduction - Terrestial and aerial Photographs - Stereoscopy -Parallax – Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying – Tides - MSL - Location of soundings and methods - Three point problem - Study of Box - Sextants and station pointer - River surveys - Measurement of current and discharge - Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Legal values -Scales and accuracies.

TEXT BOOKS:

1. Punmia B.C., " Surveying ", Vols. I, II and III, Laxmi Publications, 2005

REFERENCES:

1. Clark D., " Plane and Geodetic Surveying " , Vols. I and II, C.B.S. Publishers and Distributors, Delhi, sixth Edition, 1971.
2. James M. Anderson and Edward M. Mikhail, " Introduction to Surveying ", McGraw Hill Book Company, 1985.
3. Wolf P.R. " Elements of Photogrammetry", McGraw Hill Book Company, Second Edition, 1986.
4. Robinson A.H., Sale R.D. Morrison J.L.andMuehrche P.C., " Elements of Cartography ", John Wiley and Sons, New York, Fifth Edition, 1984.
5. HeribertKahmen and Wolfgang Faig, " Surverying " , Walter de Gruyter, 1995.
6. Kanetkar T.P., " Surveying and Levelling " , Vols. I and II, United Book Corporation, Pune, 1994.

BCE403	SOIL MECHANICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Engineering Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To impart knowledge on behavior and the performance of saturated soil.
2. To understand and access both physical and engineering behavior of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes

COURSE OUTCOMES (COs)

CO1	To carry out soil classification
CO2	To solve three phase system problems
CO3	To solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram.
CO4	To estimate the stresses under any system of foundation loads
CO5	To solve practical problems related to consolidation settlement and time rate of settlement.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1		M		H							
	CO2	H			H	M						
	CO3				H							
	CO4	M			M							
	CO5		M		H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 10

Nature of soil - Soil description and classification for engineering purposes - IS Classification system – Phase relationships - Soil compaction - Theory, comparison of laboratory and field compaction methods – Ground improvements by compaction.

UNIT II SOIL WATER AND WATER FLOW 8

Soil water - static pressure in water - Permeability measurement in the laboratory and field - Seepage - Introduction to flow nets - Simple problems.

UNIT III STRESS DISTRIBUTION AND SETTLEMENT 9

Effective stress concepts in solids - Stress distribution in soil media - Use of influence charts - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory.

UNIT IV SHEAR STRENGTH 9

Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - saturated soil mass - Measurement of shear strength - direct shear - triaxial compression, UCC and Vane shear tests - Pore pressure parameters.

UNIT V SLOPE STABILITY 9

Slope failure mechanisms - Types - Infinite slopes - Finite slopes - Total stress analysis for saturated clay - Method of slices - friction circle method - Use of stability number - Slope protection measures.

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations ", Laxmi Publications Pvt. Ltd., New Delhi 2005

REFERENCES:

1. Holtz R.D. and Kovacs W.D., "Introduction to Geotechnical Engineering ", Prentice-Hall, 1995.
2. McCarthy P.D.F., "Essentials of Soil Mechanics and Foundations ", Prentice-Hall, 1973.
3. Sutten B.H.C., "Solving Problems in Soil Mechanics", Longman Group Scientific and Technical, U.K.England, 1994.
4. Khan I.H., "A text book of Geotechnical Engineering ", Prentice Hall of India, New Delhi, 1999.
5. Arora K.R., "Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, New Delhi, 1997.

BCE404	BASIC STRUCTURAL DESIGN	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Basic Mechanical Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.
2. Design of structural systems such as roof trusses, purlins as per provisions of current code (IS 800 - 2007) of practice

COURSE OUTCOMES (COs)

CO1	To study about different materials used in masonry
CO2	To analyse the steel structures.
CO3	To design of trusses and their members.
CO4	To carry out the analysis of simple beams
CO5	To study about different loading conditions on trusses

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	L		H	M							
	CO2	L		H	M							
	CO3	L		H	M							
	CO4	L		H	M							
	CO5	L		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I MASONRY 12

Strength of bricks and masonry – Design of walls – Pillars and roofing as per the latest BIS codes. Timber Structures – Properties and strength of timber used in constructions – permissible stresses in timber – design of joints, using bolts, and metal connections – design of tension and compression members – beams in bending.

UNIT II STEEL STRUCTURES 12

Introduction – properties of Indian standard rolled steel sections – types of loads, permissible stresses in tension, compression and shear as per BIS Code - Riveted and Bolted connections – Permissible stresses for various types of rivets and bolts -Efficiency of a joint - types of failures of riveted Joint - design of riveted and bolted connections for members subjected to axial forces - design of eccentrically loaded connections.

UNIT III TENSION MEMBERS 12

Design of simple and compound steel sections subjected to tension- tension splice-Compression Members - Maximum slenderness ratio for different types of compression members – Design of simple and compound sections to resist compressive loads – design of battens and lacings – design of column base and connections – column splicings.

UNIT IV BEAMS 12

Design of simple beams- strength and stiffness criteria – design of built up beams – curtailment of flange plates – connections between flange and web- need for lateral support for compression flange and their design – web strength of beams in shear – design of grillage foundation

UNIT V ROOF TRUSSES 12

Types of roof trusses for different spans - design of pitched roof trusses for dead, live and wind loads - Design of joints, Design of supports and bearings – design of purlins.

TEXT BOOKS:

1. Ramachandra S. Design of steel Structures, Vol I & II, Standard Publications, New Delhi 1982

REFERENCES:

1. Arya.A.S. & Ajmani. IL "Design of Steel Structures". Nem Chand Bros., Roorkee (UP), 1992
2. Dayaratnam.P, "Design of Steel Structures", Wheelers Publishing Co.Ltd, 2008
3. Duggal, Design of Steel Structures, Tata McGrew Hill Co.II Edition,1991
4. Vazirani V.N. and Ratwani M.M. : Steel Structures , Khanna Publications, New Delhi,1976

Note: The relevant BIS Codes for the design of masonry (I.S.1905) Timber (LS883) and Steel Structures (IS 800) are permitted in the University Examinations. Steel Tables are also permitted in the University Examinations

BCE405	**TRANSPORTATION ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite – Building Construction				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To give an overview about the highway engineering with respect to, planning, design, construction and maintenance of highways as per IRC standards, specifications and methods.

COURSE OUTCOMES (COs)

CO1	To prepare the plan for highways as per IRC standards
CO2	To perform geometric design of urban and rural roads
CO3	To design flexible and rigid pavements using IRC methods
CO4	To suggests modern materials and methods of highway construction.
CO5	To evaluate, carry out maintenance and strengthening of existing pavements.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H							
	CO2			H	H							
	CO3			H	H							
	CO4			H	H							
	CO5			H	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I HIGHWAY PLANNING AND ALIGNMENT 9

Highway Development in India, Macadam's Method of Road Construction, Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques) Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Krebs, Shoulders and Footpaths [IRC Standards]

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments – Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] Geometric Design of Hill Roads [IRC Standards Only]

UNIT III DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements- Components and their Functions Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic Design Practice for Flexible Pavements [CBR method, IRC Recommendations-Problems] Design Practice for Rigid Pavements – [IRC Recommendations-Problems]

UNIT IV HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil – California Bearing Ratio Test, Field Density Test, Aggregate - Crushing, Abrasion and Impact Tests Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]
Highway Drainage [IRC Recommendations]

UNIT V HIGHWAY MAINTENANCE 9

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation Overlay Design by Benkleman Beam Method [Procedure only]

TEXT BOOKS:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.

REFERENCES:

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall of India Pvt Ltd, 2006
3. MORTH Guidelines for Highway Engineering.
4. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna TechnicalPublications, Delhi, 2000

BCE406	**ENVIRONMENTAL STUDIES**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite – Physical Sciences				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To study the nature and facts about environment.
2. To find and implement scientific, technological, economic and political solutions to environmental problems.
3. To study the interrelationship between living organism and environment.
4. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
5. To study the dynamic processes and understand the features of the earth's interior and surface.
6. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

COURSE OUTCOMES (COs)

CO1	Play an important role in transferring a healthy environment for future generations
CO2	Analyze the impact of engineering solutions in a global and societal context
CO3	Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems
CO4	Ability to consider issues of environment and sustainable development in his personal and professional undertakings
CO5	Highlight the importance of ecosystem and biodiversity

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1						H	H				
	CO2						H	H				

	CO3							M				
	CO4						L	M	L			
	CO5						M	M				
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√					
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 9

Definition, scope and importance, Need for public awareness.

Natural Resources : Renewable And Non – Renewable Resources

Natural resources and associated problems

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effect on forests and tribal people.
b) Water resources : Use and over-utilization of surface and ground water, flood, drought conflicts over water, dams-benefits and problems.
c) Mineral resources : Uses and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing , effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies.
f) Land resources : Land as a resource, Land degradation, man induced landslides, soil erosion and desertification

Role of an individual in conversation of natural resources, Equitable use of resources for sustainable lifestyles.

UNIT II ECOSYSTEMS 8

Concepts of an ecosystem. Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem :- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)-

Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation - Ethics : Issues and possible Solutions, Climate change, global warming, acid rain, ozone layer depletion.

UNIT III BIODIVERSITY AND ITS CONSERVATION 7

Introduction and Definition - genetic, species and ecosystems diversity, Biogeographical classification of India - Value biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, national and local levels. India as a mega-diversity nation, Hot-spots of biodiversity -Threats to biodiversity, habitat, poaching of wildlife,

man-wildlife conflicts, Endangered and endemic species of India, Conservation biodiversity - In-situ and Ex-situ conservation of biodiversity.

Environmental Pollution **7**

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

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **8**

From Unsustainable to Sustainable development, Urban problems related to energy, nuclear accident and holocaust, case studies, wasteland reclamation, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife protection Act, Forest Conservation Act, Issues involved in enforcement of environmental Legislation, public awareness –

Fireworks and its impact on the Environment – Chemicals used in Fireworks – (Fuel –oxidizing Agent – Reducing Agent –Toxic Materials – Fuel –Binder- Regulator) – Harmful nature of ingredients – chemical effects on health due to inhaling fumes – Noise produced by fire crackers – Noise pollution – Noise level standards for fire crackers – Intensity of sound – Impact on hearing – Safety measures.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **6**

Population growth, variation among nations, population explosion-Family Welfare programs, Environment and human health, Human Rights, Value Education, HIV and AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human health - Case Studies.

TEXTBOOKS:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
3. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad – 380 013, India, 1989.
4. Benny Joseph, "Environmental Studies"., TATA McGraw Hill, 2010

REFERENCES

1. Trivedi R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, EnviroMedia 2009
2. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Wager K.D. "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.
4. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", Techno Science Publications 2013
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB),2001.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental

Encyclopedia, Jaico Publ. House, Mumabai, 1196p
7. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
8. Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
9. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
10. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
11. Rao M N. &Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publish Co. Pvt. Ltd. 345p.
12. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut.

BCE4L1	SURVEYING PRACTICAL - II	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Survey practical-I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To understand field problems like tachometry, setting out for foundation marking etc.

COURSE OUTCOMES (COs)

CO1	Take angular and linear measurements using total station
CO2	Prepare contour maps for the given area
CO3	Field observation for the calculation of azimuth.
CO4	Determination of personal stereoscopic acuity in laboratory.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	M			L						
	CO2		M			L						
	CO3		M									
	CO4											
	CO5	L				L						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I TACHEOMETRY **12**

Tangential system (using theodolite, leveling staff)
Stadia system (using theodolite, leveling staff)
Subtense system (using theodolite, tape, cross staff, leveling staff)

UNIT II SETTING OUT WORKS **12**

Foundation marking (using theodolite, tape, ranging rods)
Simple curve - right / left handed (using theodolite, tape, ranging rods)
Transition curve (using theodolite, tape, ranging rods)

UNIT III FIELD ASTRONOMY **9**

Field observation for the calculation of azimuth (using theodolite, tape)

UNIT IV ELECTRONIC SURVEYING (USINGPHOTOGRAMMETRY ACCESSORIES/INSTRUMENTS) **12**

Practicing fusion of stereo pairs of charts and photographs to get 3D
Use of pocket stereoscope and parallax bars
Determination of personal stereoscopic acuity in laboratory
Work on stereo test charts to access stereoscopic ability

BCE4L2	**SOIL MECHANICS LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**0**	**0**	**3**	**2**
	Prerequisite – Soil Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To understand and assess both Physical and Engineering behavior of soils through laboratory testing procedures.

COURSE OUTCOMES (COs)

CO1	To learn about the different type of soil according to their classification and their size distribution
CO2	To determine the soil's property and their atterberg's limit.
CO3	To have a clear understanding about determining the optimum moisture
CO4	About the compressive strength of the soil which is obtain from the site.
CO5	To know about permeability of the soil, consolidate test on the soil.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M	H	M	M	M						
	CO2	L	M	H								
	CO3			M	M							
	CO4	L										
	CO5			M	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Atterberg limits test
4. Determination of moisture - Density relationship using standard proctor.
5. Permeability determination (constant head and falling head methods)
6. Determination of shear strength parameters.
   a) Direct shear test on cohesion less soil
   b) Unconfined compression test on cohesive soil
   c) Tri axial compression test on cohesion less soil
7. One dimensional consolidation test (Determination of co-efficient of consolidation only)

REFERENCES:

1. " Soil Engineering Laboratory Instruction Manual ", Published by the Engineering College Co-operatiave Society, Chennai,
2. Lambe T.W., “Soil Testing for Engineers ", John Wiley and Sons, New York, 1990.
3. "I.S.Code of Practice (2720) Relevant Parts ", as amended from time to time.

BMA501	PROBABILITY AND STATISTICS FOR CIVIL ENGINEERS	L	T	P	C
	Total Contact Hours - 45	3	1	0	4
	Prerequisite – Numerical method				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

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

COURSE OUTCOMES (COs)

CO1	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
CO2	To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems
CO3	To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.
CO4	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.
CO5	To understand the fundamentals of quality control and the methods used to control systems and processes.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
	CO1	H			M	H		M			M	
	CO2			M								
	CO3	M			H						M	
	CO4					H		H				
	CO5	H									H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PROBABILITY AND RANDOM VARIABLES

Sample space, Random experiments and random variables, Concept of probability, Conditional probability, Addition and multiplication laws, Baye's theorem - One dimensional Random Variables- Expectation, Variance, Covariance, and Moments. 9

UNIT II THEORETICAL DISTRIBUTIONS DISCRETE:

Binomial, Poisson, Geometric, Negative Binomial; Continuous: Exponential and Normal Distributions, their properties and applications to industrial problems. 9

UNIT III TESTING OF HYPOTHESIS

Introduction – Large sample tests based on normal distribution - Test for single mean, difference between means, proportion, difference between proportion, Small sample tests based on t, distributions- Test for single mean, difference between means, standard deviation, difference between standard deviation. Chisquare test for goodness of fit, independence of attributes. 9

UNIT IV CORRELATION, REGRESSION AND ANALYSIS OF VARIANCE

Pearson's Correlation coefficient- Spearman's Rank correlation coefficient. Regression- Concepts – Regression lines – Multiple correlation and regression. Analysis of Variance- One-way classification and two way classification. 9

UNIT V STATISTICAL QUALITY CONTROL

Introduction – Process control – control charts for variables - X and R, X and S charts control charts for attributes: p chart, np chart, c chart and their applications in process control. 9

TEXT BOOKS

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

BCE501	STRUCTURAL ANALYSIS – I	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Basic Structural Design				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To introduce the students to basic theory and concepts of structural analysis and the classical methods for the analysis of structures.

COURSE OUTCOMES (COs)

CO1	Analyze the pin jointed plane frames using energy and consistent deformation method
CO2	Analyze indeterminate structures using various classical methods.
CO3	Determine absolute maximum bending moment and shear force in beams due to moving loads.
CO4	Find the maximum moment, shear and stresses produced in arches due to external loads temperature effects and support settlements.
CO5	To find the influence line diagram for determinate structures.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		M	H							
	CO2	M		M	H					L		
	CO3	M		M	H						L	
	CO4	M		M	H					L		
	CO5	M		M	H						L	
	CO6											

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INDETERMINATE ANALYSIS 12

Indeterminate Structures: Introduction to static and kinematic Indeterminacy- two and three dimensional pin jointed and rigid jointed structures-space trusses-Energy method-application to indeterminate pin jointed trusses-temperature effect-beams curved in plan.

UNIT II SLOPE DEFLECTION METHOD 12

Slope deflection method: Analysis of continuous beams and portal frames with single storey.

UNIT III MOMENT DISTRIBUTION METHOD 12

Moment distribution method: Stiffness and distribution factors-carry over factor-analysis of continuous beams -single storied portal frames.

UNIT IV ROLLING LOADS 12

Rolling loads: Single concentrated loads - two concentrated loads-uniformly distributed loads-curves of maximum SFD and BMD – equivalent. UDL

UNIT V INFLUENCE LINE DIAGRAMS 12

Influence line for statically determinate beams for bending moment and shear force- absolute maximum BM-concentrated and UDL-Influence line for forces in members for statically determinate truss parallel chord truss.

TEXT BOOK:

1. Vaidyanadhan, R and Perumal, P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2",Laxmi Publications, New Delhi, 2003.

REFERENCE:

1. Bhavai Katti, S.S, Structural Analysis – Vol. 1 & Vol. 2, Vikas Publishing Pvt Ltd., New Delhi,2008
2. Analysis of Indeterminate Structures – C.K. Wang, Tata McGraw-Hill, 1992.
3. Negi L.S. Jangid & R.S., "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2003.

BCE502	**APPLIED HYDRAULIC ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Fluid Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
- At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

COURSE OUTCOMES (COs)

CO1	Be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
CO2	They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
CO3	They will have knowledge in hydraulic machineries (Turbines)
CO4	Acquire skills in rotodynamic machineries that will help in their day-to-day-life.

CO5	Acquire skills in Reciprocal pumps.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	M	L	H	H						
	CO2	H	M	L	H	H						
	CO3	H	M	L	H	H						
	CO4	H	M	L	H	H						
	CO5	H	M	L	H	H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I OPEN CHANNEL FLOW 9

Types of flow – State of Flow - Velocity distribution - Specific energy, specific force, critical flow computation - flow measurement. Chezy's and Manning's equation, Computation Uniform flow – Normal depth – Hydraulically best section.

UNIT II VARIED FLOW 9

Varied Flow- Rapid & Gradual - Dynamic equation characteristic of flow profiles – Classification of flow – Computation of the flow profiles – Direct step method - Canal transitions – Hydraulic Jump – Type of Jump, Location of Jumps – Energy losses in Jumps – Surges in Canal – Types of Surges.

UNIT III TURBINES 9

RotodynamicsMachinary Turbines: Classification of turbines -Work done - Efficiency of Turbines, Pelton Wheel, Francis turbine, Kaplan and propeller turbines. Similarity laws and specific speed. Performance of turbines - impact of free jets.

UNIT IV PUMPS 9

Rotodynamic Machinery Pumps: Classification of pumps –Centrifugal Pumps – Casing – Impellor – Work done and Efficiency – Cavitations.

UNIT V RECIPROCATING PUMPS 9

Reciprocating pump – Work done – Air Vessel – Indicator Diagram.

TEXT BOOK:

1. Bansal R K., A Text Book of Fluid Mechanics & Hydraulic Machines – Laxmi Publications 2010

REFERENCE:

1. Subramanya K., "Flow in Open channels ", Tata McGraw Hill Publishing Company 1986
2. Kumar K.L., "Engineering Fluid Mechanics ", Eurasia Publishing House (P) Ltd. New Delhi, 1992.
3. Rajput R.K, A Text of Fluid Mechanics & Hydraulic machines – S.Chand & Co.P.Ltd, 2009

BCE503	**FOUNDATION ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Soil Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

To impart knowledge on common method of sub soil investigation and design of foundation and to acquire the capacity to investigate the soil condition and to select and design a suitable foundation.

COURSE OUTCOMES (COs)

CO1	Select type of foundation required for the given soil condition.
CO2	Determine the settlement of the foundation on different types of soil
CO3	Find the dimensions of the foundation for isolated footing, combined footing and floating foundation
CO4	Analyze the group of piles for their load capacity
CO5	Carry out stability analysis of retaining walls.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H							
	CO2			H	H							
	CO3	L		H	H							
	CO4	M		H	H							
	CO5	H		H	H							
	CO6											

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Introduction – Scope and objectives – Method of exploration: boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests– Data interpretation – Selection of foundation based on soil condition

UNIT II SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from in-situ tests – Factors influencing bearing capacity – codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimizing settlement.

UNIT III DESIGN OF FOOTING 9

Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Codal provisions.

UNIT IV PILE FOUNDATION 9

Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from in-situ tests– Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions

UNIT V RETAINING WALLS 9

Earth pressure theory – Plastic equilibrium in soils – active and passive states – Rankine's theory – Coloumb's wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load alone – Graphical method (Culmann's method alone) – Stability of retaining wall.

TEXT BOOKS:

1. Punmia, B.C., Soil mechanics and foundations, Laxmi publications pvt. Ltd., New Delhi.

REFERENCES:

1. Khan, I.H., A text book of Geotechnical Engineering, Prentice Hall of India, New Delhi, 1999.
2. Arora K.R. Soil mechanics and foundation engineering, standard publishers and distributors, New Delhi, 1997.
3. Bowles J.E. Foundation analysis and design, McGraw Hill, 1994.
4. Gopal Ranjan and Rao, A.S.R. Basic and applied soil mechanics, Wiley Eastern Ltd., New Delhi (India), 1997.

BCE504	REINFORCED CONCRETE STRUCTURES – I	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Theory Of Structures				
	Course Designed by – Dept of Civil Engineering				

COURSE OUTCOMES (COs)

CO1	Design RC concrete structural elements using various methods.
CO2	Design reinforced concrete slabs and beams by WSD for flexure
CO3	Design various basic elements of reinforced concrete structures like slabs, beams, columns and footings by LSD
CO4	Design reinforced concrete slabs and beams for shear and torsion by LSD
CO5	Design reinforced concrete Footing

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		H	M							
	CO2	M		H	M							
	CO3	M		H	M							
	CO4	M		H	M							
	CO5	M		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics	Engineering	Professional Core	Core Elective (CE)	Non-Major Elective	Open Elective (OE)	Project/ Term Paper/ Seminar/
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 12

Actual and idealized stress- strain diagrams of concrete and steel (Mild Steel, High Strength deformed bars) – behavior of R.C.beam in bending – introduction to the ESD philosophy – Design of rectangular beams, tee beams, shear, development length- design of one way slab, two way slabs BIS 456 2000.

UNIT II WORKING STRESS METHOD 12

Design of continuous beams and slabs – axially and eccentrically loaded column footings for individual columns and combined rectangular footings for two columns.

UNIT III DESIGN OF BEAMS 12

Limit state design of rectangular T and L shaped beams for flexure, shear, bond torsion, - design of one way slab – Lintels – sun shades.

UNIT IV LSM: DESIGN OF SLABS &COLUMNS 12

Limit state design of two way slab using BIS 456 – limit state design of short rectangular and circular columns for axial and eccentric loads using SP- 16 design of long columns.

UNIT V LSM: DESIGN OF FOOTING 12

Limit state design of square / rectangular footings for axially and eccentrically loaded columns combined rectangular footings for two columns.

TEXT BOOKS:

1. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers &Distributors, New Delhi,2003

REFERENCES:

1. Jain.A.K. Limit State Design of R.C.Structures, Nerchand Publications
2. BIS 456 – 2000
3. S.P.16 of BIS
4. W.H. & R.S. Mosely, J.H.Bungcy an R.Hulse, Reinforced Concrete Design, 5th Edition, Macmillan Co.
5. Ramamrutham S, Design of Steel ***Structures***, Dhanpat Rai ***Publishing Co***., New. Delhi, 2001
6. Dr.Purushothaman P Reinforced Concrete Structures Tata McGraw-Hill, 1984

BCE505	**ENVIRONMENTAL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Studies				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To make the students conversant with principles of water supply, treatment and distribution

COURSE OUTCOMES (COs)

CO1	Plan water supply system for developing area
CO2	Design the various treatment plant in water supply system
CO3	Treat the drinking water using advanced techniques
CO4	Design the water distribution systems
CO5	Principles of design of water supply and drainage in buildings

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	M							
	CO2	M		H	M				M			
	CO3			H	M							L
	CO4	L		H	M							
	CO5	M		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I PLANNING FOR WATER SUPPLY AND SEWERAGE SYSTEMS 9

Public water supply System and Sewerage system – Design Period – Prediction of population during design period – Selection of Sources of Water supply – Conveyance of Raw Water - Treatment site – Piped Flow – Open Channel Flow – Layout of Water Treatment Plant.

UNIT-II WATER TREATMENT SYSTEMS 9

Raw water Quality – Impurities in Water – Water Quality Standards – Plain Sedimentation - Pumping to Chemical House – Coagulation – Hydraulic Jump / Flash Mixer - Clariflocculator – Rapid Sand Filtration – Iron & Manganese Removal - Post Chlorination – Clear Water Tank – Pumping to Overhead Tank.

UNIT-III WATER DISTRIBUTION SYSTEM 9

Water Distribution Layout – Service Reservoirs – Hydraulics of Flow in Pipes - Appurtenances – Construction Operation and maintenance – Leak Detection – Strom Water Network – Plumbing Work in Houses.

UNIT-IV COLLECTION AND CONVEYANCE OF DOMESTIC SEWAGE 9

Sewer Pipe Network – Sewage Treatment Site – Activated Sludge Process – Aeration Tank Design – Design of Secondary Settling Tank – Sludge Digester – Sludge Drying Beds – Re-Use of Treated Effluent – Selection of Pumps.

UNIT-V SOLID WASTE MANAGEMENT 9

Collection and Conveyance of Solid Wastes – Segregation of Solid Wastes – Sanitary Land Fill – Incineration – Recycling and Re-use Concepts – Disposal of Electronic Wastes.

TEXT BOOKS:

1. Garg S.K.Environmental Engineering, Vol.I & II, khanna Publishers, New Delhi, (1994).

2. Water Supply Engineeering, R.Pannirselvam, SPGS-Publications, Adambakkam, Chennai-600088, (2007).
3. Wastewater Engineering, SPGS-Publications, Adambakkam, Chennai-600088,(2007).
4. C.S.Shah, Water Supply Sanitation, Galgotia Publishing Company, New Delhi, (1994).

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, (1999).
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, (1993).
3. Wastewater Engineering – Treatment and Re-Use, MetCalf & Eddy, Inc., Tata McGraw-Hill Publishing Company, New Delhi-(2003).

BCE5L1	CONSTRUCTION ENGINEERING LABORATORY	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Basic Civil and Mechanical Engineering Practices Laboratory				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To learn the principles and procedures of testing Concrete and Highway materials and to get hands on experience by conducting the tests and evolving inferences.
2. To know about the fresh mixed concrete and experience by mixing a freshly mixed concrete.

COURSE OUTCOMES (COs)

CO1	Have a fundamental knowledge of the basic test to be performed on the material used in the construction site
CO2	Testing the aggregate material which is used in the laying pavement
CO3	Designing the mix of the concrete for various structures in construction.
CO4	To know about the freshly mixed concrete and check their workability by slump, consistency and compaction.
CO5	To know the ability of the bitumen and their properties for laying pavements.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
	CO1	H				M	M					
	CO2					M						

	CO3		M	M								
	CO4	H			L	M						
	CO5						M					
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
							√					
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I TESTS ON CEMENT 9

Specific gravity, fineness, specific surface, soundness, consistency, initial and final setting time, compressive strength of cement mortar.

UNIT II TESTS ON AGGREGATES 12

a. Tests to find salinity, organic content etc.
b. Size distribution of particles.
c. Specific gravity / voids ratio.
d. Bulking of Sand.

Particle size, shape, flakiness index, elongation index, sieve analysis, specific gravity, density, absorption test, crushing and impact strength of coarse aggregates and abrasion tests.

UNIT III CONCRETE MIX DESIGN 6

UNIT IV TESTS ON FRESH AND HARDENED CONCRETE 12

Slump test, Vee-Bee Test, Compaction factor test, Test on cubes and cylinders – Determination of Young's modulus, compressive strength, tensile strength (beam and cylinder).

UNIT V HIGHWAY: TESTS ON BITUMINOUS MATERIALS AND MIXES 6

a. Penetration test on Bitumen
b. Ductility test on Bitumen
c. Softening point test on Bitumen or tar
d. Flash and fire point tests on bitumen cut back bitumen
e. Specific gravity test.
f. Viscosity test on black bitumen – cutback bitumen or tar (using orifice viscometer).
g. Marshall stability test on bituminous mix - preparation of bituminous mix and determination of density, voids, stability and flow values.

BCE5L2	FLUID MECHANICS AND FLUID MACHINERY LAB	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Fluid Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

Students should be able to verify the principles studied in theory by performing the experiments in lab.

COURSE OUTCOMES (COs)

CO1	Measure theoretical discharge in pipes, Venturi meter, orifice meter and notches
CO2	Demonstrate and conduct experiment to find characteristic curves of various pumps
CO3	Demonstrate and conduct experiment to find characteristic curves of various turbines

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
	CO1		H									
	CO2		H		M				M			
	CO3		H				L					

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS

A) Fluid Mechanics Lab Experiments

1. Determination of flow through pipes, losses in pipes.
2. Calibration of Orifice Meter &Venturi Meter
3. Flow through Notches & weirs.
4. Flow Through open orifices: Calculation of Cd, Co &Cv
5. Buoyancy experiment, Metacentric- height
6. Calibration of Mouth Pieces- Constant & Variable Head Method
7. Impact of jet on Vanes: inclined, curved.
8. Verification of Bernoulli's equation.

B) Fluid Machinery Lab Experiments

1. Performance characteristics of Centrifugal Pump.
2. Performance characteristics of Multistage Pump
3. Performance characteristics of Gear Pump
4. Performance characteristics of Reciprocating Pump
5. Performance characteristics of Impulse Turbine
6. Performance characteristics of Reaction Turbine.
7. Performance characteristics of Jet Pump
8. Performance characteristics of Vane Pump

REFERENCES:

1. Modi P.N & Sethi S.M "Hydraulics and Hydraulic Mechanics". Standard, Publishing Co, New Delhi.

BCE5C1	**COMPREHENSION I**	**L**	**T**	**P**	**C**
	Total Contact Hours : Test will be conducted at the end of the semester	0	0	0	1
	Prerequisite – All the courses up to fifth semester				
	Course Designed by – Dept. Civil Engineering				

OBJECTIVES

- To provide a complete review of Civil engineering topics covered up to fifth semesters, so that a comprehensive understanding is achieved.
- It will also help students to face job interviews, competitive examinations and also to enhance the employment potential.
- To provide overview of all topics covered and to assess the overall knowledge level up to fifth semester.

BCE601	STRUCTURAL ANALYSIS – II	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Structural Analysis – I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to basic theory and concepts of structural analysis and methods for the analysis of structures.

COURSE OUTCOMES (COs)

CO1	Analyze Space Truss using tension Coefficient method
CO2	Analyze cable suspension bridges
CO3	Perform plastic analysis of indeterminate beams and frames
CO4	Analyze structures by using matrix flexibility and stiffness methods
CO5	Implement basic concepts of finite element analysis

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			M	H							
	CO2			M	H							
	CO3			M	H							
	CO4			M	H							
	CO5			M	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ILD FOR INDETERMINATE STRUCTURES 12

Influence line for statically indeterminate structures – Maxwell Betti theorem - Muller – Breslau Principle and its application to determine the influence lines of reactions. SF and BM at a section of continuous beams – qualitative influence lines for horizontal thrust reaction and moments for continuous beams, portal and arches.

UNIT II ARCHES & CABLES 12

Arches and suspension Cables : Three hinged and two hinged arches-parabolic and circular arches – influence lines for three and two hinged arches for horizontal thrust, SF and BM at any section - length of cable, maximum tension - types supports – forces in towers.

UNIT III PLASTIC THEORY 12

Plastic Theory: Plastic moment of resistance - plastic modulus – shape factor – plastic hinges – determination of collapse load for continuous beams and portals.

UNIT V STIFFNESS METHOD 12

Matrix Method of Structural Analysis: Stiffness methods-development of stiffness method - stiffness matrix for continuous beams and portals application to simple pin jointed trusses, continuous beams, portal frames.

UNIT V FLEXIBILITY METHOD 12

Matrix method of Structural Analysis: Flexibility method – statically determinate and indeterminate (up to 2 degrees only) structures- formation of flexibility matrix - simple problems on Continuous beams, Portal frame.

TEXT BOOKS:

1. S.S.Bhavikati. Structural Analysis Vol.-I & II. Vikas Publishing House pvt ltd, 2009

REFERENCES:

1. William Weaver, Computer Programs for structural Analysis, VNR Publishers, 2006
2. Rubinstein M.F, Matrix Computer Analysis of Structures, Prentice Hall, Englewood cliffs, 1990
3. Arya AS. and Jain." Theory and Analysis of Structures", Nem Chand & Bros, Dec 1992
4. Pandit G S and Gupta S P,"Matrix methods in structural analysis", Tata McGraw Hill Publishing Company Limited, 2007

BCE602	**REINFORCED CONCRETE STRUCTURES – II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	4	0	0	4
	Prerequisite – Reinforced Concrete Structures – I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To give an exposure to the design of continuous beams, slabs, staircases, walls and bridge structures and to introduce yield line theory

COURSE OUTCOMES (COs)

CO1	Design counter-fort and cantilever retaining walls
CO2	Design underground and overhead water tanks
CO3	Design bridges and flat slab
CO4	Different methods and systems – uniform and non-uniform pre-stressing design

CO5	Design Slab using yield line theory

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	M							
	CO2			H	M							
	CO3			H	M							
	CO4			H	M							
	CO5			H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I RETAINING WALLS 12

Retaining Walls – Design of cantilever and counter fort types using working stress method.

UNIT II WATER TANKS 13

Water Tanks – Underground rectangular tanks – Domes – overhead circular and rectangular tanks – Design of staging and foundations.

UNIT III BRIDGES 13

Bridges – slab Bridge – Distribution of concentrated loads by effective width and Pigeaud's method. Load distribution in interconnected girders by Courbon's method – T – Beam Bridge.

UNIT IV PRE STRESSED CONCRETE 11

Principles of Pre–stressing – Materials for pre–stressed Concrete – Different methods and systems – uniform and non-uniform pre-stressing – losses in pre-stress – Analysis of simply supported beams with straight and parabolic tendons.

UNIT V YIELD LINE THEORY 11

Yield Line Theory: Application of virtual work method to square, rectangular, and Triangular slabs.

TEXT BOOKS:

1. N.Krishnaraju, Design of R.C.Structures, CBS Publishers and Distributors. Delhi, 1989

REFERENCE BOOKS:

1. Mac Ginley, T.J. Reinforced Concrete Design, Theory and Examples, E and N.Spon. Umited London, 1978
2. Jaikrishna and Jain O.P, Plain and Reinforced Concrete Vol. I & II",Nem Chand & Bros., 1958
3. Krishna Raju N, Bridge Engineering" Oxford and IBH Publishing,2010
4. Park R. and Paulay T. Reinforced Concrete Structures John Wiley and Sons, 1975.
5. Neville A.M. Properties of Concrete, Pitman Pub., 1981

BCE603	**IRRIGATION ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Fluid Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To expose the student to different phases in Water Resources Management and National Water Policy. Further they will be imparted required knowledge on Reservoir planning, management and economic analysis including Irrigation and Irrigation management practices

COURSE OUTCOMES (COs)

CO1	Estimate water requirements for irrigation and drinking
CO2	Estimate consumptive use of water for irrigation
CO3	Perform water resources and prepare water budget
CO4	Prepare irrigation scheduling and water distribution for various crops.
CO5	Design cross drainage works

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M			H							
	CO2	M			H							
	CO3	M			H							
	CO4	M		H	H							
	CO5	M			H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I IRRIGATION AS A SCIENCE 9

Definition, Need, Benefit, Historical Development, Scope in the country and the state - Sources for irrigation, wells, springs, rivers, streams, tanks, reservoirs - Flow and Lift irrigation. Methods of flow irrigation - Devices and equipments for lift irrigation - Duty, different concepts of duty and factors affecting duty.

UNIT II CROP WATER REQUIREMENTS 9

Soil – plant – water relationship – Evapo transpiration – consumptive use - Perennial, Annual and Seasonal crops - Principal irrigated, dry and wet irrigated crops - Assessment of crop water requirements - Effective rainfall - Net irrigation requirements for principal crops -Irrigational quality - Salt resistant crops - Water logging, remedial measures.

UNIT III CONVEYANCE AND DISTRIBUTION OF IRRIGATION WATER 9

Head works – Diversion and storage structures -Canals unlined and lined. Canal alignments - contour ridge, Branch canals, minors, water course and notches - Control structures - drops, escapes, shutters and operating devices, division boxes - Cross drainage structures- under tunnels, aqueducts, siphons, siphon aqueducts - Cross masonry structures - road and railway bridges.

UNIT IV IRRIGATION WATER MANAGEMENT 9

Need for optimization of water use - Management and productivity - Minimizing irrigation water losses - Operational rules for regulation - physical structures for management on farm development works - Participatory Irrigation Management (PIM) - Water Users Associations (WUA) - Training the water users.

UNIT V DESIGN OF IRRIGATION STRUCTURES 9

Sluices and surplus weirs in tanks - Earth dam section, homogenous and zoned. Anicuts and weirs on solid and permeable foundation - Head regulators, canal drops, canal siphons and aqueducts, under tunnels - Simple design of masonry and earth dams- Designing channels- Computer aided designs.

TEXT BOOKS:

1. Sharma R.K, “Irrigation Engineering and Hydraulic Structures”, Oxford and IBII Publishing Company, New Delhi, 2002.
2. Sathyanarayanan Murthy, “Irrigation Design and Drawing”, Published by Mrs.L.Banumathi, Tuni, East Godavari District. A.P. 1998.

REFERENCES:

1. Michael A.M,”Irrigation – Theroy and practice”, Vikas Publishing House, 2000.
2. Hand Book on irrigation system operation Practices, Water Management and training Project Technical Report No.33. CWC, 1990.
3. Hand Book for improving Irrigation System Maintenance Practices, Water Management and Training Report No.19A, CWC, Delhi, 1989.

BSS601	VALUE EDUCATION AND PROFESSIONAL ETHICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Professional Courses				
	Course Designed by – Dept of Management Studies				

OBJECTIVES

- To teach the philosophy of Life, personal value, social value, mind cultural value and personal health
- To teach professional ethical values, codes of ethics, responsibilities, safety, rights and related global issues.

COURSE OUTCOMES (COs)

CO1	To learn about philosophy of Life and Individual qualities
CO2	To learn and practice social values and responsibilities
CO3	To learn and practice mind culture, forces acting on the body and causes of diseases and their curing
CO4	To learn more of Engineer as Responsible Experimenter.
CO5	To learn more of Risk and Safety assessment with case studies.
CO6	To learn more of Responsibilities and Rights as Professional and facing Global Challenges

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			M		H		M			L	L
	CO2			M		H		M			L	L
	CO3			M		H		M			L	L
	CO4	M		H		H		M			L	M
	CO5	M		H		H		M			L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I : PHILOSOPHY OF LIFE AND INDIVIDUAL QUALITIES 9

Human Life on Earth - Purpose of Life, Meaning and Philosophy of Life. The Law of Nature – Protecting Nature /Universe. Basic Culture - Thought Analysis - Regulating desire - Guarding against anger - To get rid of Anxiety – The Rewards of Blessing - Benevolence of Friendship - Love and Charity - Self – tranquility/Peace

UNIT II : SOCIAL VALUES (INDIVIDUAL AND SOCIAL WELFARE) 9

Family - Peace in Family, Society, The Law of Life Brotherhood - The Pride of Womanhood – Five responsibilities/duties of Man : - a) to himself, b) to his family, c) to his environment, d) to his society, e) to the Universe in his lives, Thriftness (Thrift)/Economics. Health - Education - Governance - People's Responsibility / duties of the community, World peace.

UNIT III: MIND CULTURE & TENDING PERSONAL HEALTH 9

Mind Culture - Life and Mind - Bio - magnetism, Universal Magnetism (God –Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelizing the Mind, Stages - Meditation, Spiritual Value. Structure of the body - the three forces of the body- life body relation, natural causes and unnatural causes for diseases, Methods in Curing diseases

UNIT IV: ENGINEERING AS SOCIAL EXPERIMENTATION AND ENGINEERS'S RESPONSIBILITIES FOR SAFETY 9

Engineering as Experimentation – Engineer as Responsible Experimenters – Codes of Ethics – The Challenger, case study. Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl case studies.

UNIT V: ENGINEERS'S RESPONSIBILITIES FOR RIGHTS AND GLOBAL ISSUES 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Whistle Blowing – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination. Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development –Engineers as Managers – Consulting Engineers – Engineers as Expert Eye Witnesses and Advisors – Moral Leadership

TEXTBOOKS:

1. Value Education for Health, Happiness and Harmony, The World Community Service, Centre Vethathiri Publications (Unit 1 – III).
2. Mike W Martin and Roland Schinzinger, Ethics In Engineering, Tata McGraw Hill, Newyork 2005 (Units IV & V)

REFERENCE:

1. Philosophy of Universal Magnetism (Bio - magnetism, Universal Magnetism) The World Community Service Centre Vethathiri Publications (for Unit III)
2. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road,Thanjavur 613 004 (for Units I - III)
3. R S Nagaarazan, Textbook On Professional Ethics And Human Values, New Age International Publishers, 2006 (for Units IV-V)

4. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico,2004(for Units IV-V)

BCE6L1	COMPUTER AIDED BUILDING DRAWING	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Computer Practices Lab				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to draw the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

COURSE OUTCOMES (COs)

CO1	To study about drawing of Residential Building using Autocad
CO2	To study about drawing of RCC framed using Autocad
CO3	To study about drawing of office building using Autocad
CO4	To study about drawing of various types of Truss
CO5	To Study about 3D drawing of a building using revit architecture

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1					M						
	CO2					M						
	CO3					M						
	CO4					M						
	CO5					M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

Building Drawing in Accordance with Development and Control Rules Satisfying Orientation and Functional Requirements for the following:

1. Residential buildings with load bearing walls (RCC roof) **9**
2. RCC framed structures **9**
3. Office buildings (RCC roof) **9**
4. Industrial buildings – North light roof structures – Trusses – Gantry arrangements **9**
5. Perspective view for small buildings **9**

TEXT BOOKS:

1. Verma B.P ,"Civil Engineering. Drawing & House planning", Khanna publishers, Delhi, 2014
2. Balagopal & Prabhu T S, "Building drawing & detailing", Spades publishers, Calicut, 1984

REFERENCES:

1. M. G. Shah, C. M. Kale, S. Y. Patki ,"Building drawing", Tata McGraw-Hill, 2002
2. Kumaraswamy N, Kameswara Rao A,"Building Planning & Drawing", Charotar Publishing House, 1995

BCE6L2	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Physics and Chemistry Laboratory-I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To understand the sampling and preservation methods and significance of characterization of wastewater.

COURSE OUTCOMES (COs)

CO1	Have a fundamental knowledge to conduct various quality tests on water and wastewater
CO2	Have a well-founded knowledge to assess the suitability of water for drinking and irrigation purpose.
CO3	Acquire skills in assessing the suitability of water for concreting works

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1		H	M		M						
	CO2		H	M		M						
	CO3		H	M		M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS:

1. a. Determination of pH.
   b. Determination of Turbidity
2. Determination of hardness.
3. Determination of Alkalinity.
4. Determination of Residual Chlorine
5. Estimation of Chlorides.
6. Estimation of Ammonia Nitrogen.
7. Estimation of Sulphate.
8. Determination of optimum coagulant dose.
9. Determination specific conductivity.
10. Estimation of available chlorine in Bleaching Powder.
11. Determination of dissolved Oxygen.
12. Determination of suspended settleable, Volatile and fixed solids.
13. B.O.D.Test
14. C.O.D.Test

REFERENCES:

1. Trivedhi and Goel. Chemical and Biological Methods for Water Pollution studies.
2. A Course manual – Water and Waste Water Analysis, national Environmental Engineering
3. Research Institute Nagpur Publication.
4. Standard Methods for Examination of Water and Wastewater - APHA, AWAA and WPCF, 1985 Edition.

BCE6P1	TERM PAPER	L	T	P	C
	Total Contact Hours – 60	0	0	4	2
	Prerequisite – Professional Courses				
	Lab Manual Prepared by – Dept of Civil Engineering				

OBJECTIVES

To teach the student the procedures and methodologies for understanding the literature survey and prepara research paper.

COURSE OUTCOMES (COs)

CO1	To identify the area of research.
CO2	To prepare list of literatures in the relevant area.
CO3	Compile the abstract from the literatures.
CO4	Focus the search to a well defined theme and title.
CO5	Make and exhaustive report by compiling all the literatures that student surveyed.
CO6	To prepare a research paper for publications in journal/conference proceedings.

LIST OF TASKS

1. **PREPARING PROPOSAL**
   Proposed Research Topic
   Purposes
   Background
   Method: (suggested methods – develop your own to suit your research topic)

2. **CONDUCTING LITERATURE REVIEW**
   Exploring and Sharpening your Topic
   Evaluating Information
   Taking Notes and Keeping Records

3. **COMPLETING ANNOTATED BIBLIOGRAPHY**
   Citing Your Sources and Avoiding Plagiarism
   Writing and Annotated Bibliography

4. **IDENTIFYING PROBLEM STATEMENT**
   Meeting the Challenges of Research
   Developing New Information

5. **COMPLETING OUTLINE FOR THE RESEARCH**
   Organizing Your Project into an outline
   Pick up your critique paper and begin editing and incorporate the suggestions from guide

6. **SUBMITTING FIRST DRAFT**
   Drafting your Project
   Entering Conversations and Supporting Your Claims

7. **SUBMITTING WORKS CITED**
   Create the individual citations
   Apply the formatting rules

8. **SUBMITTING FULL PAPER**

Revising, Editing, and Proofreading
Designing and Presenting Your Project
Conducting Research in the Disciplines
Documenting Sources

REFERENCES:

1. Website.
2. Printed Journals.

BCE701	ESTIMATION AND COSTING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite - Building Construction				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge on methods and types of estimation and its merits and demerits
CO2	Have knowledge on specifications and tendering process for contracts
CO3	Will have the ability to understand the types, formation, terms and conditions in contracts and arbitration
CO4	Will have the knowledge of rate analysis of different item of work and MB and bill of quantities
CO5	Will able to value a property, price escalation recommendations and auditing

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			M	H		M			M	
	CO2			M								
	CO3	M			H						M	
	CO4					H		H				
	CO5	H									H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ESTIMATION 9

Purpose – Methods of estimation – advantages – types of estimates – detailed estimates of residential buildings – single storied and multistoried buildings – earthwork – foundations – Super structure – Fittings including sanitary and electrical fittings – paintings.

UNIT II SPECIFICATIONS AND TENDERS 9

Specifications – Detailed and general specifications – construction specifications – sources – types of specifications – Tender notices – types – corrigendum notice – tender procedures – Drafting model tenders

UNIT III CONTRACTS 9

Contract – types of contracts – formation of contract – contract conditions – contract problems – contract for labor, material, design and construction – drafting of contract documents – construction contracts – arbitration and legal requirements.

UNIT IV RATE ANALYSIS AND PREPARATION OF BILLS 9

Data – Rate analysis – abstract estimate – report to accompany estimate – measurement book – bills – types

UNIT V VALUATION 9

Basic – Principles of valuation – Value and Cost – value engineering – value analysis – phases in value engineering – information – function – escalation – evaluation – recommendation implementation – Audit

TEXT BOOK:

1. Estimating and costing in Civil Engineering –Dutta B.N & Dutta S UBS Publishers & Distributors Pvt. Company, Lucknow 1986

REFERENCES:

1. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004
2. Birdie G.S. "A text book on estimating and costing" — Dhanpat Rai and Sons, New Delhi.
3. Jagannathan G, Getting more at less cost – The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.

BCE702	COMPUTER AIDED DESIGN OF STRUCTURES	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	Prerequisite -Computer Aided Building Drawing				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students about computer graphics, structural analysis, design and optimization and expert systems, applications in analysis.

COURSE OUTCOMES (COs)

CO1	Prepare wire frame modeling and solid modeling using drafting packages
CO2	Perform structural analysis using computer packages
CO3	Prepare algorithms for the analysis and design of steel and RC structures
CO4	Analysis simple structures using expert systems
CO5	Analysis and design of structures by using STADD.PRO, STRAP

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		H	H	H						
	CO2			H	H	H						
	CO3			H	H						M	
	CO4			H	H	H		L				
	CO5			H	H	H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION & COMPUTER GRAPHICS 10

Introduction to computer graphics - Fundamentals of CAD – Hardware and software requirements – Design process – Applications and benefits – drafting packages- use of AUTOCAD – application to layout of buildings and structures - graphic primitives – wireframe modeling and solid modeling.

UNIT II DESIGN & OPTIMIZATION 12

Design and Optimization: Optimization techniques – principles of design of steel and RCC structures - applications to simple design problems.

UNIT III INTRODUCTION TO FINITE ELEMENT ANALYSIS 14

Introduction of Finite Element Analysis: Fundamentals of finite element analysis – steps involved - boundary value problems. Galerkin's approach – variation principles – finite element matrix - assemblage solution for deflections - stresses and strains - simple problems using triangular elements.

UNIT IV ANALYSIS OF STRUCTURES BY FINITE ELEMENT METHOD 12

Analysis of Structures by FEM: Analysis of plane truss, space truss, plane frame and space frame by using FEM packages – ANSYS – STRUDL – NASTRAN – SAP 2000.

UNIT V STRUCTURAL ENGINEERING PACKAGES 12

Structural Engineering Packages: Introduction of various structural engineering packages - analysis and design of structures by using STADD.PRO, STRAP.

TEXT BOOKS:

1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers 2004.

REFERENCES:

1. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi Publications Pvt. Ltd 2003.
2. Rajasekaran, S., Finite Element Analysis. AH Wheelers Publishing Company Ltd.,
3. Rao S.S.Optimization – Theory and Application, Wiley Eastern Ltd.
4. Auto CADD manual.

BCE703	**DESIGN OF STEEL STRUCTURES**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	4	0	0	4
	Prerequisite -Basic Structural Design				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

This course deals with some of the special aspects with respect to Civil Engineering structures in industries.

COURSE OUTCOMES (COs)

CO1	Design of plate girders, web and flange design, curtailment of flange plates.

CO2	Design of simple and built up columns subject to combined bending and axial loads
CO3	Design of flexural and compression members, Design of self supporting steel chimneys.
CO4	Design of overhead rectangular, cylindrical and pressed steel tanks
CO5	To study shape factor, plastic hinge ,plastic moment , plastic analysis of beams.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		H	M							
	CO2	M		H	M							
	CO3	M		H	M		M				L	
	CO4	M		H	M							
	CO5	M		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PLATE GIRDER 12

Design of plate girders – web and flange design – curtailment of flange plates – Design of stiffeners and splices – Design of gantry girder.

UNIT II COLUMNS SUBJECTED TO COMBINED BENDING AND AXIAL LOADS 12

Design of simple and built up columns subject to combined bending and axial loads - design of column base and connections to foundation.

UNIT III LIGHT GAUGE STEEL SECTIONS 12

Behavior – Design of flexural and compression members – Design of self supporting steel chimneys.

UNIT IV STEEL WATER TANKS 12

Design of overhead rectangular, cylindrical and pressed steel tanks including the design of staging and foundations.

UNIT V PLASTIC THEORY 12

Shape factor – plastic hinge – plastic moment – plastic analysis of beams - design of beams.

TEXT BOOKS:

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.
3. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.

REFERENCES:

1. Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002
2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005
3. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2009
4. Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007 Structures Publications, 2009. 5. IS800 :2007, General Construction In Steel – Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

BCE704	**MANAGEMENT CONCEPTS FOR CIVIL ENGINEERS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Nil				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES: To practice as professionals, engineers must be able to act responsibly and ethically, understand their limits use, communicate effectively, ci be able to pursue graduate level education

COURSE OUTCOMES (COs)

CO1	To study the basic concept in business operation
CO2	To study on marketing management concepts
CO3	To Know the concept about Equipment management
CO4	To learn about Human resource managemnet
CO5	To study about computer softwares

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	S	M	S	M	M	S	L	M		L	L

	CO2	S	S	S	M	L	M	M	M	M	M	M
	CO3	S	L	S		L		M	M			
	CO4	M	L	S	S	M	M	S			L	M
	CO5	M		S	M	M	M	S	L			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I BASIC CONCEPTS 9

Types of business operations, Sole proprietorship partnership, Company, public and private sector enterprises / Joint ventures, collaborations. Functions of Management / Principles of management, inventory control, Management tools, L.P.P.E.R.T., CPM, etc.

UNIT II INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT9

Marketing – Marketing Segmentation, Positioning, Marketing Research, Marketing planning, Scope of financial management – Cost accounting Vs Financial accounting. Appraisal of projects, investment decisions, concept of pay back.

UNIT III MATERIALS AND EQUIPMENT MANAGEMENT 9

Planning – Identification, Procurement, Schedule and Cost control – Systems approach- resource management - ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment.

UNIT IV HUMAN RESORUCE MANAGEMENT 9

Scope of objectives of HRM – Man power policy and planning – Recruitment and selection. Training performance appiaisal. - Wage policy and compensation systems. Company union relationship and collective bargaining - Accidents absenteeism and turn over – Grievances / conflicts – Identification and resolution.

UNIT V INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT 9

Planning, Scheduling and Resource analysis. Recording and operations project accounting, costing and finance - usage of project management software.

TEXT BOOKS:

1. Konni, Donnel C.O. and weighrich H., Management, Eight editions. McGraw Hill

International Book Company.

2. Philip Kotler, Marketing management, Prentice – Hall of India, Edition.

REFERENCES:

1. Momoria, personal management, himalaya publishing co., 1992.

2. Sharma j.l. construction management and accounts, sathya prakashan, new delhi, 1994.

3. Srinath, ls., an introduction to project management, tata mcgraw hill publications,

BCE7L1	COMPUTER AIDED DESIGN OF STRUCTURES LAB	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Computer Aided Building Drawing				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to analyze and design different structures like trusses, beams, frames etc.

COURSE OUTCOMES (COs)

CO1	To Study about Microsoft office
CO2	To Study about drawing of buildings using Autocad in 2D
CO3	To Study about drawing of buildings using Autocad in 3D
CO4	To Study about Modeling
CO5	To Study about 3D objects
CO6	To Study about Solid Editing
CO7	To Study about drawings of plans and layouts
CO8	To Study about various mode of drawing in Autocad
CO9	To Study about file management
CO10	To Study about analysis of trusses and frame
CO11	To Study about analysis of different component in staad pro
CO12	To Study about analysis and design of different component in staad pro

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1					M						
	CO2					M						
	CO3					M						
	CO4					M						
	CO5					M						
	CO6					M						
	CO7					M						
	CO8					M						
	CO9					M						
	CO10					M						
	CO11					M						
	CO12					M						
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)		Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√						
4	Approval	37th Meeting of Academic Council, May 2015											

LIST OF EXPERIMENTS

1. Preparation of Script and Slide presentation
2. Creating 2D drawings plan, elevation, section of residential buildings
3. Creating 3D drawings, preparation of elevation for multi storeyed buildings.
4. Surface modeling and solid modeling
5. 3D objects – construction and enhanced viewing
6. Solid Editing and real time 3D rotations
7. Working with layouts.
8. Modifying AUTOCAD environment and plotting
9. File management
10. Analysis of Plane truss space truss – plane frame – space frame and other elements such as plate elements and shell elements.
11. Analysis of different structural components by using STAAD.PRO – STRAP.
12. Analysis and design of different structural components by using STRAP – STAAD.PRO – STAAD etc.

BCE7L2	COMPUTER AIDED DESIGN AND DRAFTING LABORATORY (R.C.C, Steel, Irrigation & Environment)	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Computer Aided Building Drawing				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. The student shall be able to conceive, design and draw all types of irrigation structures in detail showing plan, elevation and sections.
2. This subject includes process design (excluding Structural Design) of major units associated with water and sewage treatment and transport including house building drainage. At the end of the course, the student is expected to know about the sizing of treatment plant units and draw the general arrangement.
3. To understand the techniques for designing of reinforced concrete structures and steel structures

COURSE OUTCOMES (COs)

CO1	Have a fundamental knowledge of the design of irrigation structures.
CO2	Have a fundamental knowledge of the design of environmental works which can describe real life phenomena.
CO3	To learn about design and Drawing for concrete structures
CO4	To learn about design and Drawing for steel structures

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		H				L		M		H
	CO2	H		H				L		M		H
	CO3	H		H				L		M		H
	CO4	H	M	H		M		M		M		H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I **11**

Detailed design and drawing (Not to scale) of the following reinforced concrete structures.

1. a. Typical building floors consisting of stabs and beams.

b. Flat slabs using BIS code formula.
2. Isolated and combined footings.

UNIT II **11**

Detailed design and drawing (Not to scale) of the following steel structures :

1. a. Columns and base plate
   b. Grillage foundation
2. Plate Girder

UNIT III

Design of following irrigation works are to be worked out and drawing (Not to Scale) are to be drawn. **12**

1. Earthen Dams – Sections of different types of earth dams, plan showing drainage systems.
2. Tank Sluice Wing type
3. Tank Surplus Weir
4. Canal Regulator (Head regulator)

UNIT IV

Design of the following Environmental works are to be worked out and detailed drawing (Not to Scale) to be drawn. **11**

1. General layout of water supply scheme
2. Mixing basin, flocculation and sedimentation tanks
3. Slow and rapid sand filters – Service and clear water reservoirs

TEXT BOOK:

1. Satyanarayana Murthy, "Irrigation Design and Drawing", Published by Mrs. L. Banumathi, Tuni, East Godavari District, A.P. 1998
2. Punmia, B.C., Jain, A.K., and Jain.A., Environmental Engineering,Vol.I& Vol.II, Lakshmi Publications, Newsletter, 2005.

REFERENCES:

1. Krishnamurthy D, Structural Design Drawing CBS Publication. New Delhi 1985.
2. Shah M.G & Kale C.M, Building Drawing to Built to Environment –Tata McGraw Hill Co.
3. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
4. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.
5. H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering MoGrawHill Company, New Delhi, 1995.
6. Shah C.S, Water Supply and Sanitation, Galgotia Publishing Company, New Delhi 1994

BCE8C1	COMPREHENSION II	L	T	P	C
	Total Contact Hours : Test will be conducted at the end of the semester	0	0	0	1
	Prerequisite – All the courses up to eighth semester				
	Course Designed by – Dept. of Civil Engineering				

OBJECTIVES

- To provide a complete review of Civil Engineering topics covered up to eighth semesters, so that a comprehensive understanding is achieved.
- It will also help students to face job interviews, competitive examinations and also to enhance the employment potential.
- To provide overview of all topics covered and to assess the overall knowledge level up to eighth semester.

BCE8P1	PROJECT WORK	L	T	P	C
	Total Contact Hours – 18 periods a week	0	0	18	9
	Prerequisite –Term paper				
	Course Designed by – Dept. of Civil Engineering.				

OBJECTIVES

- Learn to work as a member of a project team.
- Understand project management tasks.
- Develop a hardware / software solution for a real-time, industry relevant problem.

COURSE OUTCOMES (COs)

CO1	Apply knowledge of basic science and engineering to Civil Engineering problems
CO2	Implement the simple applications and verify using modern simulation tools.
CO3	Identify, formulate, and model engineering equipment
CO4	Recognize the real world applications and to solve with core engineering knowledge.
CO5	Analyze and work on multidisciplinary tasks
CO6	Choose latest tools, software and equipment to solve real world problems

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H	M		M				M			
CO2	H	M	H		M				M		
CO3	H	M		M					H		
CO4	H	M	M	M							M
CO5	H			M				M		M	H
CO6	H			M				M		H	

CORE ELECTIVE – I

BCE051	CONCRETE TECHNOLOGY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To study the properties of concrete making materials, tests, mix design, special concretes and various methods for making concrete.

COURSE OUTCOMES (COs)

CO1	To learn about concrete making material IS specifications.
CO2	To know about properties of fresh concrete and hardened concrete.
CO3	To understand the principles and methods of concrete mix design
CO4	To know about the various types of special concrete.
CO5	To understand process of manufacturing of concrete.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H		H	H							
	CO2	H	M	H	H	H						
	CO3	H	M	H	H		M					
	CO4	H		H	H							
	CO5	H	M	H	H	H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CONCRETE MAKING MATERIALS 9

Aggregates, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading. Cement, Grades of cement. Chemical composition, Hydration of cement, structure of hydrated cement, Special cements - Water Chemical admixtures. Mineral admixtures.

UNIT II CONCRETE 9

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage. Variability of concrete strength. Concrete testing Methods: Non destructive tests ultrasonic pulse velocity, Rebound Hammer test. Pullout tests.

UNIT III MIX DESIGN 9

Principles of concrete mix design. Methods of concrete mix design. Indian standard Recommended Method. IS 10262-82

UNIT IV SPECIAL CONCRETE 9

Light Weight concrete, Fly ash concrete, Fibre reinforced concrete, Polymer Concrete, Super plasticised concrete, Epoxy resins and screeds for rehabilitation - Properties and Applications- High performance concrete.

UNIT V CONCRETING METHODS 9

Process of manufacturing of concrete, methods of transportation, placing and curing - Extreme weather concreting, special concreting methods. Vacuum dewatering underwatering concrete, Ready mix concentrate.

REFERENCES:

1. Neville, A.M. Properties of Concrete, Pitman Publishing Limited, Lnclon.
2. Shetty M.S., Conrete Technology, S. Chand and Company Ltd. Delhi.
3. Rudhani G., Light Weight Concrete Academic Kiado, Publishing Home of Hungarian Academy of Science, 1963.

BCE052	**INDUSTRIAL STRUCTURES**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Reinforced Concrete Structures - I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

This course deals with some of the special aspects with respect to Civil Engineering structures related to industries

COURSE OUTCOMES (COs)

CO1	Prepare the layout for industrial buildings
CO2	Design for functional requirements
CO3	Design steel girder, bunker and silos
CO4	Design RC structures like chimneys, silos and folded plates
CO5	Design prestressed precast concrete units.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k

2	CO1	H		M	M							
	CO2			H	H							
	CO3			H	H							
	CO4			H	H							
	CO5			H	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I GENERAL 8

Specific equipments for industries like Engineering. Textile, Chemical etc., - Site layout and external facilities classification of industries minimum standards internal calculation – Materials – Works.

UNIT II FUNCTIONAL REQUIREMENTS 10

1. Lighting – Natural and artificial – protection from the sun – sky light.
2. Services, Layout, wiring fixtures, cable and pipe bridges – Electrical installations – lighting - Substations - effluent.
3. Ventilation and fire protection, ventilation & air – conditioning, fire escapes and, chutes, fire alarms, extinguishers and hydrants.

UNIT III PLANNING & DESIGN 9

(Requirement of factory and other rules)

Layout stages. Loading Design of single bay and design of multi bay multi storied frames in RCC and steel – Analysis of industrial structures.

UNIT IV DESIGN OF APARTMENT STRUCTURES 10

Cranes - Different types - principles - design of girder – open web and solid web bunkers – silos – R.C. ducts.

UNIT V CONSTRUCTION TECHNIQUES 8

Expansion joints- design of machine foundations and other foundations as per I.S. Code - Water proofing – roof drainage – joints – sound, shock proof mountings.

TEXT BOOKS:

1. Purushothaman P ,"Reinforced Concrete Structural elements", Tata McGraw-Hill, 1984.

REFERENCES:

1. Pasala Dayaratnam,"Design of Steel Structure", Wheeler publishers Allahabad , 1990.

2. Planning industrial structures Dunham, Industrial Structures McGraw-Hill Book Co; 1st edition (1948)
3. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.
4. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.
5. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.

BCE053	**ADVANCED CONSTRUCTION TECHNIQUES**	**L**	**T**	**P**	**C**
	Total Contact Hours -45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

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

COURSE OUTCOMES (COs)

CO1	Understand the various processes involved in sub-structure construction
CO2	Understand the various processes involved in super-structure construction.
CO3	Understand the construction process of special structures and offshore structures.
CO4	Know about the rehabilitation techniques carried out for a structure.
CO5	Know about the demolition techniques carried out for a structure.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		M		H						
	CO2	M		M		H	L				L	
	CO3	M		M		H						
	CO4	M		M		H						
	CO5	M		M		H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
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4	Approval	37th Meeting of Academic Council, May 2015

UNIT I SUB STRUCTURE CONSTRUCTION 15

Box jacking - pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - piling techniques - driving well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction - well points - dewatering and stand by plant equipment for underground open excavation.

UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS 10

Vacuum dewatering of concrete flooring – concrete paving technology – techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – launching techniques – suspended form work – erection techniques of tall structures, large span structures – launching techniques for heavy decks – insitu prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures.

UNIT III CONSTRUCTION OF SPECIAL STRUCTURES 10

Erection of lattice towers and rigging of transmission line structures – construction sequence in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges – launching and pushing of box decks – Advanced construction techniques for offshore structures – construction sequence and methods in domes and prestress domes – support structure for heavy equipment and conveyor and machinery in heavy industries – erection of articulated structures, braced domes and space decks.

UNIT IV REHABILITATION TECHNIQUES 6

Mud jacking grout through slab foundation - micropiling for strengthening floor and shallow profile - pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing, underpinning, crack stabilization techniques.

UNIT V DEMOLITION 4

Advanced techniques and sequence in demolition and dismantling.

REFERENCES:

1. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications, 1995.
2. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons, 1992.
3. Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984
4. Peter.H.Emmons, “Concrete repair and maintenance illustrated”, Galgotia Publications Pvt. Ltd., 2001.
5. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.

BCE054	CONSTRUCTION PLANNING, SCHEDULING AND CONTROL	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To study the finer aspects of planning, scheduling and controlling of construction projects.

COURSE OUTCOMES (COs)

CO1	Know the elements of construction planning and estimating activity durations and resource requirements.
CO2	Know the elements of scheduling and to apply appropriate tools and techniques like networks and coding systems.
CO3	Understand the monitoring and accounting of projects through cost control.
CO4	Know the elements of quality control and safety of construction projects.
CO5	Know the concept of gathering and using project information

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M			M			M	H			
	CO2	M			M			M	H			
	CO3	M			M			M	H			
	CO4	M			M			M	H			
	CO5	M			M			M	H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CONSTRUCTION PLANNING 9

Basic Concepts in the Development of Construction Plans - Choice of Technology and Construction Method - Defining Work Tasks - Defining Precedence Relationships among Activities - Estimating Activity Durations - Estimating Resource Requirements for Work Activities - Coding Systems

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES 9

Construction Schedules - Critical Path Method – Scheduling Calculations - Float - Presenting Project Schedules - Scheduling for Activity-on-Node and with Leads, Lags, and Windows - Scheduling with Resource Constraints and Precedences - Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process.

UNIT III COST CONTROL, MONITORING AND ACCOUNTING 9

The Cost Control Problem - The Project Budget - Forecasting for Activity Cost Control - Financial Accounting Systems and Cost Accounts - Control of Project Cash Flows - Schedule Control - Schedule and Budget Updates - Relating Cost and Schedule Information.

UNIT IV QUALITY CONTROL DURING CONSTRUCTION 9

Quality Concerns in Construction - Organizing for Quality - Work and Material specifications - Total Quality Control - Quality Control by Statistical Methods - Statistical Quality Control with Sampling by Attributes - Statistical Quality Control with Sampling by Variables

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 9

Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in Databases - Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

REFERENCES:

1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
5. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

BCE055	INDUSTRIAL WASTE TREATMENT AND DISPOSAL	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To provide knowledge on sources and characteristics of industrial waste water, techniques and approaches for minimizing the generation and application of physio-chemical and biological treatment methods for recovery, reuse and disposal.

COURSE OUTCOMES (COs)	
CO1	Have a fundamental knowledge of the effluent discharge standards and waste minimization technology
CO2	Have a well-founded knowledge of characteristics of industrial waste water and treatment methods.
CO3	Acquire knowledge about conventional methods of treatment for industrial waste.
CO4	Understand various biological treatment methods
CO5	Have a fundamental knowledge of combined treatment of industrial and municipal wastes.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1							H	M			H
	CO2			L				M				
	CO3	L	M	M				M				
	CO4	L	M	M				M				
	CO5	L	M	M				H		H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I EFFECTS AND CONTROL OF INDUSTRIAL POLLUTION 9

Effects of industrial wastes on streams, land and air, wastewater treatment plants, water quality criteria – effluent standards : Process modification, method and material changes, housekeeping etc., to reduce water discharges and strength of the waste and established recovery methods for bye products within the plant operations.

UNIT II CHARACTERISTICS AND TREATMENT OF INDUSTRIALWASTEWATER 9

Characteristics of major industrial waste water (liquid wastes) Chemical Industries: Petrochemicals & refineries, pharmaceuticals. Apparel Industries: Textile, synthetic fibres, leather, paper. Agro Industries: Fertilizer Food Industries: Heat – packing pickles, canning poultry and eggs, distillers, sugar. Metallurgical Industries: Thermal power station, nuclear power plants.

UNIT III PHYSICAL TREATMENT METHODS 9

Conventional methods of treatment and disposal of industrial wastes. Equalisation and neutralization, separation of solids – sedimentation and filtrations.

UNIT IV BIOLOGICAL TREATMENT METHODS 9

Removal of organic contents: Biological treatment methods, aerobic and anaerobic, digestion, tickling filters, stabilization ponds, activated sludge process – oxidation ditch.

UNIT V PHYSICO – CHEMICAL TREATMENT METHODS 9

Physico - Chemical Treatment Method – Neutralization, coagulation, flocculation, adsorption and precipitation. Combined treatment of industrial and municipal wastes.

TEXT BOOKS:

1. Eckenfalder W.W,"Industrial Water Pollution Control", McGraw Hill, New York, 1989

REFERENCES:

1. Arceivala S.J & Shyam Asolekar R, "Waste Water Treatment and Pollution Control Tata McGraw Hill, 1998.
2. Nelson Leonard Nemerow," Theories and practice of industrial waste treatment", Addison Wesley Pub. Co., 1963
3. World Bank Group "Pollution prevention and Treatment Hand Book" World Bank and UNEP Washington DC, 1998

BCE056	SOLID AND HAZARDOUS WASTE MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the students on the principles involved in the management of municipal solid waste and hazardous wastes- from source identification up to disposal.

COURSE OUTCOMES (COs)

CO1	To make them understand the fundamentals of solid and hazardous wastes and also the types, need and sources of solid and hazardous wastes.
CO2	To understand about the methods of waste characterization and source reduction and to study the various methods of generation of wastes.
CO3	To understand in detail about the storage, collection and transport of wastes. and also to study about the methods used for handling and segregation of wastes.
CO4	To improve the knowledge on the waste processing techniques which includes incineration, solidification and stabilization of hazardous wastes
CO5	To know about the basics of the waste disposal options and also a detailed study on the disposal in landfills and also to learn about landfill remediation

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H				H				M		
	CO2	H			M					H		
	CO3			M			H					
	CO4	H						H		L		
	CO5		M			H				H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
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4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Types and Sources of solid and hazardous wastes-Need for solid and hazardous waste management- Elements of integrated waste management and roles of stakeholders- Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, lead acid batteries, plastics and fly ash,financing waste management.

UNIT II WASTE CHARACTERIZATION AND SOURCE REDUCTION 9

Waste generation rates and variation-Composition, physical, chemical and biological properties of solid wastes- Hazardous Characteristics- TCLP tests- waste sampling and characterization plan- source reduction of wastes- Recycling and reuse- waste exchange.

UNIT III STORAGE, COLLECTION AND TRANSPORT OF WASTES 9

Handling and segregation of wastes at source- storage and collection of municipal solid wastes- Analysis of collection systems- Need for transfer and transport- Transfer stations Optimizing Waste allocation- compatibility, storage, labeling and handling of hazardous wastes- hazardous waste manifests and transport.

UNIT IV WASTE PROCESSING TECHNIQUES 9

Objectives of waste processing- material separation and processing technologies- biological and chemical conversion technologies-method and controls of composting- thermal conversion technologies and energy recovery- incineration- solidification and stabilization of hazardous wastes- treatment of biomedical wastes.

UNIT V WASTE DISPOSAL 9

Waste disposal options- Disposal in landfills- Landfill Classification, types and methods- site selection- design and operation of sanitary landfills, secure landfills and landfill bioreactors- leachate and landfill gas management- landfill closure and environmental monitoring- closure of landfills- landfill remediation.

REFERENCES:

1.George Tchobanoglous, Hilary Theisen and Samuel A, Vigil "Integrated Solid Waste Management, McGraw- Hill International edition, New York, 1993.

2.CPHEEO "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation, Government of India, New Delhi, 2000.

3.Micheael D. Lagrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, McGraw- Hill International edition, New york, 2001.

4.Vesilind P.A., Worrell W and Reinhart, Solid Waste Engineering, Thomson Learning Inc., Singapore, 2002.

CORE ELECTIVE – II

BCE057	DESIGN OF R.C.FRAMED STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Reinforced Concrete Structures – I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

The design aspects and analysis methodologies of tall buildings will be introduced. The stability analysis of tall buildings is another important objective of this course.

COURSE OUTCOMES (COs)

CO1	Computation of design moments and shears.
CO2	Analysis for wind and earthquake effects , Design of beams, columns and slabs.
CO3	Design by empirical and rigid frame analysis.
CO4	Design of various types of shear walls and detailing
CO5	Moment distribution and FEM methods of analysis of tall building using standard packages.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H	H						
	CO2			H	H							
	CO3			H	H							
	CO4			H	H							
	CO5	M		H	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INDUSTRIAL FRAMES 8

Single Storey Industrial Frames: Estimation of member forces in single storey R.C.C. Industrial bents -of flat Top & gabled configuration from handbooks – Design of members, rigid joints and footing detailing.

UNIT II RC STRUCTURES ELEMENTS 10

Medium – Rise Framed Buildings : Computation of design moments and shears using substitute frame methods of IS 456 and explanatory handbooks – Analysis for wind and earthquake effects – Design of beams, columns and slabs by Sp-16 Design aid – Detailing of reinforcement – Design of staircases and footings.

UNIT III DESIGN OF FLAT SLAB 9

Flat Slab Design, Design of heavily loaded warehouse type – Multi storey frames using flat – slab type of construction – Design by empirical and rigid frame analysis – Detailing – Design of pile foundations.

UNIT IV FUNCTIONAL DETAILS OF TALL BUILDINGS 9

Tall building - functional details – wells, staris and shear walls – lateral deflection - Frame and shear wall interaction - Design of various types of shear walls and detailing – Design of pile foundations.

UNIT V COMPUTER APPLICATION 9

Computer Methods. Moment distribution and FEM methods of analysis of tall building using standard packages.

TEXT BOOKS:

1. Vazirani V.N & Ratwani M M,"Concrete Structures", Khanna Publishers, New Delhi, 1995

REFERENCES:

1. P.Purushothaman, Reinforced Concrete Structural elements Tata McGraw Hill Co, New Delhi.
2. R.Park&T.Paulay, Design of Reinforced Concrete Structural Elements – John Wiley & Sons, New York, 1975.
3. C.M.Reynolds& J.C. Steedam Reinforced Concrete Designers Handbook Rupa & Co, Calcutta, 1987.
4. V.Baikov, and E.Singalov, Reinforced Concrete Structures, Mir Publishers, Moscow,1971.

5. W.H.MosleyandW.J.Spencer, Micro Computer Application in Structural Engineering McMilfan Press, London, 1986.

BCE058	TALL STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Structural Analysis – I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

The design aspects and analysis methodologies of tall structures will be introduced. The stability analysis of tall structures is another important objective of this course.

COURSE OUTCOMES (COs)

CO1	Implement design philosophies for the development of high rise structures
CO2	Find out the design loads for high rise buildings
CO3	Analyze the behavior of tall buildings subjected to lateral loading.
CO4	Perform computerized general three dimensional analysis for high rise building
CO5	Perform stability analysis using various methods for tall buildings

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H							
	CO2			H	H							
	CO3			H	H							
	CO4	M		H	H							
	CO5			H	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I GENERAL 9

Historical Development & Design Criteria: Design philosophy Loading, strength and stability. Stiffness and dirt limitations. Human comfort, Creep, shrinkage and temperature effects – Fire – Foundation -settlement – Soil structure interaction.

UNIT II LOADS 9

Gravity loading Methods and lively hood reduction- Impact loading - Construction loads – Wind loading – Static and dynamic approach – Analytical and experimental method – Earthquake loading – Model analysis.

UNIT III BEHAVIOUR SYSTEMS 9

Behaviour of Various Structural system: Factors affecting growth, height and structural form. High Rise behavior- Rigid frames - Braced frames - Infilled frames – Shear walls – Coupled shear walls – Walls frames – Tubular cores and hybrid mega systems.

UNIT IV ANALYSIS & DESIGN 10

Analysis & Design: Modeling – Analysis of building as total structural system considering overall integrity and major sub – system interaction. Analysis of member forces- Drift and twist - Computerised general three dimensional analysis - Section shapes, Properties and resisting capacity – Design of differential movement – Creep and shrinkage effects- Temperature effects and fiber resistance.

UNIT V STABILITY OF TALL BUILDINGS 8

Stability of Tall Buildings : Overall buckling analysis - Wall frames - Approximate methods – Second order effects – P – Delta – Simultaneous first – order and P – Delta analysis – Translational – Torsional instability – Out of plumb – Effect of foundation rotation.

TEXT BOOKS:

1. Wolfgang Schueller " High Rise Building Structures", John Wiley And Sons, NewYork, 1976.

REFERENCES:

1. Tung-Yen Lin &Sidney D. Stotesbury, “Structures Concept and Systems for Architects and Engineers”, John Wiley & Sons, 1981
2. Lynn Baedle S., “Advances in Tall Buildings”, CBS Publishers and Distributors. New Delhi, 1986.
3. Bryan Stafford Smith And Alex Coull, " Tall Building Structures ", Analysis And Design, John Wiley And Sons, Inc., 1991.

BCE059	SAFETY PRACTICES IN CONSTRUCTION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To study various safety practices that has to be adopted in construction and to know the finer aspects of safety programs, sampling and audit.

COURSE OUTCOMES (COs)

CO1	Know the safety concepts that have to be adopted in construction

CO2	Understand the elements of safety programmes
CO3	Know the awareness on safety practices that has to be ensured during construction.
CO4	Know about the accident prevention, safety sampling and audit.
CO5	Know the safety concepts in hand tools, grinding, lifting works and while operating fire fighting equipments.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M					H	M	H			
	CO2	M					H	M	H			
	CO3	M					H	M	H			
	CO4	M					H	M	H			
	CO5	M					H	M	H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I SAFETY CONCEPTS 9

Construction accidents - Construction Safety Management: Importance - causes of accident, safety measures- Environmental issues in construction-Construction industry related laws. Human factors in safety – legal and financial aspects of accidents in construction – occupational and safety hazard assessment.

UNIT II SAFETY PROGRAMMES 9

Safety Programmes - Construction Safety - Elements of an Effective Safety Programmes - Job-site assessment - Safety Meetings - Safety Incentives. Contractual Obligations - Safety in construction contracts- Substance Abuse - safety Record Keeping.

UNIT III SAFETY PRACTICES 9

Safety Culture - Safe Workers- Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Safety Personnel - Sub-contractual Obligation - Project Coordination and Safety Procedures - Workers Compensation

UNIT IV SAFETY SAMPLING AND AUDIT 9

Accident prevention-cost of accidents-Safety and productivity-safety provision in the factories act-accident reporting investigation and statistics-total loss control and damage control-Safety sampling- safety audit - critical incident technique- safety equipment - planning and site

preparation- safety system of storing construction materials-Excavation - blasting- timbering- scaffolding- safe use of ladders- safety in welding.

UNIT V SAFETY IN LIFTING AND FIRE 9

Safety in hand tools- Safety in grinding- Hoisting apparatus and conveyors- Safety in the use of mobile cranes-Manual handling- Safety in demolition work- Trusses, girders and beams- First-aid- Fire hazards and preventing methods-Interesting experiences at the construction site against the fire accidents.

REFERENCES

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
3. Hand Book on Construction Safety Practices, SP:70, BIS, 2001.

BCE060	**MODERN CONSTRUCTION MATERIALS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To bring about an exposure to design concepts structures, the loads, systems, structural materials, design procedures, repair and rehabilitation of systems

COURSE OUTCOMES (COs)

CO1	Identify the various types of concretes and their constituents and properties.
CO2	Identify the various types of metals, their properties and applications.
CO3	Identify the various composite materials, their properties and applications.
CO4	Understand the concept of water-proofing and identify the purpose of flooring and façade materials.
CO5	Design and develop smart intelligent buildings.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M				H		M			L	
	CO2	M				H		M				
	CO3	M				H		M		L		
	CO4	M				H		M				
	CO5	M				H		M				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I SPECIAL CONCRETES 10

Concretes, Behaviour of concretes - High Strength and High Performance Concrete – Fibre Reinforced Concrete, Self compacting concrete, Alternate Materials to concrete.

UNIT II METALS 10

Steels - New Alloy Steels – Aluminum and its Products –Coatings to reinforcement – Applications.

UNIT III COMPOSITES 10

Plastics –Reinforced Polymers – FRP – Applications

UNIT IV OTHER MATERIALS 10

Water Proofing Compounds – Non-weathering Materials – Flooring and Façade Materials

UNIT V SMART AND INTELLIGENT MATERIALS 5

Smart and Intelligent Materials for intelligent buildings - Special features

REFERENCES:

1. Santhakumar A.R., Concrete Technology, Oxford University Press, New Delhi. 2007.
2. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999.
3. Ashby, M.F. and Jones.D.R.H.H. "Engineering Materials 1: An Introduction to Properties, applications and designs", Elsevier Publications, 2005.
4. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001
5. Aitkens , High Performance Concrete, McGraw Hill, 1999
6. Deucher, K.N, Korfiatis, G.P and Ezeldin, A.S, Materials for Civil and Highway Engineers, Prentice Hall Inc., 1998.
7. Shetty M.S, Concrete Technology: Theory and Practice, S.Chand & Company Ltd., 2005.
8. ACI Report 440.2R-02, "Guide for the Design and Construction of Externally Bonded Rp Systems For Strengthening Concrete Structures", American Concrete Institute, 2002.

BCE061	AIR & NOISE POLLUTION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Studies				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.
2. The emphasis in this course will be the monitoring and control of particulate and Gaseous pollutants, Minimization of the noise and noise pollution including technical measures, Codes, regulations, directives and standards about noise pollution.

COURSE OUTCOMES (COs)

CO1	To learn about the air pollutants, sources and its effects.
CO2	To have a clear understanding on the air quality standards and its techniques.
CO3	To determine the fluid resistance for organic materials.
CO4	To find the Properties of air pollution and its control measures.
CO5	To learn about the effects and the sources of noise pollution.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L				M	H				
	CO2			H						L		
	CO3		M		H			H		H		
	CO4	H							M	M		
	CO5				H					H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Definition of clean air, nature, air pollutants, sources of air pollutants, effects of air pollution on man, animal, vegetation and properties.

UNIT II AMBIENT AIR QUALITY STANDARDS AND AIR QUALITY MONITORING 10

Harmful concentration – geographical factors in air pollution – air pollution control legislation. Classification sampling; sampling techniques; monitoring atmospheric pollution.

UNIT III FLUID RESISTANCE TO PARTICLE MOTION 9

Principles of removal of a gaseous constituent; adsorption and combustion; catalytic combustion of organic materials; catalytic oxidation and decomposition.

UNIT IV AIR POLLUTION AND CONTROL MEASURES 9

Setting chambers; momentum separators, fibrous filters; electro static precipitators; bag houses centrifugal spray scrubbers; venture scrubbers; elementary principles of air pollution e-control techniques.

UNIT V NOISE POLLUTION 8

Sound and noise; sources of noise pollution, environmental and industrial noise; effects of noise pollution: measures for prevention and control of noise; environmental and industrial noise; noise control legislation.

TEXT BOOKS:

1. Anjaneyulu D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.

REFERENCES:

1. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi,1996.
2. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.
3. Stern A.C. *ed*, " Air Pollution Vol. I, II & III", Academic Press, New York, 1968
4. Cunniff P.F, "Environmental Noise Pollution", John Wiley & Sons, New York. 1977.
5. Docks H.M., "Environmental Pollution", John Wiley & Sons. New York 1981.
6. Chanlett T Emit,"Environmental Protection", McGraw Hill series in Water Resources and Environmental Engineering, New York. 1973.
7. Patrick C.F,"Environemental noise pollution", John Wiley & Sons, 1977.

BCE062	**ENVIRONMENTAL IMPACT ASSESSMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1.To educate the students on the scope, steps involved and various methods related to assessment of environmental impact due to development projects

COURSE OUTCOMES (COs)

CO1	To make them understand the basics of EIA and its limitations across sectoral issues and terms of references in EIA. It also includes the study of participation of Public and Non-Governmental Organizations in environmental decision making.
CO2	To understand about the methods and components of EIA and to learn about the expert systems

CO3	To understand in detail about the prediction tools for EIA along with the mathematical modeling for impact prediction
CO4	To improve the knowledge on the ethical and quality aspects of Environmental Impact Assessment
CO5	To know in detail about the Case studies of EIA related to the various sectors in a country like infrastructure, sources of energy etc.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H				M					L	
	CO2		H		M					M		
	CO3	H			H		M					
	CO4							H		M		
	CO5	H							M	H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 9

Environment Impact Assessment (EIA) - Environmental Impact statement – EIA in Project Cycle – Legal and Regulatory aspects in India according to Ministry of Environment and Forests – Types and Limitations of EIA- cross sectoral issues and terms of references in EIA- participation of Public and Non-Governmental Organizations in environmental decision making.

UNIT II COMPONENTS AND METHODS 9

Components of EIA – Processes – screening – scoping – setting – analysis - mitigation. Matrices-Networks –Checklists – connections and combinations of processes – Cost benefit analysis - Analysis of alternatives - Software packages for EIA-Expert systems in EIA.

UNITIII PREDICTION, ASSESSMENT OF IMPACTS AND REPORTING 9

Prediction tools for EIA-Mathematical modeling for impact prediction-Assessment of impacts-air-water-soil-noise-biological-socio-cultural environments-Cumulative Impact Assessment-Documentation of EIA findings-planning-organization of information and visual display materials-Report preparation.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN 9

Environmental Management Plan-preparation, implementation and review- Mitigation and Rehabilitation Plans-Policy and guidelines for planning and monitoring programmes - post project audit-Ethical and Quality aspects of Environmental Impact Assessment.

UNIT V CASE STUDIES 9

Case studies related to the following sectors-Infrastructure-Mining-industrial-Thermal Power – River valley and Hydroelectric-Nuclear Power.

REFERENCES:

1.Lawrence, D.P., Environmental Impact Assessment - Practical Solutions to Recurrent Problems, Wiley- Interscience, New Jersey, 2003.

2.Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science London,1999.

3.Canter, L.W., Environmental Impact Assessment , McGraw- Hill, New York,1996.

4.Biswas, A.K. and Agarwala, S.B.C. Environmental Impact Assessment for Developing Countries, Butterworth Heinemann, London,1994.

5. The World Bank Group, Environmental Assessment Source Book Vol. I, II and III. The World Bank, Washington,1991.

CORE ELECTIVE – III

BCE063	PRESTRESSED CONCRETE STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to the basic concepts and principles of Prestressed concrete structures

COURSE OUTCOMES (COs)

CO1	To design prestressed concrete beam
CO2	To design prestressed composite beams
CO3	To design flexural members with partial prestressing
CO4	To design prestressed concrete tanks, poles and sleepers
CO5	To design prestressed concrete bridges

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H							
	CO2			H	H							

	CO3			H	H							
	CO4			H	H							
	CO5			H	H							
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√				
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR 8

Basic concepts – Advantages – Materials required – Systems and methods of prestressing. Analysis of sections. Stress concept, Strength concept, Load balancing concept -. Effect of loading on the tensile stresses in tendons - Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections – Losses of prestress – Estimation of crack width.

UNIT II DESIGN OF END BLOCK ` 10

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block- Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing- Applications.

UNIT III CIRCULAR PRESTRESSING 9

Design of prestressed concrete tanks – Poles and sleepers

UNIT IV COMPOSITE CONSTRUCTION 8

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members.

UNIT V PRESTRESSED CONCRETE BRIDGES 10

General aspects pretensioned prestressed bridge decks - Post tensioned prestressed bridge decks - Advantages over R.C.bridges - Principles of design only.

TEXT BOOKS:

1. Krishna Raju N. “Prestressed concrete”, Tata McGraw Hill Company, New Delhi 2007

REFERENCES:

1. MallieS.K.and Gupta A.P. “Prestressed concrete”, Oxford and VB publishing Co. Pvt Ltd., 1987.

BCE064	ADVANCED CONCRETE DESIGN	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Reinforced Concrete Structures - I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To apprise the students about the basics of design of flat slabs, folded plates and cylindrical shells.

COURSE OUTCOMES (COs)

CO1	To study Limit Analysis of beams in Flexure.
CO2	Limit analysis and design of Portal frames
CO3	Analysis and design of orthogrid floors/roofs.
CO4	Analysis and design of prismatic folded plates and circular cylindrical shells
CO5	To study the Design of bunkers and silos.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			H	H							
	CO2			H	H							
	CO3			H	H							
	CO4			H	H							
	CO5			H	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I LIMIT STATE ANALYSIS OF BEAMS 9

Limit Analysis of beams in Flexure: 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.

UNIT II PORTAL FRAMES 9

Limit Analysis & Design: Limit analysis and design of Portal frames.

UNIT III DESIGN OF FLAT SLABS 9

Design of Flat Slabs Using BIS 456: Analysis and design of orthogrid floors/roofs.

UNIT IV PLATES AND SHELLS 9

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

UNIT V BUNKERS AND SILOS 9

Design of bunkers and silos.

TEXT BOOKS:

1. Krishna Raju N," Advanced Concrete Design",CBS Publishers and Distribution, Delhi, 1988.

REFERENCES:

1. Jain OP and Jaikrishna,"Plain and reinforced Concrete Vol.2", Nemchand and bros, Roorkee, 1958
2. Dunham C W,"Advanced Concrete Design",Mc Graw Hills Company, 1992
3. Malick and Rangasamy, "Reinforced Concrete Design", Khanna Publishers, Delhi,1976

BCE065	CONSTRUCTION EQUIPMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

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

COURSE OUTCOMES (COs)

CO1	Manage the equipment, cost control and maintenance of a project.
CO2	Identify and understand the working principle of earthwork equipments.
CO3	Identify and understand the working of various equipments for different construction process
CO4	Identify and understand the working principle of material handling equipments.
CO5	Understand the working of aggregate production and concreting equipments.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		M		H				L		
	CO2	M		M		H						
	CO3	M		M		H						
	CO4	M		M		H		L				

	CO5	M		M		H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CONSTRUCTION EQUIPMENT MANAGEMENT 10

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

UNIT II EQUIPMENT FOR EARTHWORK 10

Fundamentals of Earth Work Operations - Earth Moving Operations - Types of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front end Waders, Earth Movers.

UNIT III OTHER CONSTRUCTION EQUIPMENTS 10

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment for Compaction - Erection Equipment - Types of pumps used in Construction - Equipment for Dewatering and Grouting – Foundation and Pile Driving Equipment – Equipment for Demolition.

UNIT IV MATERIALS HANDLING EQUIPMENT 5

Forklifts and related equipment - Portable Material Bins – Conveyors – Hauling Equipment.

UNIT V EQUIPMENT FOR PRODUCTIO OF AGGREGATE AND CONCRETING 10

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

REFERENCES:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction Planning, Equipment and Methods, McGraw Hill, Singapore, 2006.
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988.
3. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988.
4. Dr.Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi. 1983.

BCE066	PREFABRICATION AND CONSTRUCTION TECHNIQUES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To bring about an understanding of the prefabrication and construction techniques adopted

COURSE OUTCOMES (COs)

CO1	Know the standardization and tolerances-system for prefabrication
CO2	Understand the Pre-casting and handling techniques
CO3	Know the Curing techniques including accelerated curing.
CO4	Know the Pre-cast and pre-fabricating technology for low cost and mass housing schemes.
CO5	Understand the Repairs and economical aspects on prefabrication

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		M		H				L		
	CO2	M		M		H						
	CO3	M		M		H						
	CO4	M		M		H						
	CO5	M		M		H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Materials - Modular co-ordination, standardization and tolerances-system for prefabrication. Pre-cast concrete manufacturing techniques, Moulds –construction design, maintenance and repair.

UNIT II TECHNIQUES OF PRE-CASTING 9

Pre-casting techniques - Planning, analysis and design considerations - Handling techniques - Transportation Storage and erection of structures.

UNIT III INDUSTRIAL STRUCTURES 9

Joints -Curing techniques including accelerated curing such as steam curing, hot air blowing etc., -Test on precast elements - skeletal and large panel constructions - Industrial structures.

UNITIV APPLICATIONS 9

Pre-cast and pre-fabricating technology for low cost and mass housing schemes. Small pre-cast products like door frames, shutters, Ferro-cement in housing - Water tank service core unit.

UNIT V QUALITY CONTROL 9

Quality control - Repairs and economical aspects on prefabrication.

REFERENCES:

1. Levitt. M., Precast concrete - Materials, Manufacture Properties and Usage, Applied Science Publs. 1982,
2. Konex.T., Handbook of Pre-cast Construction, Vol.1.2&3.
3. Richardson,J.G., Pre-cast concrete Production, Cement and Concrete Association, London, 1973.
4. Madhava Rao.A-G., Modern Trends in Housing in Developing Countries, Oxford & UBH Publishing co., 1985. -
5. Lewicki.B., Building with Large Pre-fabrications, Elsevier Publishers.
6. Large Panel Prefabricated Constructions, Proc. of Advance Course conducted by SERC, Madras.
7. Bruggeling.A.S.G., & Huyghe.G.F., Prefabrication with Concrete, A.s.A., Balkema Publishers, Netherland, 1991.

BCE067	**ENVIRONMENTAL HEALTH ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

- To introduce types of pollution and its impacts
- To acquaint the student with various methods and techniques of disposing and management of waste
- To give an insight into the various diseases that affect human beings and introduces the importance of sanitation processes

COURSE OUTCOMES (COs)

CO1	To learn about the air pollutants, sources and its effects.
CO2	To have a clear understanding on the air quality standards and its techniques.
CO3	To determine the fluid resistance for organic materials.
CO4	To find the Properties of air pollution and its control measures.
CO5	To learn about the effects and the sources of noise pollution.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	L				M	H				
	CO2			H						L		
	CO3		M		H			H		H		
	CO4	H							M	M		
	CO5				H					H		
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)	Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√				
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I INTRODUCTION 9

Definition of clean air, nature, air pollutants, sources of air pollutants, effects of air pollution on man, animal, vegetation and properties.

UNIT II AMBIENT AIR QUALITY STANDARDS AND AIR QUALITY MONITORING 10

Harmful concentration – geographical factors in air pollution – air pollution control legislation. Classification sampling; sampling techniques; monitoring atmospheric pollution.

UNIT III FLUID RESISTANCE TO PARTICLE MOTION 9

Principles of removal of a gaseous constituent; adsorption and combustion; catalytic combustion of organic materials; catalytic oxidation and decomposition.

UNIT IV AIR POLLUTION AND CONTROL MEASURES 9

Setting chambers; momentum separators, fibrous filters; electro static precipitators; bag houses centrifugal spray scrubbers; venture scrubbers; elementary principles of air pollution e-control techniques.

UNIT V NOISE POLLUTION 8

Sound and noise; sources of noise pollution, environmental and industrial noise; effects of noise pollution: measures for prevention and control of noise; environmental and industrial noise; noise control legislation.

TEXT BOOKS:

1. Anjaneyulu D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.

REFERENCES:

1. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi,1996.
2. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.
3. Stern A.C. *ed*, " Air Pollution Vol. I, II & III", Academic Press, New York, 1968
4. Cunniff P.F, "Environmental Noise Pollution", John Wiley & Sons, New York. 1977.
5. Docks H.M., "Environmental Pollution", John Wiley & Sons. New York 1981.
6. Chanlett T Emit, "Environmental Protection", McGraw Hill series in Water Resources and Environmental Engineering, New York. 1973.
7. Patrick C.F, "Environemental noise pollution", John Wiley & Sons, 1977.

BCE068	**INDOOR AIR QUALITY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Studies				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the students on air pollution and control in the indoor environment.

COURSE OUTCOMES (COs)

CO1	To make them understand the fundamentals of Design and operation of buildings for improvements of public health associated with indoor air quality
CO2	To understand about the air pollutants in indoor environments and its characteristics, consequences
CO3	To understand in detail about the classification and control of pollutants and case studies associated with it.
CO4	To improve the knowledge on the Concepts and tools in indoor air quality along with the statistical models associated with it.
CO5	To know about the basics of the Indoor air pollution from outdoor sources.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H						M		H		
	CO2	M	H		M					H		
	CO3	H										H
	CO4	H								M		
	CO5		M				H			H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Indoor activities of inhabitants – residence time. Levels of many pollutants in indoor and outdoor air. Design and operation of buildings for improvements of public health.IAQ policy issues: Sustainability; indoor air quality as a basic human right

UNIT II INDOOR AIR POLLUTANTS 9

Air pollutants in indoor environments, private residences, offices, schools sand public buildings, factors that govern pollutant indoors concentrations, including ventilation. Characteristics, Consequences.

UNIT III CONTROL OF POLLUTANTS 9

Control of several pollutant classes, such as radon ,toxic organic gases, combustion byproducts, and microorganisms such as molds and infectious bacteria. Case study by an exploration of public policy related to indoor air.

UNIT IV CONCEPT AND TOOLS 9

Concepts and tools: exposure, material-balance models, statistical models ventilation.

UNIT V INDOOR AIR POLLUTION FROM OUTDOOR SOURCES 9

Indoor air pollution from outdoor sources: particulate matter and ozone ;Combustion byproducts; Radon and its decay products. Volatile organic compounds: odors and sick-building syndrome, Humidity Bio-aerosols: infectious disease transmission. Special indoor environments: A/C units in indoor: museums -labs; Measurement methods, Control Technologies, Control strategies.

REFERENCES:

1.Thaddes Godish, Indoor air and Environment Quality, CRC press,2000.
2.Nazaroff W.W and L Aivarez-Cohen, Environmental Engineering Science Wiley Sons, New York, 2001.
3.Moroni Marco , Seifet Bernd and Lindrall Thomas, Indoor Air Quality: A Comprehensive Reference Book, Elsvier Science .Vol.3,1995.

NON MAJOR ELECTIVE-I

BCE069	MATRIX METHODS AND STRUCTURAL ANALYSIS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Structural analysis-II				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to advanced methods of analysis like matrix methods, structural analysis stiffness method, Flexibility method and also analysis of space structures.

COURSE OUTCOMES (COs)

CO1	Apply the basic concepts of matrix methods in structural Analysis
CO2	Find out the deflections in beams and trusses using various methods
CO3	Analyze the structures using flexibility and stiffness method
CO4	Determine member forces using element and system matrices for determinate and indeterminate structures
CO5	Determine the forces in various members due to lack of fit and thermal expansion.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M		M	H	H						
	CO2	M		M	H							
	CO3	M		M	H							
	CO4	M		M	H							
	CO5	M		M	H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I ANALYSIS OF INDETERMINATE STRUCTURES 9

Concept of Indeterminate Structural Analysis –Indeterminacy - flexibility method stiffness method – choice of method.

UNIT II STIFFNESS METHOD 9

Stiffness Method: Three dimensional structures – space trusses – grid structures – rigid frame structures.

UNIT III ANALYSIS OF SUBSTRUCTURE 9

Analysis of Structural system using substructure: Basic concepts – analysis of substructure – simple examples.

UNIT IV FLEXIBILITY METHOD 9

Flexibility method: Trusses, beams and space frames.

UNIT V COMPUTER APPLICATIONS 9

Preparation of Computer Programmes: Trusses – beam – space frames

TEXT BOOKS:

1. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi,2003.

REFERENCES:

1. BhaviKatti, S.S, "Structural Analysis – Vol. 1 Vol. 2", Vikas Publishing House Pvt. Ltd., New Delhi, 2008
2. William Weaver,"Computer Programs for Structural Analysis",Van Nostrand,1967)
3. Rubinstein M.E, "Matrix Computer Analysis of Structures", Prentice Hall, 1969.

BCE070	CONCRETE STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Reinforced Concrete Structures - I				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To study the properties of concrete making materials, tests, mix design, special concretes and various methods for making concrete.

COURSE OUTCOMES (COs)

CO1	To learn about calculation of deflection and crack width according to IS 456-2000
CO2	To know about design of special RC elements.
CO3	To Design flat slabs and flat plates according to ACI method.
CO4	To know about the inelastic behavior of concrete beams.
CO5	To analyze problems based on detailing for ductility.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			H	H						
	CO2	H			H	H						
	CO3	H			H	H						
	CO4	H	M		H	H						
	CO5	H			H	H	M					

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Review of limits state design of beams, Slabs and columns according to IS: 456-2000 Calculation of deflection and crack width according to IS 456-2000.

UNIT II DESIGN OF SPECIAL RC ELEMENTS 11

Design of Slender columns - Design of Rewalls - Ordinary and shear walls - Design of Corbels - Deep beams and grid floors.

UNIT III FLAT SLABS AND FLAT PLATES 10

Design of flat slabs and flat plates according to ACI method - Design of shear load - reinforcement and edge (Spandrel) beams - Yield line theory and Hillerberg method of design of slabs.

UNIT IV INELASTIC BEHAVIOUR OF CONCRETE BEAMS 9

In elastic behavior of concrete beams - moment - rotation curves - moment redistribution - Baker's method of plastic design, Design of cast in situ Joints in frames.

UNIT V GENERAL 6

Detailing for ductility - Fire resistance of buildings - field control of concrete.

REFERENCES:

1. Purushothaman P, Reinforced Concrete Structural Elements: Behaviour Analysis and Design, Tata McGraw Hill, 1986.
2. Varghese P. C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 1995.
3. Krishna Raju, N. Advanced Reinforced Concrete Design, CBS Publishers and Distributors, 1986.
4. N. C. Sinha, S. K. Roy, Fundamentals of Reinforced concrete, S. Chand & Company Ltd, 2001.
5. Varghese. P. C. Advanced Reinforced concrete design, Prentice Hall of India, 2005.

BCE071	SHORING, SCAFFOLDING AND FORMWORK	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To bring about a thorough exposure to shoring, scaffolding and formwork procedures in construction practice by studying the materials, planning and design aspects and erection procedures.

COURSE OUTCOMES (COs)

CO1	Study the materials associated with formwork.
CO2	Study the design aspects of formwork under various requirements.
CO3	Know the design of forms and shores
CO4	Study the planning and erection aspects of form work for buildings.
CO5	Understand few other special types of forms.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			M		H	M					
	CO2			M		H	M		L			
	CO3			M		H	M					
	CO4			M		H	M					
	CO5			M		H	M					

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PLANNING AND SITE EQUIPMENT & PLANT FOR FORM WORK 9

At Tender stage – Development of basic system – Planning for maximum reuse – Economical form construction – Planning examples – Crane size, effective scheduling estimate – Recheck plan details – Detailing the forms. Overall Planning – detail planning – Standard units – Corner units – Schedule for column formwork – Formwork elements – Planning Crane arrangements – Site layout plan – Transporting plant – Formwork beams – Formwork ties – Wales and ties – scaffold frames from accessories – Vertical transport table form work.

UNIT II FORM MATERIALS 9

Lumber – Types – Finish – Sheathing boards working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood – Steel – Aluminium Form lining materials – Hardware and fasteners – Nails in Plywood Concrete density – Height of discharge – Temperature – Rates of Placing – Consistency of concrete – Live loads and wind pressure – Vibration Hydrostatic pressure and pressure distribution – Examples – Vertical loads - Uplift on shores – Adjustment for non standard conditions.

UNIT III DESIGN OF FORMS AND SHORES 9

Basic simplification – Beam formulas – Allowable stresses – Deflection bending lateral stability – Shear, Bearing – Examples in wall forms – Slab forms – Beam forms – Ties, Anchors and Hangers – Column forms – Examples in each. Simple wood stresses – Slenderness ratio – Allowable load – Tubular steel shores patented shores – Site Preparation, Size and spacing – Steel Tower Frames – Safety practices – Horizontal shores shoring for multistories – More concentrated shore loads T- heads – Tow Tier wood shores – Ellis shores – Dayton sure grip and Baker Roofs shores – Safeway Symons shores – Beaver – advance shores Dead shore – Raking and Flying shores.

UNIT IV FORMWORK FOR BUILDINGS 9

Location of job mill – Storage – Equipment – Footings – Wall footings – Column footings Sloped footing forms – Curb and gutter forms – Wall forms –Prefabricated panel systems – Giant forms curved wall forms – Column heads – Beam or girder forms – Beam pockets – Suspended forms – Concrete joint construction – Flying system forms. Causes of failures – Inadequate shoring inadequate bracing of members – improper vibration – Premature stripping – Errors in design – Failure to follow codes – How formwork affects concretes quality – ACI – Case studies – Finish of exposed concrete design deficiencies – Safety factors – Prevention of rotation – Stripping sequence – Advantages of reshoring.

UNIT V FORMS FOR DOMES AND TUNNELS, SLIP FORMS AND SAFETY PRACTICES FOR SCAFFOLDS 9

Hemispherical, Parabolic, Translational typical barrel vaults, Hyperbolic Folded plates– Shell form design considerations loads – Inserts , Anchors bolts – Building the forms-Placing concrete – Form removed – Strength requirements – Tunnel forming components – Curb forms invert forms – Arch forms – Concrete placement methods – Cut and cover construction – Tolerances – Form construction – Shafts. Slip Forms -Principles – Types – advantages – Functions of various components – Planning – Desirable characteristics of concrete – Common problems faced – Safety in slip forms special structures built with slip form Technique – Codal provisions Types of scaffolds – Putlog and independent scaffold – Single pole scaffolds – Fixing ties – Spacing of ties plan – bracing – knots – safety net – General safety requirements – precautions against particular hazards – Truss suspended – Gantry and system scaffolds.

REFERENCES:

1. Robert L. Peurifoy and Garold D. Oberlender, Formwork For Concrete Structures, McGraw – Hill , 1996.
2. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996
3. Michael P. Hurst, Construction Press, London & New York, 2003

4. Austin, C.K., Formwork for Concrete, Cleaver – Hume Press Ltd., London, 1996.

BCE072	CONSTRUCTION PROJECT MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To study the elements of construction project management; consisting of owners' perspective, organization, design and construction procedures, resource utilization and cost estimation.

COURSE OUTCOMES (COs)

CO1	Know the types and financing of construction and changing Environment of the industry.
CO2	Understand the organisation of project management
CO3	Know the design and construction process as an integrated system.
CO4	Know the labour, material and equipment utilization
CO5	Understand Cost Estimates and the Costs Associated with Construction Facilities.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	K
2	CO1	M				L	M		M			
	CO2	M					M		M			
	CO3	M					M		M		L	
	CO4	M					M		M			
	CO5	M					M		M			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I THE OWNERS' PERSPECTIVE 9

Introduction - Project Life Cycle - Types of Construction - Selection of Professional Services - Construction Contractors - Financing of Constructed Facilities - Legal and Regulatory Requirements - Changing Environment of the Construction Industry - Role of Project Managers

UNIT II ORGANIZING FOR PROJECT MANAGEMENT 9

Project Management – modern trends - Strategic Planning - Effects of Project Risks on Organization - Organization of Project Participants -Traditional Designer- Constructor Sequence - Professional Construction Management - Owner-Builder Operation - Turnkey Operation - Leadership and Motivation for the Project Team

UNIT III DESIGN AND CONSTRUCTION PROCESS 9

Design and Construction as an Integrated System - Innovation and Techno logical Feasibility - Innovation and Economic Feasibility - Design Methodology - Functional Design - Construction Site Environment

UNIT IV LABOUR, MATERIAL AND EQUIPMENT UTILIZATION 9

Historical Perspective - Labour Productivity - Factors Affecting Job-Site Productivity - Labour Relations in Construction - Problems in Collective Bargaining - Materials Management - Material Procurement and Delivery - Inventory Control - Tradeoffs of Costs in Materials Management. - Construction Equipment - Choice of Equipment and Standard Production Rates - Construction Processes Queues and Resource Bottlenecks

UNIT V COST ESTIMATION 9

Costs Associated with Constructed Facilities - Approaches to Cost Estimation - Type of Construction Cost Estimates - Effects of Scale on Construction Cost - Unit Cost Method of Estimation - Methods for Allocation of Joint Costs - Historical Cost Data - Cost Indices - Applications of Cost Indices to Estimating - Estimate Based on Engineer's List of Quantities - Estimation of Operating Costs.

REFERENCES:

1. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
3. Frederick E. Gould, Construction Project Management, Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
4. Choudhury, S, Project Management, Tata McGraw-Hill Publishing Company, New Delhi, 1988.
5. George J.Ritz , Total Construction Project Management - McGraw-Hill Inc, 1994.

BCE073	GROUND WATER CONTAMINATION AND TRANSPORT MODELING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Transportation Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the students on the hydraulics related ground water contamination and modeling

ground water quality.	
COURSE OUTCOMES (COs)	
CO1	To make them understand the fundamentals of Ground water and the various hydrologic cycles.
CO2	To understand about the various steady state hydrologic budgets and various case studies associated with it.
CO3	To understand in detail about the development of Ground Water resources and Aquifers.
CO4	To improve the knowledge on the basics of Chemical equilibrium and Geochemical interpretation of ^{14} C Dates
CO5	To know about the basics of the Transport process in solute transfer and hydro chemical behavior of contaminants in the ground water.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	H				M				L	
	CO2		H	H						M		
	CO3	H	H						H	H	L	
	CO4									M		
	CO5	H	M				H		W			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 9

Ground water and the hydrologic cycles – Ground water as resources – 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 Nestes. 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 – Transmissivity and storability – Equations of ground water flow – Limitations of Darcian Approach – Hydro dynamic dispersion – Case Studies.

UNIT II HYDROLOGIC CYCLE AND FLOW NETS 9

Flow nets – Graphical construction – Flow nets by numerical simulation. Steady state Regional Ground Water flow – steady state hydrologic budgets – Fluctuations in ground water levels – Case Studies.

UNIT IIIRESOURCE EVALUATION 9

Development of Ground Water resources – Exploration for Aquifers – the response of Ideal acquifers to pumping – Measurement of parameters – Laboratory tests - Piezometer test – Pumping tests – Estimation of saturates Hydraulic conductivity – Numerical simulation for aquifer yield prediction – Artificial recharge and induced infiltration – Land subsidence – Sea water intrusion –Case Studies.

UNIT IV CHEMICAL PROPERTIES AND PRINCIPLES 9

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 Measurment of Index parameters- Hydro chemical facies – Ground water in carbonate terrain – Ground Water in crystalline rocks- ground water in complex sedimentary systems – Geochemical interpretation of ^{14} C Dates – Process rates and molecular diffusion.

UNITV SOLUTE TRANSPORT 9

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.

REFERENCES:

1.Randall J. Charbeneau, "Ground water Hydraulics and Pollutant transport " Prentice Hall,Upper Saddle.

2.Todd David Keith , Ground water Hydrology, second edition , john Wiley and sons New York, 1980.

3.Allen Freeze, R. and John A. Cherry , "Ground Water ", Prentice Hall, Inc.1979.

BCE074	PHYSICAL AND CHEMICAL TREATMENT OF WATER AND WASTEWATER	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the student on the working principles and design of various physical and chemical treatment systems for water and wastewater.

COURSE OUTCOMES (COs)

CO1	To make them understand the fundamentals of waste water treatment .To learn about the various Pollutants in water and waste water and also to study about their characteristics.
CO2	To understand about the methods of waste characterization , source reduction

	and to study the various methods of generation of wastes.
CO3	To understand in detail about the various principles of chemical treatment which include precipitation coagulation etc.
CO4	To improve the knowledge on the Selection of unit operation and processes and to study the design oriented aspects of sand filters and other treatment processes.
CO5	To know about the basics of the design of industrial waste water treatment and reclamation processes

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H				M					L	
	CO2				M			M		H		
	CO3	H					H					
	CO4							H		L		
	CO5	H	M			H		M			L	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNITI INTRODUCTION 9

Pollutant in water and wastewater – characteristics, standards for performance – significant and need for physic – chemical treatment.

UNITII PHYSICAL TREATMENT PRINICIPLES 9

Principles of screening – mixing, equalizations –sedimentation – filtration –modeling – backwashing –evaporation-incineration- gas transfer-mass transfer coefficients. Adsorption-isotherms-principles, equilibrates and kinetics, reactors, regeneration, membrane separation, reverse osmosis, nano filtration ultra filtration and hyper filtration – electro dialysis, distillation – stripping and crystallization-recent advances.

UNITIII CHEMICAL TREATMENT PRINCIPLES 9

Principles of chemical treatment – coagulation flocculation – precipitation –floatation, solidification and stabilization- disinfection .ion exchange, electrolytic methods -Solvent extraction –advanced oxidation / reduction –recent advances.

UNITIV DESIGN OF CONVENTIONAL TREATMENT PLANTS 9

Selection of unit operation and processes – design of conventional water treatment plant units – aerators –chemical feeding –flocculation –clarifier – filters –rapid sand filter, slow sand filter, pressure filter-chlorinators. Displacement and gaseous type. layouts- flowcharts –hydraulic profile –O & M aspects- case studies , residue management – up gradation of existing plants – recent advances.

UNITV DESIGN OF INDUSTRIAL WATER TREATMENT AND ECLAMATIO 9

Selection of process –design of softeners – demineralisers –wastewater reclamation – reverse osmosis plants –residue management – O & M aspects –recent advances –case studies.

REFERENCES:

1. Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse Tata McGraw-Hill, New Delhi, 2003.
2. Manual on water supply and Treatment CPHEEO, Ministry of Urban Development ,GOI, New Delhi,1999.
3. Lee ,CC and Shun dar Lin , Handbook of Environmental Engineering Calculations, McGraw-hill,Newyork , 1999.
4. Qasim,S.R motely, E.N., Zhu, G. Water Works Engineering – Planning, Design and Operation,Prentice Hall,New Delhi, 2002.
5. Casey, T.J.Unit Treatment Processes in Water and Wastewater Engineering, John Wiley and Sons, London1993.

BCE075	**GROUND WATER ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Irrigation Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
2. To understand the techniques of development and management of groundwater.

COURSE OUTCOMES (COs)

CO1	To learn about the basics of ground water Engineering including the hydrogeological cycle and water level fluctuations
CO2	To learn about the basics of hydrology of ground water and to make a clear understanding of ground water flow equations of velocity equations.
CO3	To study the basics of unsteady flow and various methods unsteady flow.
CO4	To know about the various sources of ground water like collector wells, infiltration galleries.
CO5	To study about the ground water quality chemistry its origin and water quality standards.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			M						L	
	CO2						H		L			M
	CO3				H					M		
	CO4						M			H	L	
	CO5					M						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I FUNDAMENTALS OF GROUND WATER 9

Introduction – Characteristics of Ground water – Global distribution of water – ground water column- Permeability- Darcy's Law, laboratory permeability test Types of aquifers. Hydro geological Cycle, water level fluctuations.

UNIT II HYDRAULICS OF FLOW 9

Storage coefficient, Specific yield, Heterogenetiy and AnisotrophyTransmissivity – governing equations of ground water flow – Steady state flow – DupuitForchheimer assumption. Velocity potential flow nets.

UNIT III ESTIMATION OF PARAMETERS 9

Transmissivity and Storativity Pumping test - Unsteady state flow- Thies method- Jacob methods - Image well theory - Effect of partial penetrations of well – collectors wells.

UNIT IV GROUND WATER DEVELOPMENT 9

Collector wells – infiltration gallery – Conjunctive use – Artificial recharge – Safe yield – Yield test – Geophysical method – Selection of pumps.

UNIT V WATER QUALITY 9

Ground water chemistry – origin, movement and quality – water quality standards – salt water intrusion – Environmental concern.

TEXT BOOKS:

1. Reghunath H.M. "Ground Water Hydrology", Wiley Eastern Ltd., Second reprint, 2000.

REFERENCES:

1. Tood D.K,"Ground Water Hydrology", Johnand Sons, 2000.
2. Ramakrishnan S,"Ground Water Groundwater",,Ramakrishnan Publication,Chennai 1998.
3. William C Walton, "Ground Water Resource Evaluation", McGraw Hill New York 1970.

BCE076	COASTAL ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Fluid Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

- To provide an overview of the analysis and design procedures used in the field of coastal engineering.
- To introduce the processes of including coastal and estuarine circulation, coastal and shelf waves, surf zone hydrodynamics, sediment transport, hurricane-induced storm surge and inundation, beach nourishment etc
- To enable students apply these engineering principles to solve the problems in this environment such as shoreline erosion, natural flooding hazards, water quality deterioration and coastal habitat evanescence.

COURSE OUTCOMES (COs)

CO1	To provide an overview of the fundamental principles of ocean science and technology.
CO2	To provide the background needed to undertake coastal oceanographic investigations and sets them in context by incorporating case studies and sample problems based on local and global examples.
CO3	To facilitate students to work across disciplinary boundaries and develop an approach that will enable them to incorporate human society in their exploration and analysis of coastal areas.
CO4	To be able to "see" the features and components of the natural, engineering and human aspects of the coast, the functions of components and relationship between them.
CO5	To provide students understanding of the materials and processes associated with the major natural natural and artificial harbours.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H										
	CO2	H		M								
	CO3	H					H				M	
	CO4	H										
	CO5	H										

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I WAVES GENERATION, PROPAGATION AND FORCE 9

Definition – Wave classification – Linear theory of waves- Assumptions and derivations of relationship of wave characteristics- Pressure within progressive wave- Wave energy - Fundamental aspects of stokes theory.

UNIT II WAVE FORECASTING 9

Need for forecasting – SMB and PNJ methods of wave forecasting.

UNIT III TIDES 9

Origin and classification of tides - Karwin's equilibrium theory of tides- Effects on structure - Seiches, surges and Tsunamis.

UNIT IV SEDIMENT MOVEMENT 8

Types of sediment movement – Types of beaches and beach profile – long shore drift and its engineering significance – Causes of coastal erosion and methods of protection.

UNIT V HARBOURS 10

Classification - types of their requirements – Requirements of modern port -Selection of site. BreakWater and their types of selection - Functional design of entrance Channel and breakwaters- Dredging - Need & types of selection of dredgers.

TEXT BOOKS:

1. Garrison .T, "Oceanography", Wadsworth Publications, 4th edition, 2002.

REFERENCES:

1. Sorenson .R. M, "Coastal Zone Engineering", Chapman & Hall, 3rd edition, 2006.
2. Wiegal. R.L., Oceanographical Engineering Prentice Haff, Englewood Cliff's, New Jersy, 1964.

NON MAJOR ELECTIVE-II

BCE077	FINITE ELEMENT ANALYSIS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Structural Analysis – II				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:
To study the energy principles, finite element concept, stress analysis, meshing, linear problems and applications

COURSE OUTCOMES (COs)

CO1	To learn concepts of piecewise Approximation and Finite Elements
CO2	To know about two dimensional problems in stress analysis.
CO3	Tounderstand the meshing and solution problems
CO4	To know about thenonlinear and vibration problems
CO5	To understand the Application to Thermal Analysis Problems.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H			H	H						
	CO2	H			H	H						
	CO3	H			H	H	M					
	CO4	H			H	H						
	CO5	H			H	H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 10

Boundary Value problem – Approximate Solution - Variational and Weighted Residual Methods – Ritz and Galerkin Formulations – Concepts of piecewise Approximation and Finite Elements - Displacement and Shape Functions Weak formulation Minimum Potential Energy. Generation of Stiffness Matrix and Load Vector.

UNIT II STRESS ANALYSIS 10

Two dimensional problems – Plane Stress, Plane Strain and Axisymetric problems – Triangular and Quadrilateral Elements – Natural Coordinates –Isoparametric Formulation – Numerical Integration – Plate Bending and Shell Elements Brick elements for Fracture Analysis.

UNIT III MESHING AND SOLUTION PROBLEMS 10

Higher Order Elements – P & H methods of refinement – III conditional Elements – Discretisation Errors – Auto and Adaptive Mesh Generation Techniques – Error Evaluation.

UNIT IV NONLINEAR AND VIBRATION PROBLEMS 10

Material and Geometric Nonlinearity Methods of Treatment consistent System, Matrice Dynamic Condensation – Eigen Value Extraction.

UNIT V THERMAL ANALYSIS 5

Application to Thermal Analysis Problems.

REFERENCES:

1. Bathe, K.J. Finite Elements Procedures in Engineering analysis. Prentice Hall Inc., 1995.
2. Zienkicwicz, O.C. Arid Taylor, R.L. The Finite Elements Method, McGraw Hill, 1987.
3. Chandrupatla, R.T. and Belegunda. A.D, Introduction to Finite Elements in Engineering, 2nd Edition, Prentice Hall of India, 1997.
4. Moaveni.S., Finite Element Analysis: Theory and Application with ANSYS, Prentice Hall Inc., 1999.

BCE078	**STUCTURES ON EXPANSIVE SOILS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Soil Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To understand the dynamics of earth and to estimate dynamic properties of soils
2. To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential.
3. To design these structures in expansive soil
4. To study the effectiveness of some supper structure resting on treated expansive soil
5. Factors influencing mechanisms in expansive soils

COURSE OUTCOMES (COs)

CO1	To understand the dynamics of earth and to estimate dynamic properties of soils
CO2	To improve the engineering properties and make it suitable for construction
CO3	The engineering properties, problems and solution need to be considered when constructing a foundation on expansive soils.
CO4	To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential.
CO5	To study the behaviour of the stabilized soil subjected to cyclic loading

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	M	L	H	M						
	CO2	H	M	H	M	M						
	CO3	M	M	L	H	M						
	CO4	H	H	M	H	M						
	CO5	M	M	M	H	M						
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
										√		
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I GEOTECHNICAL PROBLEM 9

Occurrence and distribution - moisture equilibrium - Soil, structure, environmental interaction-distress symptoms - case histories.

UNIT II EXPANSIVE SOIL PROPERTIES 9

Clay mineralogy - swell potential - field exploration - laboratory tests for identification.

UNIT III SOIL HEAVING 9

Heave Prediction - Method of prediction of heave- Empirical methods - double of dometer tests - soil moisture suction - field observations, shrinkage.

UNIT IV DESIGN OF FOOTING 9

Foundation Design – Design consideration – individual and continuous footings- stiffened mats-underreamed piles- codal provisions.

UNIT V STABILIZATION 9

Stabilization methods

TEXT BOOKS:

1. John .D.N & Debora .J.M, “Expansive Soils Problems and Practice in Foundation & Pavement Engineering”, J. Wiley, 1992.

REFERENCES:

1. Satish Grower, The Architecture of India, Buddist, Hindu Period and Islamic Period Vikas Publishing HousPvt Ltd., New Delhi, 1984.
2. Chen F.R,” Foundation on Expansive Soils”, Elseivier, 1973.

3. Parcher J.V & Means R.E, Soil Mechanics & Foundation, Columbus, 1968.
4. Perkk R.E., Hansen W.E, Thombum T.H, "Foundation Engineering", John Wiley, 1974.
5. Kameswarao N.S.V," Dynamic Soil Test & Applications", Wheeler Publishing Co., 2002

BCE079	QUALITY CONTROL AND ASSURANCE IN CONSTRUCTION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Building Construction Technology				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:
To create a complete understanding on quality planning, quality assurance, quality control and safety management

COURSE OUTCOMES (COs)

CO1	Know the Quality plan and Quality Management Guidelines
CO2	Understand the Quality system and standard Documents and Quality related training
CO3	Know the quality planning, Contract and construction programming, Inspection procedures, Processes and products
CO4	Know the quality assurance, appraisals and quality control by reliability testing
CO5	Understand how the quality techniques can be improved.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1						M	M	M			
	CO2						M	M	M			
	CO3						M	M	M		L	
	CO4						M	M	M			
	CO5	L					M	M	M			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I QUALITY MANAGEMENT 9

Introduction – Definitions and objectives – Factor influencing construction quality - Responsibilities and authority - Quality plan - Quality Management Guidelines – Quality circles.

UNIT II QUALITY SYSTEMS 9

Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

UNIT III QUALITY PLANNING 9

Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures - Processes and products – Total QA / QC programme and cost implication.

UNIT IV QUALITY ASSURANCE AND CONTROL 9

Objectives - Regularity agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality - Appraisals, Factors influencing construction quality - Critical, major failure aspects and failure mode analysis, - Stability methods and tools, optimum design - Reliability testing, reliability coefficient and reliability prediction.

UNIT V QUALITY IMPROVEMENT TECHNIQUES 9

Selection of new materials -Influence of drawings, detailing, specification, standardization -Bid preparation -Construction activity, environmental safety, social and environmental factors - Natural causes and speed of construction -Life cycle costing -Value engineering and value analysis.

REFERENCES:

1. James, J.O' Brian, Construction Inspection Handbook – Quality Assurance and Quality Control, Van Nostrand, New York, 1989.
2. Kwaku, A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., Virginia, 1985.
3. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, Tata McGraw Hill, 1993
4. Hutchins.G, ISO 9000, Viva Books, New Delhi, 2000
5. Clarkson H. Oglesby, Productivity Improvement in Construction, McGraw-Hill, 1989.
6. John L. Ashford, The Management of Quality in Construction, E & F.N.Spon, New York, 1989.
7. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, England. 1998.

BCE080	CONSTRUCTION PERSONNEL MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Personality Development				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the elements of human behaviour and their impact on construction personnel management

COURSE OUTCOMES (COs)

CO1	Know about the Manpower Planning and Organising
CO2	Understand the Development and Operation of human resources
CO3	Understand the awareness on fundamentals of human behavior under varying stress conditions
CO4	Know the welfare measures and Laws related to welfare measures.
CO5	Understand Management and Development Methods Productivity of Human resources.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1						M		M			
	CO2						M		M			
	CO3						M		M			
	CO4						M		M			
	CO5						M		M			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I MANPOWER PLANNING 10

Manpower Planning, Organising, Staffing, directing, and controlling – Personnel Principles

UNIT II ORGANISATION 10

Organisation – Span of Control – Organisation Charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection - Placement, Training and Development.

UNIT III HUMAN BEHAVIOUR 10

Introduction to the field of people management - basic individual psychology; motivation - ob design and performance management - Managing groups at work - self-managing work teams - intergroup behaviour and conflict in organisations – Leadership - Behavioural aspects of decision-making; and communication for people management

UNIT IV WELFARE MEASURES 5

Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension –Laws related to welfare measures.

UNIT V MANAGEMENT AND DEVELOPMENT METHODS 10

Compensation - Wages and Salary, Employee Benefits, employee appraisal and assessment - Employee services - Safety and Health – Discipline and discharge - Special Human resource problems, Performance appraisal. - Employee hand book and personnel manual – Job descriptions and organization structure and human relations – Productivity of Human resources.

REFERENCES:

1. Carleton Counter II and Jill Justice Coutler , The Complete Standard Handbook of Construction Personnel Management, Prentice-Hall, Inc., New Jersey, 1989.
2. Memoria,C.B., Personnel Management, Himalaya Publishing Co., 1997.
3. Josy.J. Familaro, Handbook of Human Resources Administration, McGraw- Hill International Edition, 1987.
4. Charles D Pringle, Justin Gooderi Longenecter, Management, CE Merril Publishing Co.1981.
5. Dwivedi R.S, Human Relations and Organisational Behaviour, Macmillian IndiaLtd.,2005.

BCE081	WATER AND SEWAGE CONVEYANCE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Applied Hydraulic Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the students in detailed concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application

COURSE OUTCOMES (COs)

CO1	To make them understand the fundamentals of hydraulic engineering and the various fluid flow phenomenon
CO2	To understand about the methods of water transmission and distribution and the economics related to water transmission
CO3	To understand in detail about the waste water collection and conveyance and also the maintenance of sewers and design of sewer outfalls
CO4	To improve the knowledge on the planning and estimation of storm water flow.

CO5	To know about the basics of the Case Studies and Computer applications for water transmission..

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H									L	
	CO2	H	M		M		H					L
	CO3		M						H			
	CO4	H					H			L		
	CO5		M		H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PRINCIPLES OF HYDRAULICS 9

Fluid properties; fluid flow – continuity principle, energy principle and momentum principle; frictional head loss in free and pressure flow, major and minor head loss, formula for estimation of head loss – pumping of fluids – selection of pumps – Flow measurement.

UNIT II WATER TRANSMISSION AND DISTRIBUTION 9

Planning factors – Water transmission main design – pipe material – economics – water hammer analysis; water distribution pipe networks - methods for analysis and optimization - Laying and maintenance, insitu lining – appurtenances – corrosion prevention – minimization of water losses – leak detection.

UNIT III WASTEWATER COLLECTION AND CONVEYANCE 9

Planning factors – Design of sanitary sewer; partial flow in sewers, economics of sewer design; sewer appurtenances; material, construction, inspection and maintenance of sewers; Design of sewer outfalls-mixing conditions; conveyance of corrosive wastewaters.

UNIT IV STORM WATER DRAINAGE 9

Planning – run-off estimation, rainfall data analysis, storm water drain design – rain water harvesting

UNITV CASE STUDIES AND COMPUTER APPLICATIONS 9

Computer applications for water transmission, water distribution and sewer design.

REFERENCES:

1.G.S.Bajwa, Practical Handbook on Public Health Engineering, Deep Publishers, Shimla, 2003.

2."Manual on water supply and Treatment", CPHEEO, Ministry of Urban Development, Gol, New Delhi, 1999.

3."Manual on sewerage and Sewage Treatment', CPHEEO, Ministry of Urban Development, Gol, New Delhi, 1993.

4.B.A. Hauser, Practical Hydraulics Handbook, Lewis Publishers, New York, 1991.

BCE082	**ENVIRONMENTAL ENGINEERING STRUCTURES**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Environmental Engineering				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To educate the students in detailed concepts related to water transmission mains, water distribution system, sewer networks and storm water drain, with emphasis on computer application

COURSE OUTCOMES (COs)

CO1	To make them understand the fundamentals of Structural design of Concrete, Prestressed Concrete, Steel and Cast iron etc
CO2	To understand about the methods of analysis and design of water tanks and the types of cement roofing system
CO3	To understand in detail about the design of special purpose structures like underground reservoirs and swimming pools.
CO4	To improve the knowledge on the repair and rehabilitation of structures and also diagonising and identification of the cause and damage
CO5	To know about the exposure on steel, lattice structures used in water and sewerage works.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H										
	CO2	H			M						L	
	CO3	H	L									
	CO4						H			L		
	CO5		M		H							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I DESIGN OF PIPES 9

Structural design of a) Concrete b) Prestressed Concrete c) Steel and d) 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 9

Design of concrete roofing systems a) Cylindrical b) Spherical and c) 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 9

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 9

Diagonising the cause and damage, identification of different types of structural and non-structural cracks - repair and rehabilitation methods for Masonry, Concrete and Steel Structures.

UNIT V EXPOSURE ON STEEL, LATTICE STRUCTURES USED IN WATER AND SEWERAGE WORKS 9

TEXT BOOKS:

1.Reinforced Concrete by P .Dayaratnam.
2.Prestressed Concrete by Krishna Raju, Tata McGraw-ill Publishing Co. 2nd Edition 1988.
3.Reinforced Concrete by N.C.Sinha & S.K.Roy - S.Chand and Co. 1985.

REFERENCES:

1.Hulse R., and Mosley, W.H., "Reinforced Concrete Design by Computer", Macmillan Education Ltd., 1986.
2.Ramaswamy, G.S., "Design and Construction of Concrete shell roofs", CBS Publishers, India, 1986.

3.Green, J.K. and Perkins, P.H., "Concrete liquid retaining structures", Applied Science Publishers, 1981.

BCE083	SOIL DYNAMICS & MACHINE FOUNDATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Soil Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To understand the soil properties and suitable remedial measures to improve their behavior.
2. To familiarize students with the dynamic properties of soil.
3. To create an understanding about the importance of designing machine foundation for reciprocating and impact machines.

COURSE OUTCOMES (COs)

CO1	To understand the Vibration of elementary systems
CO2	To improve the engineering properties and application in soil dynamics.
CO3	The engineering dynamic properties of soil Field & Laboratory methods.
CO4	To develop specific design Impact type machine and Rotary type machines
CO5	To study the principles of vibration neutralizer

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	H	M	M	H	M		H				
	CO2	M	L	H	M	M		M				
	CO3	M	M	L	H	M		M				
	CO4	M	H	M	H	M		M				
	CO5	M	M	M	H	M		M				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 8

Vibration of elementary systems – vibratory – single degree freedom -system – free and forced vibrations with and without damping – transient response of single degree freedom systems.

UNIT II WAVES & WAVE PROPAGATION 9

Wave propagation in an elastic homogeneous isotropic medium - Shear and compression waves - wave propagation in elastic, half space (no theoretical treatment or derivation) properties of compression, shear and Raleigh waves – application in soil dynamics.

UNIT III DYNAMIC PROPERTIES OF SOILS 9

Elastic properties of soils – soil treated as spring or elastic half space – Co – efficient – provision of dynamic properties of soil as per latest BIS 5249 -Co efficient of elastic, uniform and non-uniform compression and shear- Determination of dynamic properties of soil- Field & Laboratory methods.

UNIT IV DESIGN OF MACHINE FOUNDATION 10

General requirements of machine foundations – Design criteria – principles of & simple procedures of design of foundations for machineries of reciprocating type, Impact& Rotary type (treated as single degree freedom only) – dynamic loads, simple design procedures for foundations under Reciprocation machines. Impact type machine and Rotary type machines.

UNIT V VIBRATION ISOLATION & SCREENING 9

Vibration isolation technique mechanical isolation, foundation isolation, isolation by location isolation by barriers – active and passive isolation tests – problems – types of Isolation – active, passive – principles of vibration neutralizer (no derivation)

TEXT BOOKS:

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 2010.

REFERENCES BOOKS:

1. Rtehart F.E, R.D.Woods & J.R. Hall, vibrations of Soils and Foundations, Prentice Hall, 1970.
2. Prakash S.& Pun V.K, Soil Dynamics & Design foundation, McGraw Hill Co. 1998.
3. Srinivasulli P &Vaidanathan C," Handbook on machine Foundations", McGraw Hill Co.1976.
4. Code Practice of Design and Construction of Machine Foundations, I.S.2974, 1987 Part I to IV.Prakash .S and Puri V.K, "Foundation for Machines", McGraw Hill Publishing Company, Newyork, 1988

BCE084	HYDROLOGY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Fluid Mechanics				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To impart knowledge on hydrological cycle, spatial and temporal measurement and analysis of rainfall and their applications including flood routing and ground water hydrology.

COURSE OUTCOMES (COs)

CO1	Measure the rainfall intensity , duration and frequency
CO2	Assess the losses of precipitation due to evaporation
CO3	Prepare the unit hydrograph for surface runoff
CO4	Solve the flood routine and channel routine problems
CO5	Conduct yield test on aquifers

UNIT I HYDROMETEOROLOGY 9

Hydrological cycle -Hydro meteorological factors -Cloud formation- Winds and their movement -types of precipitation.- Forms for precipitation- Density and Adequacy of rain gauges – Recording and non-recording gauges.

UNIT II PRECIPITATION AND ABSTRACTIONS 9

Spatial distribution – Consistency analysis – Frequency analysis – Intensity, duration, frequency relationships- Evaporation –Infiltration- Norton's equation Infiltration indices – Types of streams – Stage discharge relationships – Flow measurements – Currents meter method for velocity measurements.

UNIT III HYDROGRAPH ANALYSIS 9

Factors affecting the shape of hydrograph- Components of DRH. Baseflow- Unit hydrograph - Scurve hydrograph- Synthetic unit hydrograph.

UNIT IV GROUND WATER HYDROLOGY 9

Occurrence of ground water – Types of aquifer – Dupuifs assumptions – Darcy's law – Estimation of aquifer parameters – Pump tests.

UNIT V FLOOD ANALYSIS 9

Flood estimation – Gumbel's method – log Pearson types III method – Reservoir flood routing, Channel routing, Other methods of routing.

TEXT BOOKS:

1. Subramanya K. Engineering Hydrology, Tata McGraw Hill. Publishing Company Limited, 2006

REFERENCES:

1. Raghunath H M, Hydrology, Witey Eastern Limited, New Delhi 1998.
2. Vijay Singh P, Elementary Hydrology -Prentice Hall of India, 1998.
3. Mutreja K N, Applied Hydrology, Tata McGraw Hill Publications, New Delhi, 1998.

4. Jayaram Reddy P Hydrology, Tata McGraw Hill Publications, New Delhi, 1998.

OPEN ELECTIVE-I

BCE093	REMOTE SENSING AND GIS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite-Engineering Physics – II				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To introduce the students to the basic concepts and principles of various components of remote sensing.
2. To provide an exposure to GIS and its practical applications in civil engineering.

COURSE OUTCOMES (COs)

CO1	Apply the concepts of Electro Magnetic energy, spectrum and spectral signature curves in the practical problems
CO2	Apply the concepts of satellite and sensor parameters and characteristics of different platforms
CO3	Apply the concepts of DBMS in GIS
CO4	Analyze raster and vector data and modeling in GIS
CO5	Apply GIS in land use, disaster management, ITS and resource information system

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1				H	H				H		
	CO2				H	H				H		
	CO3				H	H				H		
	CO4				H	H				H		
	CO5				H	H				H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I REMOTE SENSING 9

Definition Historical Components of Remote Sensing Principles & methods of remote sensing - Active and Passive remote sensing - Remote Sensing platforms -Electro magnetic radiation- Spectrum- Block body radiation – planks law – Stefan – Boltzmann law – satellites classification – based on orbit- sun synchronous and Geosynchronous based on purpose Earth Resources satellites, communication satellite Weather satellites Spy satellites Sensors Description of sensor in landscape, spot, IRS series and current satellites- Radar SLAR-and SAR.

UNIT II EMR INTERACTIONS 9

Interaction with atmosphere Scattering of EMR Raleigh, Mie, Non Selective and Raman Scattering Bach scattering Speckle EMR Interaction with water and Ozone Atmospheric windows and its significance EMR interaction with the earth surface materials Radiance, irradiance, Absorbed and Transmitting energy – reflectance- Specular- and diffuse surface- Spectral signature – and curves EMR interaction with soil Resolution Spectral, Spatial, Radiometric, and Temporal.

UNIT III RESOURCES ENGINEERING 9

Characteristics of Digital satellite image enhancement Filtering Applications of Aerial photographs and satellite imageries – merits – Limitations – Water resources – watershed management – Urban Studies – Flood Management- Fishing Forestry etc.,

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.

UNIT V MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems

TEXT BOOKS:

1. Anji Reddy, “Remote Sensing and Geographical Information Systems”, BS Publications 2001

REFERENCES:

1. Anand P.H,”Principles of remote Sensing and Geographical Information Systems”, Sri Venkateswara Publishers, 2003.
2. Lillesand T.M and Kiefer R.W. Remote sensing and Image, Interpretation, John Wiley and Sons, INC, New York, 1987.
3. Burrough P A,”Principle of GIS for land resource assessment”, Oxford University, 1990.

BBA008	TOTAL QUALITY MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Professional Courses				
	Course Designed by – Dept of Mechanical Engineering				

OBJECTIVES

1. To introduce to the student about the basic terms related to quality and concepts of quality management
2. To familiarize the student about the basic principles of total quality management
3. To acquaint the student with the basic statistical tools used in process control
4. To introduce to the student about the various tools used in implementing and checking total quality management
5. To familiarize the student about the different quality systems used in auditing the quality of a company/industry/organization

COURSE OUTCOMES (COs)

CO1	By understanding about various quality terms, it will be helpful for the student to maintain quality in his/her organization
CO2	The student will be able to formulate new plans/procedures to be implemented to achieve the desired quality status by knowing about the various principles of quality management
CO3	The student will be able to analyze the periodical data in quality control using statistical tools
CO4	The total quality management tools will help the student to understand the procedures in measuring the quality of the organization/process and will also enable him/her to identify the parameters that are improving/depriving the quality
CO5	By knowing about the quality ISO systems, the student will be maintain processes/documentation properly so that the quality maintained by his/her organization gets recognized

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1			M		H		M	H	M	L	L
	CO2			M		H		M	H	M	L	L
	CO3			M		H		M	H	M	L	L
	CO4			H		H		M	H	M	L	L
	CO5			H		H		M	H	M	L	L

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation

UNIT II TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership –Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS 9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA –Stages of FMEA.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System –Elements, Implementation of Quality System, Documentation, Quality Auditing, TS16949, ISO 14000 – Concept, Requirements and Benefits

TEXT BOOKS:

1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc.2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCE BOOKS:

1. Evans. J. R. & Lindsay. W,M "The Management and Control of Quality", (5th Edition),South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management", McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management", Butterworth Hcinemann Ltd., Oxford,1989.
4. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks",New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers, 1991.

BCE094	OPTIMIZATION TECHNIQUES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Fundamentals of Computing and Programming				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To introduce the students to the basic concepts and principles of optimization, linear programming and queuing theory

COURSE OUTCOMES (COs)

CO1	Understanding the Concept of optimization and classification of optimization problems.
CO2	Formulation simplex methods variable with upper bounds
CO3	Study the Queuing Model, poison and exponential distributions
CO4	Understand the maximization and minimization of convex functions
CO5	To study equality constraints, inequality constraints

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1							M	H			
	CO2							M	H			
	CO3	L			M			M	H			
	CO4							M	H			
	CO5							M	H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 8

Concept of optimization – classification of optimization – problems.

UNIT II LINEAR PROGRAMMING 10

Examples of linear programming problems – formulation simplex methods variable with upper bounds – principle- duality -dual simplex method - sensitivity analysis – revised simplex procedure – solution of the transportation problem – assignment – network minimization – shortest route problem – maximal two problem – L.P. representation of networks.

UNIT III QUEUING THEORY 9

Queuing Model, poison and exponential distributions -Queues with combined arrivals and departures- random and series queues.

UNIT IV UNCONSTRAINED OPTIMIZATION 9

Maximization and minimization of convex functions. Necessary and sufficient conditions for local minima – speed and order of convegence – unibariate search – steepest and desent methods- metcher reeves method -conjugate gradient method.

UNIT V CONSTRAINED OPTIMIZATION 9

Necessary and sufficient condition – equality constraints, inequality constraints -kuhu – tucker conditions – gradient projection method – penalty function methods – cutting plane methods of sibel directions.

TEXT BOOKS:

1. Rao S.S,"Optimization – Theory and applications", Wiley Easter Ltd., 1979.

REFERENCES:

1. David G.Luerbeggan, "Introduction to Linear and Non Linear Programming", Addison Wesley Publishing Co. 1973.
2. Hadley G. "Nonlinear and – dynamic programming" Addison Wesley Publishing Co. 1964.
3. Cordan C.C. Beveridge and Robert S. Schedther, "Optimization, Theory and Practice" McGraw Hill Co.1970.
4. HarndyA.Tahh. "operations Research, An Introduction", Macmillan Publishers Co.NewYork,1982.
5. Beightferand S. others, "Foundations of Optimization Pill", New Delhi, 1979.

OPEN ELECTIVE-II

BCE095	GEOGRAHICS INFORMATION SYSTEM	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Remote Sensing and GIS				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To introduce the students to the basic concepts and principles of various components of Geographic Information System

COURSE OUTCOMES (COs)

CO1	To procure knowledge about History and development of GIS
CO2	Apply the concept of Data Entry, Storage & Maintenance
CO3	Apply the concepts of DBMS in GIS
CO4	Analyze raster and vector data and modeling in GIS
CO5	Apply GIS in land use, disaster management, ITS and resource information system

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1	M			H	H				H		
	CO2	M			H	H				H		
	CO3	M			H	H				H		
	CO4	M			H	H				H		
	CO5	M			H	H				H		

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION 9

Definition – Map and amp analysis – Automated carrography, History and development of GIS. Hardware requirement -system concepts Coordinate systems - Standard GIS packages.

UNIT II DATA ENTRY, STORAGE & MAINTENANCE 9

Type of data. Spatial and non-spatial data – Data structure – points – Lines – polygon - Vector and raster Piles and data formats- Data compression.

UNIT III DATA ANALYSIS OF MODELING 9

Spatial analysis - Data retrival- Query Simple analysis- Record overlay- vector data analysis- raster data analysis - Modeling in GIS- Digital elevation model- DIM cost and path analysis - Artificial intelligence- Expert system.

UNIT IV DATA OUTPUT & ERROR ANALYSIS 9

Types of output data – Display on screen – Printer – Plotter – Other output devices – Sources of errors – Types of error – Elimination. Accuracies.

UNIT V APPLICATION 9

GIS Application: Application areas – Resources management – Agriculture Soil – Water Resources management – Cadestral records and US – Integrated remote sensing application with GLS – Knowledge based techniques.

TEXT BOOKS:

1. Anji Reddy .M, "Remote sensing and Geographical information system", B.Publications, 2011.

REFERENCES:

1. Chester (England), Geo informational System, Application of GIS and Related Spatial Information Technologies – ASTER Publication Co. 1992.
2. Burrough .P.A, "Principles of GIS for Land Resources Assessment", Oxford Publication,2000.
3. Jeffrey Star and Join Estes, "Geographical Information System An Introduction" – Prentice Hall, 1990.

BCE096	**ENGINEERING ECONOMICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Management Concepts For Civil Engineers				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

1. To impart knowledge on Economics and its importance in the field of Engineering

COURSE OUTCOMES (COs)

CO1	Have knowledge about the importance of Economics and the factors affecting demand and supply
CO2	Have a well-founded knowledge about the cost aspects and cost-output relationship
CO3	Acquire skills in assessing functions and principles of management and also the types of organizations
CO4	Have knowledge about plant layout and its maintenance
CO5	Have knowledge about the concepts of productivity, economic growth and standard of living.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1		H					H				
	CO2		H							M		
	CO3			H			M					L
	CO4		H									
	CO5			H								
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Mathematics (BS)		Engineering Sciences	Professional Core (PC)	Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
											√	
4	Approval	37th Meeting of Academic Council, May 2015										

UNIT I BASIC CONCEPT 9

Basic economic concept - importance of economics in engineering- economic and Technical decisions- demand and supply- factors influencing demand- elasticity of demand - demand forecasting- competition.

UNIT II COST 9

Actual cost and opportunity cost- marginal cost- incremental. costs and sunk cost, fixed and variable cost- short-run long- run cost- cost output relationship- price fixation pricing methods, break even analysis.

UNIT III PROCESS OF MANAGEMENT 9

Nature of management and its process- contribution of Taylor and. Foyal of management Functions and principles of management- types of organizations- organization charts and Manuals - industrial ownership - types, formation, merits, and demerits management by Objective, management by exception and management information system.

UNIT IV PLANNING TECHNIQUES 9

Plant location - factors- decisions- plant layout, types, procedure and techniques material handling- principles, equipments and selection- plant maintenance- objective types and techniques

UNIT V PRODUCTION AND ITS APPLICATION 9

Production, productivity, economic growth and standard of living- factors affecting Productivity - role of work study- human factor- method study-objective and procedures- charting and photographic techniques- SIMO chart - principles of motion economy- work measurement- stop watch time study- ruling concept and systems- allowances - work sampling.

TEXT BOOK:

1 Varshney and Maheshwari, Managerial Economics

2. Dewett, Modern Economic Theory

REFERENCE:

1. L.M.Prasad, Principles and Practice of Management, Sultan Chand and Sons.
2. V.P.S.Rao and P.S.Narayana, Principles of Management.

BCE097	**RENEWABLE SOURCES OF ENERGY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Engineering Earth Science				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES:

To impart knowledge on sources and characteristics of various renewable source of energy and strategies for its implementation.

COURSE OUTCOMES (COs)

CO1	Have knowledge about the various renewable sources of energy
CO2	Have a well-founded knowledge about the Primary energy sources
CO3	Acquire skills in assessing the suitability of direct energy conversion
CO4	Have knowledge about bio – energy
CO5	Have knowledge about solar energy.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k
2	CO1		H	H								
	CO2		H	H								
	CO3		H	H								
	CO4		H	H								
	CO5		H	H								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Mathematics (BS)	Engineering Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I GENERAL 9

Primary energy sources -direct energy - conversion -comparison with conventional energy-conversion devices.

SOLAR ENERGY – Principles of solar energy collection – solar radiation – measurement instruments - data and estimation - types of collectors - characteristics and design principles of different types of collectors - testing of collectors.

UNIT II SOLAR ENERGY APPLICATIONS 9

Solar thermal applications – water heaters and air heaters performance and applications - simple calculations on solar cooling, solar drying, solar ponds, solar tower concepts and solar furnace.

UNIT III WIND AND TIDAL ENERGY 9

Energy from the wind – general theory of windmills – design aspects of horizontal axis and vertical axis windmills – applications. Energy from tides and waves – working principles of tidal plants and ocean thermal energy conversion plants – power from geothermal energy – principles of working of geothermal power plants.

UNIT IV BIO – ENERGY 9

Energy from bio – mass bio – gas plants – various types -design principles of bio – gas plants applications- Energy from waste burning- power plants, utilization of industrial and municipal wastes – energy from the agricultural wastes.

UNIT V DIRECT ENERGY CONVERSION 9

(Description, principle of working and basic design aspects only) Magneto hydrodynamic systems, thermo electric generators, thermionic generators fuel cells solar cells types, e.m.f. generated, power output, tosses and efficiency and applications.

TEXT BOOKS:

1. D. Yogi Goswami, Frank Kreith&Jan F. Kreider," Principles of Solar Energy Engineering", CRC Press, 2000

REFERENCES:

1. John A. Duffie, William A. Beckman,"Solar Energy Thermal processes", John Wiley & Sons; 4th Edition edition (17 May 2013).
2. Sukhatme K, Suhas P. Sukhatme," Solar Energy", Tata McGraw-Hill Education, 1996
3. Rai G.D,"Solar Energy Utilisation",Khanna Publishers, 1987
4. Shao-lee Soo,"Direct Energy Conversion", Prentice-Hall, 1968