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Department of Civil Engineering
B.Tech Civil Engieering (Full Time)
Curriculum and Syllabus
2018 Regulation

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
		I SEMESTER					
1	BEN18001	Technical English –I	Ty	1	0/0	2/0	2
2	BMA18001	Mathematics – I	Ty	3	1/0	0/0	4
3	BPH18001	Engineering Physics –I	Ty	2	0/1	0/0	3
4	BCH18001	Engineering Chemistry –I	Ty	2	0/1	0/0	3
5	BES18001	Basic Electrical & Electronics Engineering	Ty	2	0/1	0/0	3
6	BES18002	Basic Mechanical & Civil Engineering	Ty	2	0/1	0/0	3
		PRACTICALS*					
1	BES18L01	Basic Engineering Workshop	Lb	0	0/0	2/0	1
2	BES18ET1	Orientation To Entrepreneurship & Project Lab	ETL	0	0/0	2/0	1

Credits Sub Total: 20

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
		II SEMESTER					
1	BMA18003	Mathematics – II	Ty	3	1/0	0/0	4
2	BPH18002	Engineering Physics –II	Ty	2	0/1	0/0	3
3	BCH18002	Engineering Chemistry – II	Ty	2	0/1	0/0	3
4	BES18003	Environmental Science*	Ty				NC
		PRACTICALS*					
1	BEN18ET1	Communication Lab	ETL	1	0/0	2/0	1
2	BES18ET2	Basic Engineering Graphics	ETL	1	0/0	2/0	2
3	BES18L02	Integrated Physical Science Lab	Lb	0	0/0	2/0	1
4	BES18ET3	C Programming and Lab	ETL	1	0/0	2/0	2

Credits Sub Total: 16

TOTAL CREDITS: 36

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab   * Internal Evaluation

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	III SEMESTER						
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BMA18005	Mathematics III For Mechanical and Civil	Ty	3	1/0	0/0	4
2	BCE18001	Mechanics of Solids	Ty	3	1/0	0/0	4
3	BCE18002	Building Materials	Ty	3	0/0	0/0	3
4	BCE18003	Engineering Geology	Ty	3	0/0	0/0	3
5	BEE18I04	Energy Conservation Techniques	Ty	3	0/0	0/0	3
		PRACTICALS*					
1	BCE18L01	Building Drawing Practice	Lb	0	0/0	3/0	1
2	BCE18L02	Strength of Materials and Concrete Lab	Lb	0	0/0	3/0	1
3	BAR18IL1	Geology and Building Materials Lab	Lb	0	0/0	2/0	1

Credits Sub Total: 20

	IV SEMESTER						
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BCE18004	Engineering Survey	Ty	3	1/0	0/0	4
2	BCE18005	Strength of Materials	Ty	3	1/0	0/0	4
3	BCE18006	Mechanics of Fluids	Ty	3	0/0	0/0	3
4	BEC18I09	Sensors and Instrumentation	Ty	3	0/0	0/0	3
5	BHS18NC1/ BHS18NC2	The Indian Constitution*/ The Indian Traditional Knowledge*	Ty	2	0/0	0/0	NC
		PRACTICALS*					
1	BCE18ET1	Concrete and Construction Technology	ETL	1	0/1	3/0	3
2	BCE18L03	Fluid Mechanics and Hydraulic Machinery Lab	Lb	0	0/0	3/0	1
3	BCE18L04	Surveying Field Work	Lb	0	0/0	3/0	1
4	BAR18IL2	Basics of Auto CADD	Lb	0	0/0	3/0	1
5	BCE18TS1	Building Drawing Using Civil Engineering Software	Lb	0	0/0	0/2	1
6	BEN18SK1	Soft Skill I (Career & Confidence Building)	ETL	0	0/0	3/0	1

Credits Sub Total: 22

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab   * Internal Evaluation

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S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
		V SEMESTER					
1	BCE18007	Applied Hydraulic Engineering	Ty	3	1/0	0/0	4
2	BME18I01	Composite Materials	Ty	3	0/0	0/0	3
3	BCE18EXX	Elective I	Ty	3	0/0	0/0	3
4	BXX18OEX	Open Elective I	Ty	3	0/0	0/0	3
		PRACTICALS*					
1	BCE18ET2	Water Supply And Sanitary Engineering	ETL	1	0/1	3/0	3
2	BCE18L05	Environmental Engineering Lab	Lb	0	0/0	3/0	1
3	BCE18L06	Environmental and Hydraulic Structures Drawing	Lb	0	0/0	3/0	1
4	BCS18IL7	Basic Computer Skill For Civil Engineers	Lb	0	0/0	3/0	1
5	BCE18TS2	Survey Camp	Lb	0	0/0	3/0	1

Credits Sub Total: 20

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
		VI SEMESTER					
1	BCE18008	Structural Analysis	Ty	3	1/0	0/0	4
2	BCE18009	Soil Mechanics And Foundation Engineering	Ty	3	1/0	0/0	4
3	BCE18EXX	Elective II	Ty	3	0/0	0/0	3
4	BXX18OEX	Open Elective II	Ty	3	0/0	0/0	3
		PRACTICALS*					
1	BCE18ET3	Remote Sensing and GIS	ETL	1	0/1	3/0	3
2	BCE18L07	Soil Mechanics Lab	Lb	0	0/0	3/0	1
3	BCE18L08	Structural Analysis and Design Based On Civil Engineering Software	Lb	0	0/0	3/0	1
4	BEN18SK2	Soft Skill II (Qualitative and Quantitative Skills)	ETL	0	0/0	3/0	1
5	BCE18L09	Mini Project/In plant Training/Industrial training	Lb	0	0	3/0	1
6	BCE18TS3	Advanced Surveying Field Work	Lb	0	0/0	3/0	1

Credits Sub Total: 22

C: Credits L: Lecture T: Tutorial S. Lr : Supervised Learning P : Problem / Practical R : Research

Ty/Lb/ETL: Theory/Lab/Embedded Theory and Lab *Internal evaluation

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VII SEMESTER							
S.NO.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/ Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1	BCE18010	Estimation And Quantity Surveying	Ty	3	1/0	0/0	4
2	BCE18EXX	Elective III	Ty	3	0/0	0/0	3
3	BCE18EXX	Elective IV	Ty	3	0/0	0/0	3
4	BMG18003	Principles of Management	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BCE18ET4	Transportation Engineering	ETL	1	0/1	3/0	3
2	BCE18L010	Transportation Engineering Lab	Lb	0	0/0	3/0	1
3	BCE18L011	Estimation And Evaluation Practical	Lb	0	0/0	3/0	1
4	BCE18L012	Project Phase – I	Lb	0	0/0	3/3	2
5	BHS18FLX	Foreign Language	Lb	0	0/0	3/0	1
6	BXX18OLX	Open Elective Lab	Lb	0	0/0	3/0	1

Credits Sub Total: 22

III SEMESTER							
S.NO.	**SUBJECT CODE**	**SUBJECT NAME**	**Ty/ Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1	BCE18011	Disaster Mitigation And Management	Ty	3	1/0	0/0	4
2	BCE18012	Design Of Steel Structures	Ty	3	0/0	0/0	3
3	BCE18EXX	Elective V	Ty	3	0/0	0/0	3
PRACTICALS*							
1	BCE18L013	Project (Phase – II)	LB	0	0/0	12/12	8

Credits Sub Total: 18

C: Credits L: Lecture T: Tutorial S.Lr: Supervised Learning P: Problem / Practical R: Research
Ty/Lb/ETL: Theory /Lab/Embedded Theory and Lab   * Internal Evaluation

Credit Summary
Semester : 1   : 20
Semester : 2   : 16
Semester : 3   : 20
Semester : 4   : 22
Semester : 5   : 20
Semester : 6   : 22
Semester : 7   : 22
Semester : 8   : 18

Total Credits   : 160

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S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
ELECTIVE -I							
1	BCE18E01	Hydrology	Ty	3	0/0	0/0	3
2	BCE18E02	Dam Engineering	Ty	3	0/0	0/0	3
3	BCE18E03	Industrial Structures	Ty	3	0/0	0/0	3
4	BCE18E04	Environmental Impact Assessment	Ty	3	0/0	0/0	3

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
ELECTIVE -II							
1	BCE18E05	Design of Concrete Structures	Ty	3	0/0	0/0	3
2	BCE18E06	Housing Planning and Design	Ty	3	0/0	0/0	3
3	BCE18E07	Building Technology and Habitat Engineering	Ty	3	0/0	0/0	3
4	BCE18E08	Cost Effective Buildings	Ty	3	0/0	0/0	3

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
ELECTIVE -III							
1	BCE18E09	Industrial Waste Management	Ty	3	0/0	0/0	3
2	BCE18E10	Cleaner Production	Ty	3	0/0	0/0	3
3	BCE18E11	Architecture And Town Planning	Ty	3	0/0	0/0	3
4	BCE18E12	Construction Management	Ty	3	0/0	0/0	3

S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
ELECTIVE -IV							
1	BCE18E13	Structural Dynamics And Earth Quake Engineering	Ty	3	0/0	0/0	3
2	BCE18E14	Bridge Structures	Ty	3	0/0	0/0	3
3	BCE18E15	Prestressed Concrete Structures	Ty	3	0/0	0/0	3
4	BCE18E16	Tall Buildings	Ty	3	0/0	0/0	3

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S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
ELECTIVE -V							
1	BCE18E17	Repair And Rehabilitation Of Structures	Ty	3	0/0	0/0	3
2	BCE18E18	Municipal Solid Waste Management	Ty	3	0/0	0/0	3
3	BCE18E19	Finite Element Analysis	Ty	3	0/0	0/0	3
4	BCE18E20	Pre Fabricated Structures	Ty	3	0/0	0/0	3

OPEN ELECTIVES							
ELECTIVE -I							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BCE18OE1	Water Pollution And Its Management	Ty	3	0/0	0/0	3
2	BCE18OE2	Environment, Health And Safety In Industries	Ty	3	0/0	0/0	3
3	BCE18OE3	Green Building And Vastu Concepts	Ty	3	0/0	0/0	3
4	BCE18OE4	Climate Change And Sustainable Development	Ty	3	0/0	0/0	3
ELECTIVE -II							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BCE18OE5	Intelligent Transportation Systems	Ty	3	0/0	0/0	3
2	BCE18OE6	Geographical Information System And Mapping	Ty	3	0/0	0/0	3
3	BCE18OE7	Industrial Pollution Prevention And Cleaner Production	Ty	3	0/0	0/0	3
4	BCE18OE8	Air Pollution Control	Ty	3	0/0	0/0	3

OPEN LAB							
S.NO.	SUBJECT CODE	SUBJECT NAME	Ty/ Lb/ ETL	L	T/ SLr	P/R	C
1	BCE18OL1	Building Drawing Practice Using Auto Cadd	Lb	0	0/0	3/0	1
2	BCE18OL2	Geographical Information System And Mapping Lab	Lb	0	0/0	3/0	1
3	BCE18OL3	Environmental Engineering Lab	Lb	0	0/0	3/0	1

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I SEMESTER

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Department of Civil Engineering

DEPARTMENT OF ENGLISH

Subject Code :	Subject Name : **TECHNICAL ENGLISH - I**	L	T/SLr	P/R	C
BEN18001	Prerequisite : None	**1**	**0/0**	**2/0**	**2**

	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab
	OBJECTIVES : • Strengthen their vocabulary in both technical and business situations • Get practice in functional grammar • Learn the effective way of corresponding with officials • Learn to give instructions, suggestions, recommendations and comprehend and infer the information from the given passages. • Train learners in organized academic and professional writing
	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course would be able to
CO1	Strengthen their active and technical vocabulary
CO2	Understand functional grammar and gain proficiency in technical writing
CO3	Learn the appropriate technique of writing formal and business letters; interpret the advertisements and prepare the resume relevantly
CO4	Learn to give instructions, suggestions, recommendations and comprehend and infer the information from the given passages/ reports
CO5	Focus on academic and technical writing

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PO12
CO1				H						H			H
CO2				H						H			H
CO3				H		M			H	H			H
CO4				H					H	H			H
CO5				H					H	H			H

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical		Soft Skills
			√							

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Department of Civil Engineering

BEN18001	TECHNICAL ENGLISH - I	1 0/0 2/0 2

UNIT I   VOCABULARY BUILDING   6HRS
The concept of Word Formation-Root words and affixes from foreign languages and their use in English to form derivatives.-Homophones- Words often confused-Verbal analogy

UNIT II   BASIC WRITING SKILLS   6HRS
Using Idioms and phrases in sentences-Sentence structures: statements, interrogative and imperative-Use of Conditional/if' clauses in sentences-Importance of proper punctuation-Creating coherence with sentence markers-Organizing coherent paragraphs in essays

UNIT III   IDENTIFYING COMMON ERRORS IN WRITING   6 HRS
Subject-verb agreement-Noun-pronoun agreement- Misplaced modifiers-Articles-Prepositions- Redundancies and Clichés

UNIT IV   WRITING PRACTICE- NATURE AND STYLE OF TECHNICAL WRITING   6HRS
 Describing Gadgets- Defining Concepts-Classifying data-Comprehension-Essay Writing-Informal and Formal Letter Writing:

UNIT V   ORAL COMMUNICATION AND INTERACTIVE LEARNING   6HRS
(This unit involves interactive practice sessions in Language Lab)
 Activities to develop knowledge in Word formation, Vocabulary and analytical thinking-Instructions and – Recommendations-Formal and Informal Registers in Speech-Listening and taking notes
  \

Total no. of periods : 30

TEXT BOOK :

1. *Quest : A Textbook of Communication Skills, Vijay Nicole, 2017.*
   Pushkala, R, Padmasani Kannan S, Anuradha V, Chandrasena M Rajeswaran

SUGGESTED READINGS:
1. *Practical English Usage. Michael Swan. OUP. 1995.*
2. *Remedial English Grammar. F.T. Wood. Macmillan.2007*
3. *On Writing Well. William Zinsser. Harper Resource Book. 2001*
4. *Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.*
5. *Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.*
6. *Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press*
7. *Pronunciation in Use ,Mark Hancock. Cambridge University Press. 2012*

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DEPARTMENT OF MATHEMATICS

Subject Code : **BMA18001**	Subject Name : **MATHEMATICS – I**		L	T/SLr	P/R	C
	Prerequisite : None		**3**	**1/0**	**0/0**	**4**

	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab

	OBJECTIVES : • Apply the Basic concepts in Algebra • Use the Basic concepts in Matrices • Identify and solve problems in Trigonometry • Understand the Basic concepts in Differentiation • Apply the Basic concepts in Functions of Several variables

	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course were able to	
CO1		Find the summation of the given series of binomial, exponential & logarithmic
CO2		Transform a non – diagonal matrix into an equivalent diagonal matrix using orthogonal transformation.
CO3		Find expansion of trigonometric function into an infinite series and to separate a complex function into real and imaginary parts.
CO4		Apply knowledge and concepts in finding the derivative of given function and to find the maxima / minima of the given function.
CO5		Evaluate the partial / total differentiation and maxima / minima of a function of several variables.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PO12
CO1	**H**	**H**			**M**	**M**			**H**	**H**			**H**
CO2	**H**	**H**			**H**	**L**							**H**
CO3	**H**	**H**			**M**				**M**	**H**			**L**
CO4	**H**	**H**			**L**				**M**	**H**			**M**
CO5	**H**	**H**				**M**			**M**	**M**			**H**

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical /		Internships / Technical Skills	Soft Skills
	√									

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BMA18001	MATHEMATICS – I	3 1/0 0/0 4

UNIT I   ALGEBRA   12HRS
Binomial, Exponential, Logarithmic Series (without proof of theorems) – Problems on Summation, Approximation and Coefficients.

UNIT II   MATRICES   12HRS

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley - Hamilton theorem(without proof) – Orthogonal reduction of a symmetric matrix to Diagonal form.

UNIT III   TRIGONOMETRY   12HRS
Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$ and $\cos\theta$ – Expansion of $\tan n\theta$ – Expansions of $\sin^n\theta$ and $\cos^n\theta$ in terms of Sines and Cosines of multiples of θ – Hyperbolic functions – Separation into real and imaginary parts.

UNIT IV   DIFFERENTIATION   12HRS
Basic concepts of Differentiation – Elementary differentiation methods – Parametric functions – Implicit function –Leibnitz theorem(without proof) – Maxima and Minima – Points of inflection.

UNIT V   FUNCTIONS OF SEVERAL VARIABLES   12HRS
Partial derivatives – Total differential – Differentiation of implicit functions – Taylor's expansion – Maxima and Minima by Lagrange's Method of undetermined multipliers – Jacobians.

Total no. of periods : 60

TEXT BOOKS

1. *Kreyszig E., Advanced Engineering Mathematics (10 th ed.), John Wiley & Sons, (2011).*

2. *Veerarajan T., Engineering Mathematics (for first year), Tata McGraw Hill Publishing Co., (2008).*

REFERENCES

1. *Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, (2012).*

2. *John Bird, Basic Engineering Mathematics (5th ed.), Elsevier Ltd, (2010).*

3. *P.Kandasamy, K.Thilagavathy and K. Gunavathy, Engineering   Mathematics Vol. I (4th Revised ed.), S.Chand& Co., Publishers, New Delhi (2000).*

4. *John Bird, Higher Engineering Mathematics (5th ed.), Elsevier Ltd, (2006).*

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Department of Civil Engineering
DEPARTMENT OF PHYSICS

Subject Code : **BPH18001**		Subject Name : **ENGINEERING PHYSICS - I**		L	T/SLr	P/R	C
		Prerequisite : None		**2**	**0/1**	**0/0**	3

	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab
	OBJECTIVES : • Outline the relation between Science, Engineering & Technology. • Demonstrate competency in understanding basic concepts. • Apply fundamental laws of Physics in Engineering & Technology. • To identify & solve problems using physics concepts. • Produce and present activities associated with the course through effective technical communication
	COURSE OUTCOMES (Cos) : (3 – 5) Students completing this course were able to
CO1	Demonstrate competency in understanding basic concepts.
CO2	Utilize scientific methods for formal investigations & demonstrate competency with experimental methods and verify the concept to content knowledge.
CO3	Identify and provide solutions for engineering problems.
CO4	Relate the technical concepts to day to day life and to practical situations.
CO5	Think analytically to interpret concepts.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		PO11	PO 12
CO1	H	H		M	M	M							
CO2	H	H	M	M	M	M			M	M			
CO3	H	H	H	M	M	M				M			M
CO4	H	H	M	M		M			M	M			M
CO5	H	H	M			M		M					L

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills			Soft
	√										

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BPH18001	ENGINEERING PHYSICS - I	2	0/1	0/0.	3

UNIT I   MECHANICS & PROPERTIES OF MATTER   9HRS
Mechanics : Introduction- scalar and vector quantities - rigid body - moment of inertia - forces in nature - Newton's laws of motion - derivation of Newton's second law of motion - motion of rocket – dynamical concepts - kinematics - conservation of energy and momentum - conservative and non-conservative forces - mechanics of continuous media - friction and its applications.

Properties of Matter: Elasticity - stress, strain and Hook's law - Poisson's ratio - three moduli of elasticity - twisting couple on a wire - viscosity - flow of liquid through a narrow tube: Poiseuille's law - Ostwald`s viscometer - flow of blood in human body.

UNIT II SHM AND ACOUSTICS   9HR
SHM: Simple harmonic motion - differential equation of SHM - graphical representation of SHM - average kinetic energy of vibration - total energy of vibration - free and forced vibrations - damped and undamped vibrations - resonance - transverse wave on a string - law of transverse vibration of string - verification of the laws of transverse vibration of string - standing waves.

Acoustics : Fundamentals of acoustics - reverberation- reverberation time - factors affecting acoustics Ultrasonics - Production of ultrasonic waves - detection of ultrasonic waves - acoustic grating - application of ultrasonic waves.

UNIT III WAVE OPTICS   9HR
Huygen`s principle - interference of light - wavefront splitting and amplitude - airwedge - Newton`s   rings - Michelson interferometer and its applications - Fraunhofer diffraction from a single slit - Rayleigh criterion for limit of resolution - diffraction grating and resolving power of a telescope.

UNIT IV ELECTROMAGNETIC THEORY   9HRS
Electric field - coulomb`s law - alternating emf - rms and average value of an alternating current & voltage - resistors, capacitors and inductor - energy stored in a capacitor - LCR circuit & resonance – magnetism- definition - types - Biot Savart law - energy stored in a magnetic field - Domain theory - electromagnetic induction - self and mutual inductance - Faraday`s law of electromagnetic induction -Lenz law.

UNIT V   LASER   9HR
Laser principle and characteristics - amplification of light by population inversion - properties of laser beams: mono-chromaticity, coherence, directionality and brightness - different types of lasers - Ruby laser-Nd-YAG laser-He-Ne laser-CO_2 laser - semiconductor laser - applications of lasers in science, engineering and medicine.

Total No of Periods : 45

TEXT BOOKS

1. *Brijlal, M. N. Avadhanulu & N. Subrahmanyam, Text Book of Optics, S. Chand Publications, 25th edition, 2012*
2. *R. Murugeshan, Electricity and Magnetism, S.Chand Publications, 10th edition, 2017*
3. *R. Murugeshan & Kiruthiga Sivaprasath, Modern Physics, S.Chand Publications, 2016*

REFERENCE BOOKS
1. *Dr. Senthil Kumar Engineering Physics I VRB Publishers, 2016*
2. *N Subrahmanyam & Brijlal, Waves and Oscillations, Vikas Publications, New Delhi,1988*
3. *N Subrahmanyam & Brijlal, Properties of Matter, S. Chand Co., New Delhi, 1982*
4. *N Subrahmanyam & Brijlal, Text book of Optics, S. Chand Co., New Delhi, 1989*
5. *R. Murugeshan, Electricity and Magnetism, S. Chand & Co., New Delhi, 1995*
6. *Thygarajan K & Ajay Ghatak, Laser Theory and Applications, Macmillan, New Delhi, 1981*

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Department of Civil Engineering
DEPARTMENT OF CHEMISTRY

Subject Code : **BCH18001**	Subject Name : **ENGINEERING CHEMISTRY – I**	L	T/SLr	P/R	C
	Prerequisite : None	**2**	**0/1**	**0/0**	**3**
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab				

	OBJECTIVES :
	• Providing an insight into basic concepts of chemical thermodynamics.
	• To create awareness about the water quality parameters, water analysis and softening of water from industrial perspective.
	• Imparting fundamentals of emf, storage and fuel cells.
	• Creating awareness about corrosion and its control methods.
	• Introducing modern materials such as composites along with basic concepts of polymer chemistry and plastics.
	COURSE OUTCOMES (Cos) : (1– 5)

CO1		Gain a clear understanding of the basics of chemical thermodynamics which include concepts such as Enthalpy, Entropy and Free energy.
CO2		Obtain an overall idea of Water quality parameters, Boiler requirements, problems, Water softening and Domestic Water treatment.
CO3		Improving the basic knowledge in electrical conductance and emf and also understand the chemical principles of storage devices.
CO4		Observe the information about corrosion and understand the mechanisms of corrosion and the methods of corrosion control.
CO5		Articulate the science of polymers and composites.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H										M
CO2	H	H	M	H		H	H					M
CO3	H	M	H				L					L
CO4	H		L	H								L
CO5	H											M

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project		Internships / Technical	Soft Skills
	√									

Department of Civil Engineering

BCH18001	ENGINEERING CHEMISTRY – I	2 0/1 0/0 3

UNIT I   CHEMICAL THERMODYNAMICS   8HRS
Introduction, Terminology in thermodynamics –System, Surrounding, State and Path functions, Extensive and intensive properties. Laws of thermodynamics – I and II laws-Need for the II law. Enthalpy, Entropy, Gibbs free energy, Helmholtz free energy - Spontaneity and its criteria. Maxwell relations, Gibbs -Helmholtz equation (relating E & A) and (relating H & G), Van't Hoff equations.

UNIT II   TECHNOLOGY OF WATER   9HRS
Water quality parameters – Definition and expression. Analysis of water – alkalinity, hardness and its determination (EDTA method only). Boiler feed water and Boiler troubles-Scales and sludges, Caustic embrittlement, Priming and Foaming and Boiler corrosion. Water softening processes – Internal and external conditioning – Lime soda, Zeolite, Demineralisation methods. Desalination processes-RO and Electrodialysis .Domestic water treatment.

UNIT III   ELECTROCHEMISTRY AND ENERGY STORAGE DEVICES   10HRS
Conductance – Types of conductance and its Measurement. Electrochemical cells – Electrodes and electrode potential, Nernst equation – EMF measurement and its applications. Types of electrodes- Reference electrodes-Standard hydrogen electrode- Saturated calomel electrode-Quinhydrone electrode – Determination of P^H using these electrodes.
Reversible and irreversible cells– Fuel cells- H_2–O_2 fuel cell, Batteries-Lead storage battery,Nickel– Cadmium and Lithium-Battery.

UNIT IV   CORROSION AND PROTECTIVE COATING   9HRS
Introduction–Causes of Corrosion–Consequences- Factors affecting corrosion. Theories of corrosion-Chemical corrosion and Electrochemical corrosion. Methods of corrosion control – corrosion inhibitors, Sacrificial anode and Impressed current cathodic protection.
Protective coatings- Metallic coatings- Chemical conversion coatings-paints-Constituents and functions.

UNIT V   POLYMERS AND COMPOSITES   9HRS
Monomers – Functionality – Degree of polymerization-Tacticity.Polymers – Classification, Conducting Polymers,Biodegradable polymers- Properties and applications.Plastics – Thermoplastics and thermosetting plastics,Compounding of plastics – Compression moulding, injection moulding and extrusion processes.
Polymer composites-introduction-Types of composites-particle reinforced-fiber reinforced-structural composites-examples. Matrix materials, reinforcement materials-Kevlar, Polyamides, fiber glass, carbon fibers, ceramics and metals .

Total number of periods : 45

TEXTBOOKS
1. *S.Nanjundan & C.SreekuttanUnnithan, "Applied Chemistry", Sreelakshmi Publications, (2007)*
2. *Dr.R.Sivakumar and Dr.N.Sivakumar" Engineering Chemistry" Tata McGraw Hill Publishing Company Ltd, Reprint 2013.*

REFERENCES
1. *P.C. Jain & Monika Jain, "Engineering Chemistry", Dhanpat Rai publishing Co., (Ltd.) (2013).*
2. *J. C. Kuriacose & J. Rajaram, "Chemistry in Engineering & Technology", Tata Mc Graw Hill (1996).*
3. *B.R.Puri, L.R.Sharma & M.S.Pathania, "Principles of Physical Chemistry", Vishal publishing co., (2013)*

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Department of Civil Engineering

Subject Code : **BES18001**	Subject Name : **BASIC ELECTRICAL & ELECTRONICS ENGINEERING**			L	T/SLr	P/R	C
	Prerequisite : None			**2**	**0/1**	**0/0**	**3**
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab						
	OBJECTIVES : • Understand the concepts of circuit elements, circuit laws and coupled circuits. • Acquire knowledge on conventional &non conventional energy production. • Gain information on measurement of electrical parameters. • Identify basic theoretical principles behind the working of modern electronic gadgets. • Demonstrate digital electronic circuits and assemble simple devices.						
	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course were able to						
CO1	Students understand Fundamental laws and theorems and their practical applications						
CO2	Predict the behavior of different electric and magnetic Circuits.						
CO3	Identify conventional and Non-conventional Electrical power Generation, Transmission and Distribution.						
CO4	Identify & Apply schematic symbols and understand the working principles of electronic devices						
CO5	Analyze basics of digital electronics and solving problems and design combinational circuits						

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	H	H	H	H							M	L	
CO2	H	H	H	M	M		M				M		
CO3	H	M	H	M	H		M		M			L	
CO4	H	M		M			M				M	L	
CO5	H	M	H	M	H				M		M	L	

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project		Internships / Technical Skills	Soft

BES18001	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	2 0/1 0/0 3

UNIT I   ELECTRIC CIRCUITS   9HRS
Electrical Quantities – Ohms Law – Kirchhoff's Law – Series and Parallel Connections – Current Division and Voltage Division Rule - Source Transformation – Wye (Y) – Delta (Δ) , Delta (Δ) – Wye (Y) Transformation – Rectangular to Polar and Polar to Rectangular.

UNIT II   MACHINES & MEASURING INSTRUMENTS   9HRS
Construction & Principle of Operation of DC motor & DC Generator – EMF equation of Generator – Torque Equation of Motor – Construction & Principle of operation of a Transformer – PMMC – Moving Iron types of meter – Single Phase Induction Type Energy Meter.

UNIT III   BASICS OF POWER SYSTEM   9HRS
Generation of Electric Power (Thermal, Hydro, Wind and Solar) – Transmission & Distribution of Electric Power – Types of Transmission & Distribution Schemes – Representation of Substation.

UNIT IV   ELECTRON DEVICES   9HRS
Passive Circuit Components-Classification of Semiconductor-PN Junction Diode-Zener diode- Construction and Working Principle –Applications--BJT-Types of configuration-JFET.

UNIT V   DIGITAL SYSTEM   9HRS
Number System – Binary, Decimal, Octal, Hexadecimal – Binary Addition Subtraction, Multiplication & Division– Boolean Algebra – Reduction of Boolean Expressions – Logic Gates - De-Morgan's Theorem , Adder – Subractor.

Total no of Periods : 45

TEXT BOOKS
1. *D P Kothari, I J Nagrath, Basic Electrical Engineering, Second Edition, , Tata McGraw-Hill Publisher*

2. *A Course In Electrical And Electronic Measurements And Instrumentation,A.K. Sawhney, publisher DHANPAT RAI&CO*

3. *Text Book of Electrical Technology: Volume 3: Transmission, Distribution and Utilization,B.L.Theraja, A.K.Theraja, publisher S.CHAND*

4. *Morris Mano, M. (2002) Digital Logic and Computer Design. Prentice Hall of India*

5. *Millman and Halkias1991, Electronic Devices and Circuits , Tata McGraw Hill,*

REFERENCES

1. *R.Muthusubramanian, S.Salivahanan, K A Muraleedharan, Basic Electrical, Electronics And Computer Engineering, Second Edition, ,Tata McGraw-Hill publisher.*

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Department of Civil Engineering

DEPARMENT OF MECHANICAL ENGINEERING

Subject Code : **BES18002**	Subject Name : **BASIC MECHANICAL & CIVIL ENGINEERING**	L	T/SLr	P/R	C
	Prerequisite : None	**2**	**0/1**	**0/0**	**3**
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab				

OBJECTIVES :
- Learn Basics of Internal Combustion Engines, power plants and boilers
- Demonstrate How metals are formed, joined, using machining operations Lathe, Milling and Drilling machines
- To identify & solve problems in Engineering Mechanics
- Learn basics of Building materials and construction
- Know the basic process of concrete, types of masonry Construction of Roads , Railways, Bridges and Dams

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1	Demonstrate the working principles of power plants, IC Engines and boilers..
CO2	Utilize the concept of metals forming, joining process and apply in suitable machining process
CO3	Identify and provide solutions for problems in engineering mechanics
CO4	Utilize the concept of Building materials and construction able to perform concrete mix and masonry types
CO5	Demonstrate how Roads, Railways, dams, Bridges have been constructed

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M		H	H	H		H
CO2	H				L	M		M	M	M		M
CO3	H	H			L	L		M	M	M		M
CO4	H				L	L			M	M		M
CO5	H				L	L		M	M	M		M

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills
		√								

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BES18002	BASIC MECHANICAL & CIVIL ENGINEERING	2	0/1	0/0	3

UNIT I   THERMAL ENGINEERING   9HRS

Classification   of internal combustion engine – two stroke, four stroke petrol and diesel engines. Classification of Boilers – Cochran boiler –   Locomotive boilers – Power plant classification – Working of Thermal and Nuclear power plant.

UNIT II   MANUFACTURING PROCESS   13HRS
Metal forming processes – Rolling, forging, drawing, extrusion and sheet metal operations- fundamentals only. Metal Joining processes – Welding - arc and gas welding, Soldering and Brazing. Casting process – Patterns - Moulding tools - Types of moulding - Preparation of green sand mould -Operation of Cupola furnace.
Basics of metal cutting operations – Working of lathe- parts-Operations performed. Drilling machine – Classification – Radial drilling machine - Twist drill nomenclature.

UNIT III   MECHANICS   9HRS

Stresses and Strains – Definition – Relationship – Elastic modulus – Centre of gravity – Moment of Inertia – Problems. (Simple Problems Only).

UNIT IV   BUILDING MATERIALS AND CONSTRUCTION   7HRS

Materials:Brick - Types of Bricks - Test on bricks - Cement – Types, Properties and uses of cement – Steel - Properties and its uses – Ply wood and Plastics.
Construction:Mortar – Ingredients – Uses – Plastering - Types of mortar - Preparation – Uses – Concrete – Types – Grades – Uses – Curing – Introduction to Building Components (foundation to roof) – Masonry – Types of masonry (Bricks & Stones)

UNIT V   ROADS, RAILWAYS, BRIDGES & DAMS   7HRS

Roads – Classification of roads – Components in roads – Railways -Components of permanent way and their function – Bridges – Components of bridges – Dams – Purpose of dams – Types of dams.

Total No. of Periods : 45

TEXT BOOKS

1. *S. Bhaskar, S. Sellappan, H.N.Sreekanth,, (2002), "Basic Engineering" –Hi-Tech Publications*

2. *K. Venugopal, V. Prabhu Raja, (2013-14), "Basic Mechanical Engineering", Anuradha Publications.*

3. *K.V. Natarajan (2000), Basic Civil Engineering,Dhanalakshmi Publishers*

4. *S.C. Sharma(2002),Basic Civil Engineering,Dhanpat Raj Publications*

REFERENCES

1. *PR.SL. Somasundaram, (2002), "Basic Mechanical Engineering" –, Vikas Publications.*

2. *S.C. Rangawala(2002), Building Material and Construction, S. Chand Publisher*

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Department of Civil Engineering
DEPARTMENT OF ENGINEERING SCIENCES

Subject Code : **BES18L01**	Subject Name :**BASIC ENGINEERING WORKSHOP**	L	T/SLr	P/R	C
	Prerequisite : None	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

	OBJECTIVES :
	• Familiarize the plumbing tools, fittings, carpentry tools, etc.
	• Identify basic electrical wiring and measurement of electrical quantities.
	• Identify Electronic components ,logic gates and soldering process
	• Display simple fabrication techniques
	• Execute a project independently and make a working model

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1	Demonstrate fitting tools and carpentry tools, & Perform the process of Filing, Chipping, Cutting.
CO2	Perform the process of fabrication of tray, cones and funnels, Tee Halving Cross, Lap Joint Martise& Joints
CO3	Demonstrate various types of wirings and other equipments.
CO4	Measure fundamental parameters using the electronic instruments

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	M			L	M			L
CO2	H		H	L	M			L	L			
CO3	H		M	L				L	L			
CO4	H	H	M	L				L	L			M
CO5												

H/M/L indicates strength of correlation H – High, M – Medium, L – Low											

Category	Basic Sciences	Engg Sciences	Humanities &	Program core	Program Electives	Open Electives	Practical / Project	Internships /	Soft Skills
							√		

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| BES18L01 | BASIC ENGINEERING WORKSHOP | 0 | 0/0 | 2/0 | 1 |

<u>**MEP   PRACTICE**</u>

1. FITTING :
Study of fitting tools and Equipments – Practicing, filing, chipping and cutting – making V-joints, half round joint, square cutting and dovetail joints.

2. CARPENTRY:
Introduction – Types of wood – Tools – Carpentry processes – Joints – Planning practice – Tee Halving Joint – Cross Lap Joint – Maritse and Tenon Joint – Dovetail Joint

3. SHEET METAL:
Study of tools and equipments – Fabrication of tray, cones and funnels.

<u>**CIVIL ENGINEERING PRACTICE**</u>

1. Study of Surveying and its equipments

2. Preparation of plumbing line sketches for water supply and sewage lines

3. Basic pipe connection using valves, laps, couplings, unions, reduces and elbows in house hold fittings

<u>**ELECTRICAL ENGINEERING PRACTICE**</u>

1. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.

2. Measurement of energy using single phase energy meter.

3. Measurement of resistance to earth of an electrical equipment.

4. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

5. Fluorescent lamp wiring.

6. Stair case wiring

<u>**ELECTRONIC ENGINEERING PRACTICE**</u>

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak- peak, rms period, frequency) using CRO

2. Soldering practice – Components Devices and Circuits – Using general purpose P

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Abdul Kalam CoE for Innovation & Entrepreneurship

Subject Code : BES18ET1	Subject Name : ORIENTATION TO ENTREPRENEURSHIP & PROJECT LAB		L	T/SLr	P/R	C
	Prerequisite : None		0	0/0	2/0	1
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab					

OBJECTIVES :
- Understand how entrepreneurship Education transforms individuals into successful leaders.
- Identify individual potential &S have career dreams
- Understand difference between ideas & opportunities
- Identify components & create action plan.
- Use brainstorming in a group to generate ideas.

	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course were able to
CO1	Develop a Business plan & improve ability to recognize business opportunity
CO2	Do a self analysis to build a entrepreneurial career.
CO3	Articulate an effective elevator pitch.
CO4	Analyze the local market environment & demonstrate the ability to find an attractive market
C05	Identify the required skills for entrepreneurship & develop

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M	M	H	M	M	M		M	M	M	L
CO2	H	M		H	M	H	M	H	H	H	M	M
CO3		M	M	M		H		H	H	H		
CO4		H	M	M	M	M			H	M	M	H	
CO5		M	M	H	M	M	H	H	M	M	H	L

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills

BES18ET1	ORIENTATION TO ENTREPRENEURSHIP & PROJECT LAB	0 0/0 2/0 1 (ETL)

UNIT I   CHARACTERISTICS OF A SUCCESSFUL ENTREPRENEUR

Introduction to entrepreneurship education – Myths about entrepreneurship – How has entrepreneurship changed the country – Dream it. Do it - Idea planes - Some success stories – Global Legends – Identify your own heroes

UNITII   ENTREPRENEURIAL STYLE

Entrepreneurial styles – Introduction, concept & Different types - Barrier to Communication – Body language speaks louder than words

UNIT III   DESIGN THINKING

Introduction to Design thinking – Myth busters – Design thinking Process - Customer profiling – Wowing your customer – Personal selling – concept & process – show & tell concept – Introduction to the concept of Elevator Pitch

UNIT IV   RISK MANAGEMENT

Introduction to risk taking & Resilience – Managing risks (Learning from failures, Myth Buster) – Understanding risks through risk takers – Why do I do? – what do I do ?

UNIT V   PROJECT
How to choose a topic – basic skill sets necessary to take up a project – creating a prototype – Pitch your project – Project presentation.

REFERENCE BOOKS & WEBSITE

1. *Encyclopedia of Small Business (2011) – (e book)*

2. *Oxford Handbook of Entrepreneurship (2014) –(e book)*

3. *lms.learnwise.org*

II SEMESTER

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DEPARTMENT OF MATHEMATICS

Subject Code :	Subject Name : MATHEMATICS – II	L	T/SLr	P/R	C
BMA18003	**Prerequisite : None**	**3**	**1/0**	**0/0**	**4**

	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab
	OBJECTIVES : • Understand the Basic concepts in Integration • Identify the Basic concepts in Multiple integrals • Use the Basic concepts in Ordinary Differential equations • Apply the Basic concepts of Analytical Geometry • Analyze the Basic concepts of Vector Calculus
	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course were able to
CO1	Integrate given function by using methods of integration and to find the area under curve and the volume of a solid by revaluation.
CO2	Evaluate the multiple integrals / area /volume and to change the order of integration.
CO3	Solve the ordinary differential equation and to solve Eulers differential equation.
CO4	Find the equation of planes, lines and sphere and to find the shortest distance between to skew lines.
CO5	Find the gradient, maximum directional derivative and work done by a force and to verify Green/ Stokes/ Gauss divergence theorem

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PO12
CO1	H	H			M	M			M	M			H
CO2	H	H			M	H			H	H			M
CO3	H	H			M	H			H	H			M
CO4	H	H			L	M			M	H			M
CO5	H	H			M	M			M	H			M

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills
	√									

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BMA18003	MATHEMATICS – II	3 1/0 0/0 4

UNIT I INTEGRATION 12HRS

Basic concepts of Integration – Methods of Integration– Integration by substitution – Integration by parts – Definite integrals– Properties of definite integrals – Problems on finding Area and Volume using single integrals (simple problems).

UNIT II MULTIPLE INTEGRALS 12HRS

Double integral in Cartesian and Polar Co-ordinates – Change of order of integration – Triple integral in Cartesian Co-ordinates – Spherical Polar Co-ordinates – Change of variables (simple problems).

UNIT III ORDINARY DIFFERENTIAL EQUATIONS 12HRS

First order differential equations – Second and higher order linear differential equations with constant coefficients and with RHS of the form: e^{ax}, x^n, Sin ax, Cos ax, $e^{ax}f(x)$, x f(x) where f(x) is Sin bx or Cos bx – Differential equations with variable coefficients (Euler's form) (simple problems).

UNIT IV THREE DIMENSIONAL ANALYTICAL GEOMETRY 12HRS

Direction Cosines and Ratios – Equation of a straight line – Angle between two lines – Equation of a plane – Co-planar lines – Shortest distance between skew lines – Sphere – Tangent plane.

UNIT V VECTOR CALCULUS 12HRS

Scalar and Vector functions – Differentiation – Gradient, Divergence and Curl – Directional derivatives – Irrotational and Solenoidal fields– Line, Surface and Volume integrals – Green's, Stoke's and Gauss divergence theorems (statement only) – Verification.

Total no.of periods: 60

TEXTBOOKS

1. Kreyszig E., *Advanced Engineering Mathematics (10th ed.)*, John Wiley & Sons, (2011).

2. Veerarajan T., *Engineering Mathematics (for first year)*, Tata McGraw Hill Publishing Co., (2008).

REFERENCES

1. *Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, (2012).*

2. *John Bird, Basic Engineering Mathematics (5th ed.), Elsevier Ltd, (2010).*

3. *P.Kandasamy, K.Thilagavathy and K. Gunavathy, Engineering   Mathematics Vol. I (4th Revised e)*

S.Chand& Co., Publishers, New Delhi (2000).

3. *John Bird, Higher Engineering Mathematics (5th ed.), Elsevier Ltd, (2006).*

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DEPARTMENT OF PHYSICS

Subject Code : BPH18002	Subject Name : ENGINEERING PHYSICS – II	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :

- Design, conduct experiment and analyze data.
- Develop a Scientific attitude at micro and nano scale of materials
- Understand the concepts of Modern Physics
- Apply the science of materials to Engineering & Technology

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1		Demonstrate skills necessary for conducting research related to content knowledge and laboratory skills.
CO2		Apply knowledge and concepts in advanced materials and devices.
CO3		Acquired Analytical, Mathematical skills for solving engineering problems.
CO4		Ability to design and conduct experiments as well as function in a multi disciplinary teams.
CO5		Generate analytical thought to interpret results & place them within a broader context

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M	M	M	L				M		L
CO2	H	H		M	M							L
CO3	H	H	H	H	M					M		
CO4	H	H	H	H	M				H	M		L
CO5	H	M	M	M	M	L			M	M		L

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
	√								

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| BPH18002 | ENGINEERING PHYSICS - II | 2 | 0/1 | 0/0 | 3 |

UNIT I   QUANTUM   PHYSICS   9HRS
Quantum free electron theory - deBroglie waves - derivation of deBroglie waves - Davisson and Germer experiment - uncertainty principle - electron microscope - scanning electron microscope - physical significance of wave function - Schrodinger wave equation and its applications - Fermi energy- effective mass - phonons - Fermi function-density of states - origin of bandgap in solids - 1D scattering of electrons in periodic potential.

UNIT II   SEMICONDUCTORS   9HRS
Introduction - properties of semiconductors - classification of semiconductor - effect of temperature in semiconductor - hole current - carrier concentration in intrinsic semiconductor (electron and hole density) - variation of Fermi energy level and carrier concentration with temperature in an intrinsic semiconductor - carrier transport - diffusion - drift - mobility - Hall effect - determination of Hall coefficient and its applications - diodes.

UNIT III LIGHT SEMICONDUCTOR INTERACTION   9HRS
Types of electronic materials: metals, semiconductors and insulators - qualitative analysis of extrinsic semiconductor & its applications - optical transition in bulk semiconductors: absorption, spontaneous and stimulated emission - exciton and its types - traps and its types - colour centers and its types and importance - luminescence - classifications of luminescence based on excitation - optical loss and gain - Photovoltaic effect - Photovoltaic potential - spectral response - solar energy converters - solar cells.

UNIT IV OPTO ELECTRONIC DEVICES   9HRS
Photodetectors - photoconductors - photodiodes principle, construction, working and characteristics   - Phototransistors - Laser diodes - LED theory, construction and working - seven segment display, advantages of LED - LCD theory, construction and working.

UNIT V   ENGINEERED MATERIALS   9HRS
Classification of engineered materials - nano phase materials - its synthesis and properties - shape memory alloys and its applications - biomaterials - non linear materials - metallic glasses - metamaterials - homo and hetero junction semiconductors - semiconducting materials for optoelectronic devices - quantum wells, wires and dots.

Total no. of Periods : 45

TEXT BOOKS
1. *P.K. Palanisamy, Semiconductor Physics and Optoelectronics, Scitech Publications, 2010*
2. *Jyoti Prasad Bandyopadhyay, Semicoductor Devices, S. Chand Publications, 2014*
3. *Charles Kittal, Introduction to Solid State Physics, Wiley Publications, 2012*

REFERENCE BOOKS
1. *S. Shubhashree, S. Bharathi Devi & S. Chellammal Madhusudanan, Engineering Physics, Sree Lakshmi Publications, 2004*
2. *G. Senthil Kumar, N. Iyandurai, & G. Vijayakumar, Material Science, VRB Publishers, 2017*
3. *R.Murugeshan & Kiruthigasivaprakash, Modern Physics, 14th edition, S. Chand & Co, 2008*
4. *Pallab Bhattacharya, Semiconductor optoelectronic devices, second edition, Pearson Education, 2003*
5. *V Rajendran & A. Marikani, Materials Science, Tata McGraw- Hill, New Delhi, 2004*

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DEPARTMENT OF CHEMISTRY

Subject Code : BCH18002	Subject Name :ENGINEERING CHEMISTRY – II	L	T/SLr	P/R	C
	Prerequisite : None	2	0/1	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :
- Imparting the basic concepts of phase rule and apply the same to one and two component systems.
- Introducing the chemistry of engineering materials such as cement, lubricants,abrasives, refractories, alloys and nano materials.
- To impart a sound knowledge on the principles of chemistry involving different application oriented topics
- Introducing salient features of fuels and combustion.
- To give an overview on modern analytical techniques

COURSE OUTCOMES (Cos) : (1 – 5)
Students completing the course were able to

CO1		Understand the science of phase equilibria and apply the phase rule to different systems.
CO2		Gain an overview of Engineering Materials such as Lime, Cement, Lubricants, Abrasives, Refractories,Alloys and Nanomaterials.
CO3		Recognize the essential information about consumer products such as Soaps and Detergents,also gaining the basic knowledge about Explosives and Propellants.
CO4		Discover the fuel Chemistry and Combustion process.
CO5		Inferring few important Analytical Techniques and their applications.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H											L
CO2	H		H			L	H					L
CO3	H					H						L
CO4	H	M	H	H			H					M
CO5	H				M							H
	H/M/L indicates strength of correlation H – High, M – Medium, L – Low											

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills
	√									

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BCH18002	ENGINEERING CHEMISTRY – II	2 0/1 0/0 3

UNIT I   PHASE EQUILIBRIA   8HRS

Introduction – Definition of terms involved in phase rule. Derivation of Gibbs phase rule – Applications to one component system – water system. Binary system – Eutectic system – Pb – Ag system, Bi – Cd system .Thermal analysis – Cooling curves.

UNIT II   MATERIAL CHEMISTRY   10HRS

Cement – Manufacture, Chemistry of setting and hardening .Lubricants – Requirements of good lubricants, Mechanism, Properties of lubricants, Classification – Examples. Abrasives–Classification –Moh's scale-Hard and soft abrasives, Preparation of artificial abrasives (silicon carbide, boron carbide), Applications of abrasives. Refractories – Classification, Properties-Refractoriness, RUL, Porosity, Thermal spalling Alloys Classification of alloys – Purpose of making alloys - Ferrous and non-Ferrous alloys - Heat treatment Nano materials – properties, carbon nano tubes – properties, fabrication – carbon arc method, laser vapourization method.

UNIT III   APPLIED CHEMISTRY   9HRS

Soaps and detergents : Soaps – Saponification of oils and fats, manufacture of soaps, classification of soap – soft soap, medicated soap, herbal soap, shaving soap and creams.

Detergents – Anionic detergents – manufacture and applications, Comparison of soaps and detergents.

Rocket propellants and explosives: Rocket propellants – characteristics, solid and liquid propellants – examples. Explosives- Introduction, characteristics, classification, Oxygen balance , preparation, properties and uses of detonators, low explosives and high explosives, Dynamites, Gun cotton, Cordite.

Food adulterants- Common adulterants in different foods – milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages, Contamination with toxic chemicals – pesticides and insecticides.

UNIT IV   FUELS & COMBUSTION   9HRS

Introduction to Fuels – classification – Calorific value – GCV, LCV. Solid Fuels–Coal-Proximate Analysis, Metallurgical Coke–Manufacture of Metallurgical Coke – Liquid Fuel–Refining of Petrol, Synthetic Petrol–Manufacturing Process–Hydrogenation of Coal, Polymerization, Cracking–Knocking–Octane Number–Leaded Petrol (or) Anti–knocking – Cetane Number–Ignition Lag–Gaseous fuels–CNG–LPG–Water Gas, Producer gas–Biogas- Combustion– Flue Gas analysis– Orsat's method.

UNIT V   ANALYTICAL AND CHARACTERIZATION TECHNIQUES   9HRS

Electron microscopes: Scanning electron microscope & Transmission electron microscope, instrumentation and applications Absorption and Emission Spectrum - Beer - Lambert's law. Visible and UV Spectroscopy – instrumentation – Block diagram - working. IR Spectroscopy – instrumentation - Block diagram – molecular vibrations – stretching and bending – H_2O, CO_2. –Characterization of some important organic functional groups. Chromatographic techniques – column, thin layer and paper.

Total number of periods : 45

TEXTBOOKS
1. C. S.Unnithan, T. Jayachandran& P. Udhayakala, "Industrial Chemistry", Sreelakshmi Publications (2009).
2. Dr.R.Sivakumar and Dr.N.Sivakumar" Engineering Chemistry" Tata McGraw Hill Publishing Company Ltd, Reprint 2013.

REFERENCES
1. P.C. Jain & Monika Jain, "Engineering Chemistry", DhanpatRai publishing Co., (Ltd.) (2013).
2. B. R. Puri ,L.R. Sharma &M.S.Pathania, "Principles of Physical Chemistry", Vishal publishing co., (2013).

DEPARTMENT OF ENGINEERING SCIENCES

Subject Code : BES18003	Subject Name : ENVIRONMENTAL SCIENCE (Non- Credited)	L	T/SLr	P/R	C
	Prerequisite : None	-	-	-	-

	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab

	OBJECTIVES : • To acquire knowledge of the Environment and Ecosystem & Biodiversity • To acquire knowledge of the different types of Environmental pollution • To know more about Natural Resources • To gain understanding of social issues and the Environment • To attain familiarity of human population and Environment

	COURSE OUTCOMES (Cos) : (3 – 5) Students completing the course were able to

CO1		To known about Environment and Ecosystem & Biodiversity
CO2		To clearly comprehend air, water, Soil, Marine, Noise, Thermal and Nuclear Pollutions and Solid Waste management and identify the importance of natural resources like forest, water, and food resources
CO3		To discover water conservation and watershed management
CO4		To identify its problems and concerns climate change, global warming, acid rain, ozone layer depletion etc.,
CO5		To explain family welfare programmes and role of information technology in human health and environment

	Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PO12
CO1						M	H	M					M
CO2						M	H			M			M
CO3						M	H	M					M
CO4						M	H	M		M			M
CO5						M	H			M			M

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills
			√							

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BES18003	**ENVIRONMENTAL SCIENCE** **(Non- Credited)**

UNIT I   ENVIRONMENT AND ECOSYSTEM
Definition, Scope and Importance of environment – need for public awareness – concept, structure and function of an ecosystem - producers, consumers and decomposers – energy flow in the ecosystem. Biodiversity at national and local levels – India

UNIT II   ENVIRONMENT POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution   (f) Nuclear hazards (g) E-Wastes and causes, effects and control measures

UNIT III   NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems.

UNIT IV   SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns climate change, global warming, acid rain, ozone layer depletion, nuclear accidents ,central and state pollution control boards- Public awareness.

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion, environment and human health – human rights – value education – HIV/AIDS – women and child welfare – role of information technology in environment and human health

TEXT BOOKS
1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGrawHill,NewDelhi, (2006).

REFERENCES
1. Vairamani, S. and Dr. K. Sankaran. **Elements of Environmental and Health Science.** Karaikudi: KPSV Publications, 5th Edition, July, 2013.

2. Ifthikarudeen, Etal, **Environmental Studies**, Sooraj Publications,2005.

3. R.Murugesan, **Environmental Studies,** Millennium Publishers and Distributors, 2nd Edition, July, 2009.

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DEPARTMENT OF ENGLISH

Subject Code: BEN18ET1	Subject Name: COMMUNICATION LAB	L	T/SLr	P/R	C
	Prerequisite: None	0	0/1	2/0	1
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab				
	OBJECTIVES: • Strengthen the academic and interpersonal advanced vocabulary • Strengthen learners' writing skill such as summarizing, describing and report writing • Learn to keep the simple conversations in day to day life • Get to know certain life skills such as marketing, advertising and do presentation • Improve the reading skill with comprehension				
	COURSE OUTCOMES (COs): (3 – 5) Students completing the course would be able to				
CO1	strengthen their active vocabulary and appropriate language usage through reading poems, stories, texts, newspapers, magazines and research articles				
CO2	use appropriate technical vocabulary in interpreting data				
CO3	engage effectively in role-play, dialogue, conversation and interviews				
CO4	equip them for effective interaction with people in all situations both academic and professional				
CO5	learn English language as a 'life skill' and prepare for placement interviews				

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		PO11	PO12
CO1				H						H			H
CO2				H						H			H
CO3				H		M			H	H			H
CO4				H					H	H			H
CO5				H					H	H			H

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social	Program core	Program Electives	Open Electives	Practical / Project		Internships / Technical Skills	Soft Skills

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BEN18ET1	COMMUNICATION LAB	0 0/1 2/0 1

UNIT I   **6**
Listening and Speaking- Informal and Formal Contexts

UNIT II   **6**
Compeering -Anchoring -Group Discussion

UNIT III   **6**
Poster Presentation -Welcome Speech -Vote of Thanks

UNIT IV   **8**
Formal Presentation -Power point presentation of charts/ Diagrams

UNIT V   **4**
Facing an Interview- Mock Interview

SUGGESTED READINGS:

(i) *Practical English Usage.* Michael Swan. OUP. 1995.
(ii) *Remedial English Grammar.* F.T. Wood. Macmillan.2007
(iii)*On Writing Well.* William Zinsser. Harper Resource Book. 2001
(iv) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) *Communication Skills.* Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
(vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press
(vi) Pronunciation in Use,Mark Hancock. Cambridge University Press. 2012

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DEPARTMENT OF MECHANICAL ENGINEERING

SubjectCode: BES18ET2	Subject Name : BASIC ENGINEERING GRAPHICS	L	T/SLr	P/R	C
	Prerequisite : None	1	0/0	2/0	2

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :
- Learn to know what kind of pencils to be used to sketch lines, numbers, Letters and Dimensioning in drawing sheet.
- Draw Projection of points, line, planes and solids using Drafters
- To identify the angle of projection and development of surfaces, isometric projection and Orthographic projection
- Know the basics of elevation and plan of building.
- Learn the basics of Drafting using AutoCAD Software

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1		Utilize the concept of Engineering Graphics Techniques to draft letters, Numbers, Dimensioning in Indian Standards
CO2		Demonstrate the drafting practice visualization and projection skills useful for conveying ideas in engineering applications.
CO3		Identify basic sketching techniques of engineering equipments
CO4		Demonstrate the projections of Points, Lines, Planes and Solids.
CO5		Draw the sectional view of simple buildings and utilize Auto CAD Software.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	M	M	M			H	H		H
CO2	H	H	H	M	M	M			H	H		H
CO3	H	H	H	L		M			M	M		M
CO4	H	H	M	M		H		M	H	H		H
CO5	H	H	H	M	H	L		M	H	H		H

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills		Soft Skills

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BES18ET2	BASIC ENGINEERING GRAPHICS	1 0/0 2/0 2

CONCEPTS AND CONVENTIONS (Not for examination)   **3HRS**

Introduction to drawing, importance and areas of applications – BIS standards – IS: 10711 – 2001 : Technical products Documentation – Size and layout of drawing sheets – IS 9606 – 2001: Technical products Documentation – Lettering – IS 10714 & SP 46 – 2003: Dimensioning of Technical Drawings – IS : 15021 – 2001 : Technical drawings – Projections Methods – drawing Instruments, Lettering Practice – Line types and dimensioning – Border lines, lines title blocks Construction of polygons – conic sections – Ellipse, Parabola, Hyperbola and cyloids.

UNIT I   PROJECTION OF POINTS, LINES AND PLANE SURFACES   **6HRS**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – projection of polygonal surface and circular lamina in simple position only.

UNIT II   PROJECTION OF SOLIDS   **6HRS**

Projection of simple solids like prism, pyramid, cylinder and cone in simple position
Sectioning of above solids in simple vertical position by cutting plane inclined to one reference plane and perpendicular to the other.

UNIT III   DEVELOPMMENT OF SURFACES AND ISOMETRIC PROJECTION   **6HRS**

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders, and cones.
Principles of isometric projection – isometric scale – isometric projections of simple solids, like prisms pyramids, cylinders and cones.

UNIT IV   ORTHOGRAPHICS PROJECTIONS   **6HRS**

Orthographic projection of simple machine parts – missing views

BUILDING DRAWING

Building components – front, Top and sectional view of a security shed.

UNIT V   COMPUTER AIDED DRAFTING   **3HRS**

Introduction to CAD – Advantages of CAD – Practice of basic commands – Creation of simple components drawing using CAD software.

                         Total No. of periods:30

Note:First angle projection to be followed.

TEXT BOOKS
1. Bhatt, N.D. and Panchal, V.M. (2014) Engineering Drawing Charotar Publishing House
2. Gopalakrishnan, K.R. (2014) Engineering Drawing (Vol.I& II Combined) Subhas Stores, Bangalore.

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Subject Code : **BES18L02**	Subject Name **: INTEGRATED PHYSICAL SCIENCE LAB**				L	T/SLr	P/R	C
	Prerequisite : None				**0**	**0/0**	**2/0**	**1**

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory / Lab / Embedded Theory and Lab

OBJECTIVES :
- Demonstrate the ability to make physical measurements & understand the limits of precision in measurements.
- Display the ability to measure properties of variety of electrical, mechanical, optical systems.
- To help learners measure conductivity and EMF using electrical equipment.
- To understand the analytical skills through chromatography & viscometry
- To familiarize the concepts of cheminformatics

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1	Recognize the correctness and precision in the results of measurements.
CO2	Construct and compare the properties of variety of mechanical, optical, electrical and electronic systems.
CO3	Familiarizing the titration methods using conductometry & potentiometry
CO4	Developing the Research spirit through the knowledge of Cheminformatics & Analytical skills.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	L	H	H							
CO2	H	H	M	H	H					M		
CO3	H	H	M	H	H				H			
CO4	H	H	H	H	H				H		H	M

H/M/L indicates strength of correlation   H – High, M – Medium, L – Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills

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BES18L02	INTEGRATED PHYSICAL SCIENCE LAB	0 0/0 2/0 1

LIST OF EXPERIMENTS

1. Determination of Coefficient of Viscosity of a given liquid by Poiseuille`s method.

2. Particle Size determination using Laser Source.

3. Determination of Numerical Aperture of an Optical Fiber.

4. Spectrometer- Refractive Index/Dispersive power/i-d curve.

5. Potentiometer - Resistance of a wire.

6. Transistor Characteristics - Input Resistance, Output Resistance and Gain .

7. Studies on acid-base conductometric titration.

8. Determination of redox potentials using potentiometry.

9. Determination of R_f values of various components using thin layer chromatography.

10. Viscosity studies using Digital capillary viscometer.

11. Compute the structures of the given polymers, drugs, biomolecules usingChem Draw.

12. Studies on potential energy surface of the given molecules.

13. Estimate NMR spectra from a Chem Draw structure.

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DEPARTMENT OF COMPUTER SCIENCE

Subject Code : BES18ET3	Subject Name : C PROGRAMMING AND LAB	L	T/SLr	P/R	C
	Prerequisite : None	1	0/0	2/0	2
	L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory / Lab / Embedded Theory and Lab				

OBJECTIVES :

- Outline the basics of C Language.
- Apply fundamentals in C programming.
- Produce and present activities associated with the course**.**

COURSE OUTCOMES (Cos) : (3 – 5)
Students completing the course were able to

CO1		Acquire knowledge how to write and execute c programs
CO2		Understand the fundamental expression and statements of C Language.
CO3		Work with arrays, functions, pointers, structures, Strings and Files in C.
CO4		Identify and provide solutions for engineering problems in C programming

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			M	M		H	M			H
CO2	H	M			H	M		M	H			M
CO3	H			H		M		M	H			M
CO4	H			M		M		H	M			M
H/M/L indicates strength of correlation H – High, M – Medium, L – Low												

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills
							√		

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BES18ET3	C PROGRAMMING AND LAB	1 0/0 2/0 2

UNIT I   INTRODUCTION   **6HRS**

Fundamentals, C Character set, Identifiers and Keywords, Data Types, Variables and Constants, Structure of a C Program, Executing a C Program.

UNIT II   EXPRESSION AND STATEMENT   **6HRS**

Operators, Types-Complex and Imaginary, Looping Statement-For, While, Do, Break, continue, Decision Statement-If, If else, Nested if, Switching Statement, Conditional Operator.

UNIT III ARRAYS AND FUNCTIONS   **6HRS**

Defining an Array, Using Array elements as counters, Generate Fibonacci number, Generate Prime Numbers, Initializing Arrays, Multidimensional Arrays, Defining a Function, Function call -types of Function calls -Function pass by value -Function pass by reference, Write a Program in Recursive Function.

UNIT IV STRUCTURES AND
POINTERS   **6HRS**

Working with Structures -Introduction -Syntax of structures -Declaration and initialization -Declaration of structure variable -Accessing structure variables, Understanding Pointers -Introduction -Syntax of Pointer.

UNIT V   STRINGS AND FILE HANDLING   **6HRS**

Strings -Syntax for declaring a string -Syntax for initializing a string -To read a string from keyboard,

Files in C -File handling functions -Opening a File closing a file --example: fopen, fclose -Reading

data from a File- Problem solving in C

Total No of Periods: 30

1. www.spoken-tutorials.org
2. http://www.learn-c.org/

REFERENCE :

1. *Stephen G. Kochen" Programming in C- A complete introduction to the C Programming Language. Third Edition, Sams Publishing -2004*
2. *Ajay Mital, " Programming in C: A Practical Approach", Pearson Publication-2010*

LIST OF PROGRAMS

1. Write a program to check 'a' is greater than 'b' or less than 'b' Hint: use if statement.
2. Write another program to check which value is greater 'a', 'b' or 'c'. Hint: use else-if statement. (Take values of a, b, c as user inputs)
3. Write a Program to find the sum of the series : $x + X^3/3! + X^5/5!+\ldots\ldots\ldots\ldots.. X^n/n!$
4. Write a C Program to solve a Quadratic Equation by taking input from Keyboard
5. Write a C Program to arrange 20 numbers in ascending and descending Order. Input the Numbers from Keyboard
6. Write a C Program to Multiply a 3 x 3 Matrix with input of members from Keyboard
7. Write a program that takes marks of three students as input. Compare the marks to see which student has scored the highest. Check also if two or more students have scored equal marks.
8. Write a program to display records of an employee. Like name, address, designation, salary.
9. Write a C program, declare a variable and a pointer. Store the address of the variable in the pointer. Print the value of the pointer.
10. Write a C program to concatenate String 'best' and String 'bus'. Hint: strcat(char str1, char str2);
11. Explore the other functions in string library.
12. Write a program to create a file TEST. Write your name and address in the file TEST. Then display it on the console using C program.

III SEMESTER

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Subject Code: **BMA18005**	Subject Name : **MATHEMATICS III FOR MECHANICAL & CIVIL ENGINEERS**	Ty/Lb/ETL	L	T / S.Lr	P/R	C
	Prerequisite: **MATHEMATICS II**	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning   P : Project   R : Research C: Credits   T/L/ETL : Theory/Lab/Embedded Theory and Lab

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

COURSE OUTCOMES (COs) : (3- 5)

CO1	To understand the basic concepts in partial differential equations
CO2	To understand the basic concepts in fourier series
CO3	To understand the basic concepts in one & two dimensional heat and wave equations
CO4	To understand the basic concepts in Laplace Transforms
CO5	To understand the basic concepts in Fourier transforms

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H					M			
CO2	H	H		H					M			
C03	H	H		H					M			
C04	H	H		H					M			
C05	H	H		H					M			

COs / PSOs	PSO1	PSO2
CO1	H	M
CO2	H	M
C03	H	M
C04	H	M
C05	H	M

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical Project	Internships Technical Skill	Soft Skills			
	√											

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Subject code: BMA18005	Subject Title : **MATHEMATICS III FOR MECHANICAL & CIVIL ENGINEERS**	Ty/Lb/ ETL Ty	L 3	T/ S.Lr 1/0	P/ R 0/0	C 4

UNIT I PARTIAL DIFFERENTIAL EQUATIONS   12HRS

Formation of PDE by eliminating arbitrary constants and eliminating arbitrary functions – Solutions 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   12HRS

Dirichlet's conditions – General Fourier series – Half range Sine & Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS   12HRS

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

UNIT IV   LAPLACE TRANSFORMS   12HRS

Transforms of simple functions – Properties of Transforms – Inverse Transforms – Transforms of Derivatives and Integrals – Periodic functions – Initial and final value theorems – Convolution theorem – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients and Linear simultaneous differential equations of first order with constant coefficients.

UNIT V FOURIER TRANSFORMS   12HRS

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

Total No. of Hours: 60

TEXT BOOKS

1.   *Veerarajan T.,"Engineering Mathematics"(for first year), Tata McGraw Hill Publishing Co(2008).*
2.   *Veerarajan T,,"Engineering Mathematics"(for semester III), Tata McGraw Hill Publishing Co. (2005).*
3.   *Singaravelu,"Transforms and Partial Differential Equations"Meenakshi Agency,(2017).*

REFERENCES

1.   *Kreyszig E,"Advanced Engineering Mathematics"(9th ed.), John Wiley & Sons,(2011).*
2.   *Grewal B.S,"Higher Engineering Mathmatics", Khanna Publishers, (2012).*

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Subject Code: BCE18001	Subject Name : MECHANICS OF SOLIDS	Ty/Lb/ETL	L	T /S.Lr	P/R	C
	Prerequisite: None	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To learn fundamental concepts of Stress, Strain and deformation of soild applications of bars and thin cylinders
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyze a complex two dimensional state of stress and plane trusses

COURSE OUTCOMES (COs) : (3- 5)

CO1	To apply the fundamental concepts of stress and strain in the design of various structural components and machines
CO2	To analyze and design shafts to transmit required power
C03	To analyze about the force in member Truss with different methods
C04	To determine the bending, shear stresses and deflection produced in a beam subjected to system of loads
C05	To determine stresses due to impact and suddenly applied loads

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M								
CO2	H		H									M
C03	H			M	L							
C04	H	H		H								
C05	H	H				H					H	

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
C03	H	H										
C04	H	H										
C05	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships /	Soft Skills			
				√								

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Subject code: BCE18001	Subject Title : MECHANICS OF SOLIDS	Ty/Lb/ ETL Ty	L 3	T / S.Lr 1/0	P/ R 0/0	C 3

UNIT I   INTRODUCTION TO FORCE CONCEPT   12 HRS

Equivalent system of forces, rigid bodies, external & internal forces-Application of Statics of Particles-Free body Diagram Concurrent & Non Concurrent Forces - Principles of transmissibility- Equivalent forces & Varignon's theorem. Tension, Compression and Shear stress – Lateral Strain- Poisson's Ratio- Volumetric Strain – Deformation of Simple and Compound Bars - Elastic constants – Composite Sections .

UNIT II   CENTRE OF GRAVITY AND MOMENT OF INERTIA   12 HRS

Areas and volumes - Centroid of simple areas and volumes by integration - Centroid of composite areas - Second moment of areas - Radius of Gyration - Parallel axis and Perpendicular axis theorems - Moment of Inertia of simple areas by Integration -Moment of Inertia of Composite Areas - Mass Moment of Inertia of thin plates and simple solids.

UNIT III   BENDING MOMENT & SHEAR FORCE   12 HRS

Introduction to Bending and S.F- Beams and support conditions – types of supports – types of loads - shear forces and bending moment diagrams for simply supported beams, cantilevers and overhanging beams with all loads.

UNIT IV   ANALYSIS OF STATICALLY DETERMINATE PLANE TRUSSES   12 HRS

Stability and equilibrium of plane frames – Perfect frames - Types of Trusses – Analysis of forces in trusses member – Method of joints – Method of Sections – Tension co-efficient method – Graphical method

UNIT V   BENDING STRESS IN BEAMS & TORSION OF SHAFTS   12 HRS

Theory of simple bending-expression for bending stress-Section modulus-bending stress in symmetrical sections-Theory of torsion-Torsion of circular, hollow circular shafts and power -close coiled helical springs and leaf springs

                                                                                Total No of Hours:60

TEXT BOOKS
1. *Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007. 2.*
2. *Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010 *   Dr.R.K.Bansal A text book of Strength of Materials, Laxmi Publications,New Delhi 1996.*
3. *S. Ramamirutham and R.Narayanan, Strength of Materials, Dhanpat Rai Publications, New Delhi,1989.*

REFERENCES

1. *Kazimi S.M.A. " Solid Mechanics ", Tata McGraw Hill Publishing Company, New Delhi, 1991.*
2. *Laudner T.J. and Archer R.R., " Mechanical of Solids in Introduction ",McGraw Hill International Editions*
3. *William A.Nash, " Theory and Problems of Strength of Material" Schaum's outline series, Mc Graw Hill International Editions 1994*

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Subject Code: BCE18002	Subject Name : BUILDING MATERIALS		Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge on different materials and properties
- To understand the engineering aspects related to buildings

COURSE OUTCOMES (COs) : (3- 5)

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

CO1	Identify and characterize building materials
CO2	Understand the manufacturing process of bricks and cement
CO3	To have a clear understanding about foundation and its type

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H										M	
CO2	H				M	M						
CO3	H								M			M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Department of Civil Engineering

Subject code: BCE18002	Subject Title : **BUILDING MATERIALS**	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I BRICKS, AGGREGATES AND CEMENT 9HRS

Bricks – Classification – Manufacturing process – Test on bricks – Aggregate: Natural Stone Aggregate – Industrial By- product – Crushing strength, impact strength, and flakiness – Abrasion resistance – Grading – sand – Bulking. Cement: Cement Ingredients – Manufacturing Process – Types – Testing of Cement

UNIT II MASONRY& MORTAR 9HRS

Masonry - stone masonry - rubble and Ashlar masonry - Brick masonry - Bond - Definition need and scope - Types of bonds - English and Flemish bond - merits and demerits - composite masonry - solid and hollow block masonry-soil-cement bricks-Load bearing and non-load bearing walls- Codal provisions. Mortar – Preparation of Lime and Cement Mortar- Concrete – Ingredients – Manufacturing Process – Batching Plant – Ready Mix Concrete - Paints - Plastics – Glass

UNIT III SUB STRUCTURE AND SUPER STRUCTURE 9HRS

Substructure – Setting Out of Foundation and Trenches – Excavation and Timbering – Foundation – Shallow Foundation – Deep Foundation. Super Structure.

UNIT IV FLOOR, ROOF & STAIR CASE 9HRS

Floors - Types of floor - Details of concrete and terrazzo floors - Roofs - Types of Roofs - Types of Flat roofs - sloping roofs -different types and usage - shell roofs - roof coverings-AC sheets-GI sheets-FRP roofs Water proofing treatment of roofs -tar felt treatment- chemical treatment- Types of weathering courses .Stair Case – Definition – Types of Stair – General Dimension and Requirements – Layout of Stair Case.

UNIT V BUILDING SERVICES 9HRS

Damp Proofing- Acoustics Treatment – Thermal Insulation – Fire Protection – Ventilation – Earth Quake Protection- Integration of services in buildings - water supply & plumbing layout for a residential building - elevators & escalators - planning & installation - basic components of the electrical system for a residence .

Total No of Hours: 45

TEXT BOOKS
1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Building Construction" - Laxmi Publications (P) ltd., New Delhi.
2. Rangwala, S.C. Engineering Materials, Charotar Publishing House, 8th ed.1983. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and method of Construction, Dhanpat roy and Sons, 1997.

REFERENCES
1. Taylor, G.D .Materials of Construction, USA Longman Inc, 1989.
2. Arora and Bindra, Building Materials and Building Construction, Dhanpat Raj

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Subject Code:	Subject Name :		Ty/Lb/E	L	T /	P/	C
	ENGINEERING GEOLOGY		TL		S.Lr	R	
BCE18003	Prerequisite: None		Ty	3	0/0/	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- 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 foundation

COURSE OUTCOMES (COs) : (3- 5) At the end of the course, the student will be able to:

CO1	Identify and classify rock using basic geologic classification systems
CO2	Understand geologic concepts and approaches.
CO3	Identify the various lithological units and its applications in civil engineering

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H						M				M	
CO2	H						M				M	
C03	H						M				M	

COs / PSOs	PSO1	PSO2									
CO1	H	H									
CO2	H	H									
C03	H	H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering	Humanities and Social	Program Core	Program	Open Electives	Practical /	Internships /	Soft Skills			
				√								

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Subject code: BCE18003	Subject Title : ENGINEERING GEOLOGY	L	T / S.Lr	P/ R	C
		3	0/0	0/0	3

UNIT I   GENERAL GEOLOGY   9HRS

Geology in civil engineering - branches of geology - earth structure and composition - elementary knowledge on continental drift and plate tectonics. Seismo tectonics of the Indian plate, seismic zones of India, Weathering - work of rivers, wind, glaciers.

UNIT II   MINERALOGY   9HRS

Physical properties of minerals - study of rock forming minerals - quartz family. Feldspar family, augite, hornblende, biotite, muscovite, calcite, garnet - properties, behavior and engineering significance of clay minerals –fundamentals of process of formation of ore minerals - coal and petroleum - their origin and occurrence in India.

UNIT III   PETROLOGY   9HRS

Classification of Soil and Rock, Types of rock and origin: Igneous (extrusive and intrusive), sedimentary and metamorphic rocks, description occurrence, engineering properties of following rocks. Igneous rocks - granite, diorite, gabbro, pegmatite, dolerite and basalt sedimentary rocks sandstone, limestone, shale, conglomerate and breccia. Metamorphic rocks, quartzite, marble, slate, phyllite, gneiss and schist.

UNIT IV   STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD   9HRS

Strength Behavior of Soil and Rock , Stress and strain in rock,   failure and shear failure of soil and rock, folds, faults and joints in rock, consequences of failure (earthquakes), Bearing on engineering construction. Seismic and electrical methods for civil engineering investigations.

UNIT V   GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING   9HRS

Geologic Mapping and Remote Sensing, Topographic maps, geologic maps, aerial photographs, LIDAR, SAR, interpretation for civil engineering projects - geological conditions necessary for construction of dams, tunnels, buildings, road cuttings, landslides - causes and preventions. Sea erosion and coastal protection.

Total No of Hrs :   45

TEXT BOOKS

1. *Parbin singh, "Engineering and General geology ", S. K. Kataria & Sons, 2009*

2. *D. Venkat Reddy "Engineering Geology", Vikas publishing House New Delhi, 2010*

3. *Krynine and Judd, "Engineering Geology and Geotechniques ", McGraw Hill Book Company, New Delhi 1990.*

REFERENCE

1. *Legeet, "Geology and Engineering ", McGraw Hill Book Company, New Delhi*

2. *Blyth, "Geology for Engineers ", elbs, Pune 1995*

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Department of Civil Engineering

Subject Code: BEE18I04	Subject Name : ENERGY CONSERVATION TECHNIQUES		Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To study the various energy saving and management techniques applied to building and construction with relevance to environment.

COURSE OUTCOMES (COs) : (3- 5) At the end of the course the student shall

CO1	Possess knowledge on basic energy conservation systems
CO2	Design energy efficient buildings
CO3	Able to do energy audit and identify conservative measures

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H	M	M				
CO2	H	H		H	H	H	M	M				
CO3	H	H		H	H	H	M	M				

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
		√										

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Subject code: BEE18I04	Subject Title : ENERGY CONSERVATION TECHNIQUES	L 3	T / S.Lr 0/0	P/ R 0/0	C 3

UNIT I   INTRODUCTION   9 HRS
Fundamentals of energy- Energy Production Systems-Heating, Ventilating and Airconditioning – Solar Energy and Conservation – Energy Economic Analysis – Energy conservation and audits – Domestic energy consumption – savings - challenges –primary energy use in buildings - Residential – Commercial – Institutional and public buildings – Legal requirements for conservation of fuel and power in buildings.

UNIT II   ENVIRONMENTAL   9 HRS
Energy and resource conservation – Design of green buildings – Evaluation tools for building energy – Embodied and operating energy – Peak demand – Comfort and Indoor Air quality – Visual and acoustical quality – Land, water and materials ..

UNIT III   DESIGN   9HRS
Natural building design consideration – Energy efficient design strategies – Contextual factors – Longevity and process Assessment – Renewable Energy Sources and design – Advanced building Technologies – Smart buildings – Economies and cost analysis.

UNIT IV   SERVICES   9 HRS
Energy in building design – Energy efficient and environment friendly building – Thermal phenomena – thermal comfort – Indoor Air quality – Climate, sun and Solar radiation, - Psychometrics – passive heating and cooling systems - Energy Analysis – Active HVAC systems - Preliminary Investigation – Goals and policies – Energy audit – Types of Energy audit– Energy flow diagram – Energy consumption / Unit Production – Identification of wastage- Priority of conservative measures.

UNIT V   ENERGY MANAGEMENT   9 HRS
Energy management of electrical equipment - Improvement of power factor – Management of maximum demand – Energy savings in pumps – Fans – Compressed air systems – Energy savings in Lighting systems – Air conditioning systems – Applications .

Total No. of Hours: 45

REFERENCES

1. *Moore F., Environmental Control system Mc Graw Hill, Inc. 1994.*

2. *Brown, GZ, Sun, Wind and light: Architectural design strategies, John Wiley & Sons,1985.*

3. *Cook, J, Award – Winning passive Solar Design, Mc Graw Hill, 1984.*

4. *J.R. Waters, Energy conservation in Buildings: A Guide to part L of the Building Regulations,*

   Blackwell Publishing, 2003.

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Subject Code: BCE18L01	Subject Name : BUILDING DRAWING PRACTICE		Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Basic Engineering Graphics		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To introduce the students to draft 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) : (3- 5) At the end of the course, the student will be able to:

CO1	know about the basic principles of Building Drawing
CO2	know Basic commands of a popular drafting package
CO3	Acquire knowledge on plan, elevation and section of buildings

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M		M			M	
CO2	H							M			M	
CO3	H					M		M			M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18L01	**BUILDING DRAWING PRACTICE**	**Lb**	**0**	0/0	3/0	**1**

Experiments

1. Basic concept, purpose, function and types of building (Residential, Industrial and Institutional)

2. Principles of site selection, orientation of buildings and distribution of space.

3. Line plan. Development of plan from a line plan.

4. Details of Doors, windows, foundation and stair case etc.

5. Single storied residential building with flat and tiled roof.

6. Public buildings like office, dispensary, post office, bank etc.

7. Factory building with trusses supported on Brick walls and pillars.

Total No of Hours: 30

TEXT BOOKS

1. Civil Engg. Drawing & House planning – B.P.Verma, Khanna publishers, Delhi,1990

2. Building drawing & detailing – Dr. Balagopal & T.S.Prabhu, Spades publishers, Calicut,1989.

REFERENCES

1. Building drawing – Shah, Tata McGraw-Hill, New Delhi,2000.

2. Building planning & drawing – Dr. N.Kumaraswamy, A.Kameswara Rao, Charotar publishing house. Mumbai, 1997.

3. Shah, Kale and Patki, Building drawing, Tata McGraw-Hill New Delhi,,1998.

4. Balagopal T.S. Prabhu, Building drawing and detailing, Spades Publishers

5. Shah & Kale, Building Drawing, Tata McGraw Hill

6. B.P. Verma, Civil Engineering Drawing and housing Planning, Khanna Publishers

Department of Civil Engineering

Subject Code: BCE18L02	Subject Name : STRENGTH OF MATERIALS AND CONCRETE LAB	Ty/Lb / ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- Learn the properties of different materials like steel, concrete, timber, bricks and other materials
- Study the behavior of different structural elements and develop skill in use of measuring instruments

COURSE OUTCOMES (COs) : (3- 5)

CO1	To do tests on cement as per IS codes of practice
CO2	To do tests on fine and coarse aggregates according to IS codes of Practice;
CO3	To do tests on fresh and hardened concrete as per IS codes of practice

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M					M		M	
CO2	H			M					M		M	
CO3	H			M					M		M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
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Department of Civil Engineering

Subject code:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18L02	**STRENGTH OF MATERIALS AND CONCRETE LAB**	**Lb**	**0**	**0/0**	**3/0**	**1**

STRENGTH OF MATERIALS LAB

1. Tension test on mild steel and for steel rods.
2. Compression test on wooden specimen
3. Double shear test on mild steel and aluminum rods.
4. Torsion test on mild steel rod.
5. Impact test on metal specimen
6. Hardness tests on metals like mild steel, brass, copper and aluminum.
7. Deflection test on metal beam
8. Compression test on helical spring

Total No of Hours: 15

CONCRETE LAB

1. Tests on Cement
   a.Specific Gravity,
   b. Normal consistency,
   c. Initial and Final setting time of cement

2. Test on Aggregate
   a. Sieve analysis
   b. Specific gravity
   c. Water Absorption

3. Tests on Freshly Mixed Concrete
   Compaction Factor,
   Slump Value.

Total No of Hours: 15

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.,

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Subject Code: BAR18IL1	Subject Name : GEOLOGY AND BUILDING MATERIALS LAB		T y/ Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Lb	0	0/0	2/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- Learn to appreciate field condition in relation to engineering projects/problems and understand the problems.

COURSE OUTCOMES (COs) : (3- 5)   At the end of the course, the student will be able to:

CO1	Determine engineering properties of soils
CO2	Measure strike and dip of the bedding planes
CO3	Interpret geological Maps
CO4	Test on Physical Properties of Soil

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M	M					
CO2	H					M	M					
C03	H					M	M					
C04	H					M	M					

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
C03	H	H										
C04	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Department of Civil Engineering

Subject code: BAR18IL1	Subject Title : **GEOLOGY AND BUILDING MATERIALS LAB**	Ty/Lb/ETL Lb	L 0	T / S.Lr 0/0	P/ R 2/0	C 1

COURSE CONTENT:

ENGINEERING GEOLOGY

1. Study of Geological map and section of local area

2. Study the various properties of igneous rocks, sedimentary and metamorphic through rocks samples.

3. Study the various properties of different minerals and mineral ores through samples.

4. Study the various types of folds and faults.

5. Physical properties of minerals such as, hardness, colour, streak, etc.

6. Numerical Problems related to Dip and Strike

7. Study of different geological features through models

8. Field visit

BUILDING MATERIALS

1. Assessment of physical properties of bricks such as absorption, shape and size, structure, soundness,

   Hardness, presence of soluble salts.

2. Hardness, impact and water absorption test etc for stones

3. Study on different types of bonds for bricks and stones

4. Study on defects in timber

Total No. of Hours: 30

Department of Civil Engineering

Subject Code:	Subject Name :		Ty/	L	T / S.Lr	P/ R	C
BCE18004	ENGINEERING SURVEY		Lb/ ET L				
	Prerequisite: None		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

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

COURSE OUTCOMES (COs) : (3- 5) At the end of the course, the student will be able to:

CO1	Understand the principles of basic survey instruments in civil engineering fields, concept of contouring and the ways of plotting.
CO2	Understand the concept of tachometric surveying, Control surveying, Survey adjustments, Astronomical surveying and Photogrammetric.
CO3	Understand the concept Photogrammetry, Total station, Hydrographic survey and cartography.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M		L			H			
CO2	H	M		M		L			H			
CO3	H	M		M		L			H			

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code: **BCE 18004**	Subject Title : **ENGINEERING SURVEY**	Ty/Lb/ETL **Ty**	L **3**	T/ S.Lr **1/0**	P/ R **0/0**	C **4**

UNIT I   TYPES OF SURVEY   12 HRS

Definition - principles - classification - survey instruments - ranging and chaining - reciprocal ranging - setting perpendiculars –errors - traversing. Prismatic compass - surveyor's compass - bearing - systems and conversions - local attraction – magnetic declination - dip - plane table instruments and accessories – merits and demerits - methods - radiation - intersection - resection.

UNIT II   LEVELLING AND APPLICATIONS   12 HRS

Level line - horizontal line - levels and staves - sprit level - bench marks - temporary and permanent adjustments - fly and check leveling - reciprocal leveling - longitudinal and cross sections. Contouring - methods – characteristics and uses of contours - plotting - calculation of areas and volumes- earth work volume.

UNIT III   TACHEOMETRIC SURVEYING   12 HRS

Theodolite - vernier - description and uses - temporary and permanent adjustments of vernier transit – swing-horizontal angles - vertical angles – measurements of angles and distances Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens – Subtense bar.

UNIT IV   CONTROL SURVEYING AND PHOTOGRAMMETRY   12 HRS

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

UNIT V   SURVEY ADJUSTMENTS   12 HRS

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values –weighted observations - Principle of least squares - Normal equation – Correlates.

                                                                    Total No of hours: 60

TEXT BOOKS
1. Kanetkar T.P., "Surveying and Levelling ", vols. I and II, United Book Corporation, Pune, 1994.
2. Punmia B.C., "Surveying ", Vols. I and II, Laxmi Publications, Mumbai, 1999.
3. N.N basak., " Surveying and Levelling ", Tata McGraw Hill, New Delhi, 2004.

REFERENCES
1. Clark D., Plane and Geodetic Surveying ", vols. I and II and C.B.S. Publishers,New Delhi, Sixth edition, 1991.

2. James M. Anderson and Edward M. Mikhail, "Introduction to Surveying ", Tata McGraw Hill, New Delhi, 1995

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Subject Code:	Subject Name :		T y/ Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18005	**STRENGTH OF MATERIALS**						
	Prerequisite: Mechanics of solids		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart knowledge about deflection in beams by various methods
- To impart knowledge about analyzing the structural elements by energy concepts and finding stresses and deflection
- To impart knowledge about behavior of columns, critical loads and design of columns

COURSE OUTCOMES (COs) : (3- 5) At the end of the course, Students will have

CO1	through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
CO2	they will be in a position to assess the behaviour of columns,
C03	To knew beams and failure of materials.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M					M	
CO2	H	H	H	H		M					M	
CO3	H	H	H	H		M					M	

COs / PSOs	PSO1		PSO2	
CO1	H		H	
CO2	H		H	
C03	H		H	

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill Soft Skills			
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Subject code: BCE18005	Subject Title : STRENGTH OF MATERIALS	Ty/Lb/ETL Ty	L 3	T/ S.Lr 1/0	P/ R 0/0	C 4

UNIT I   ENERGY PRINCIPLES   11 HRS

Strain energy and strain energy density - Strain energy in tension, shear, flexure and torsion - Castigliano's & Engessor's energy theorems- Principle of Virtual Work- Application of energy theorems for computing deflection in Determinate structures – Maxwell's reciprocal theorem.

UNIT II   DEFLECTIONS   13 HRS
 Methods of Deflection Determination of Deflection curve – computation of slopes and deflections in Determinate Beams - Double Integration method – Macaulay's method – Area Moment method –Conjugate Beam method.

UNIT III   INDETERMINATE BEAMS   13 HRS
Propped Cantilever and Fixed Beams - Fixed End Moments and Reactions for Standard cases of Loading - Continuous Beams - Theorem of Three Moments - Analysis of Continuous Beams - S.F. and B.M. Diagrams for Continuous Beams.

UNIT IV   COLUMNS   13HRS
Eccentrically Loaded Short Columns Middle Third Rule - Core of Section - Columns of Unsymmetrical Sections - Rankine – Gordon Formula Eccentrically Loaded Long Columns. Theories of Failure - Principal Stress, Principal Strain, Shear Stress, Strain Energy and Distortion Energy Theories.

UNIT V   BENDING OF BEAMS   10HRS
Bending of Beams of Symmetrical and Unsymmetrical Sections – Box sections and its importance — Winkler Bach Formula - Shear Center Simple problems

Total No of Hours :60

TEXT BOOKS
1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
3. R.S. Khurmi, "Engineering Mechanics of Solids ", Prentice Hall of India, New Delhi, 1997.
4. S.S Ratan, "Strength of Materials ", Tata McGraw Hill Publishing Company, New Delhi, 2008

REFERENCES
1. Laudner T.J. and Archer R.R., " Mechanical of Solids in Introduction ",McGraw Hill International Editions, New Delhi,1994..
2. William A.Nash, " Theory and Problems of Strength of Material" Schaum's outline series, Mc Graw Hill International Editions, New Delhi, 1994

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Subject Code:	Subject Name :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	MECHANICS OF FLUIDS					
BCE18006	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To know the importance, application and inter-relationship of various properties of fluid.
- To study theories those explain the behavior and performance of fluid when the fluid is flowing through the pipe.
- To understand the utilization of dimensional analysis as a tool in solving problems in the field of fluid mechanics.

COURSE OUTCOMES (COs) : (3- 5)

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
C03	To have a clear understanding about fluid kinematics and dynamics
C04	To study the basics of boundary layer flow and flow through pipes
C05	To study about various models like distorted models and various dimensionless numbers

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M	M						
CO2	H	M										
C03	H											H
C04	H				M							
C05	H	H		M								

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
C03	H	H										
C04	H	H										
C05	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
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Subject code: BCE18006	Subject Title : **MECHANICS OF FLUIDS**	Ty/Lb/ETL Ty	L 3	T / S.Lr 0/0	P/ R 0/0	C 3

UNIT I   DEFINITIONS AND FLUID PROPERTIES   9 HRS

Definitions - Fluid and Fluid Mechanics - Dimensions and Units - Fluid properties –Viscosity, Compressibility, Surface tension and Capillarity, Continuum - concept of system and control volume.

UNIT II   FLUID STATISTICS   9 HRS

Pascal's law and Hydrostatic equation - buoyancy -meta centric height – pressure measurement – gauges and manometers.

UNIT III   FLUID KINEMATICS   9 HRS

Stream, streak and path lines - classification of flows - continuity equation - stream and potential functions –flow nets – velocity and acceleration measurement-Problems

UNIT IV   FLUID DYNAMICS   9 HRS

Euler and Bernoulli's equations - application of Bernoulli's equation - discharge measurement -Hagen Poiseuille equation .

UNIT V   FLOW THROUGH PIPES AND DIMENSIONAL ANALYSIS   9 HRS

Darcy Weisbach formula -Major and minor losses of flow in pipes – pipes in series and in parallel – Dimensional analysis - Buckingham π -theorem.

Total No of Hours: 45

TEXT BOOKS

1. *Dr.R. K. Bansal., "Fluid Mechanics and Hydraulic Machines ", Laxmi Publications 2015.*

2. *Fox, Robert W. And McDonald, Alan T., "Introduction to Fluid Mechanics ",John Willey & sons*

REFERENCES

1. *Streeter, Victor l. And Wylie, Benjamin E., "Fluid Mechanics ", McGraw-Hill Ltd., 1998.*

2. *Natarajan M.K., "Principles of Fluids Mechanics ", Anuradha Agencies, Kumbakonam, 1995*

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Subject Code:	Subject Name :	Ty/Lb/ETL	L	T /S.Lr	P/R	C
BEC 18I09	**SENSORS AND INSTRUMENTATION**					
	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

COURSE OUTCOMES (COs) : (3- 5)

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

CO1	to familiarize with the structure and physical properties of smart materials
CO2	Understand the stability properties and degradation processes.
CO3	To have a clear understanding about the selected technologies.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H										M	
CO2	H				M	M						
CO3	H								M			M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	√ Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			

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Subject code: BCE 18I09	Subject Title : SENSORS AND INSTRUMENTATION	Ty/Lb/ETL Ty	L 3	T / S.Lr 0/0	P/ R	C 3

UNIT I INTRODUCTION 9 HRS

Introduction to Smart Materials and Structures – Instrumented structures functions and response –Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II MEASURING TECHNIQUES 9 HRS

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III SENSORS 9 HRS

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT IV ACTUATORS 9 HRS

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

UNIT V SIGNAL PROCESSING AND CONTROL SYSTEMS 9 HRS

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

Total No of Hours: 45

TEXT BOOKS

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

REFERENCES

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

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Subject Code: BHS18NC1	Subject Name : The Indian Constitution	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL	T	2	0/0	0/0	0

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES:
- To provide an overview of the history of the making of Indian Constitution
- To understand the preamble and the basic structures of the Constitution.
- To Know the fundamental rights, duties and the directive principles of state policy
- To understand the functionality of the legislature , the executive and the judiciary

COURSE OUTCOMES (COs) : After studying this course the student would be able to

CO1	To provide an overview of the history of the making of Indian Constitution
CO2	To understand the preamble and the basic structures of the Constitution.
CO3	To Know the fundamental rights, duties and the directive principles of state policy

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						H	L	L	L	L		
CO2						H	L	L	L	L		
CO2						H	L	L	M	L		

COs / PSOs	PSO1		PSO2				
CO1	L		L				
CO2	L		L				
CO3	L		L				

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
			✓									

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BHS18NC1	The Indian Constitution	2	0	0	0

UNIT 1   **3Hrs**

The History of the Making of Indian Constitution, Preamble and the Basic Structures

UNIT 2   **3Hrs**

Fundamental Rights and Duties , Directive Principles of State Policy

UNIT 3   **3Hrs**

Legislature, Executive and Judiciary

UNIT 4   **3Hrs**

Emergency Powers

UNIT 5   **3Hrs**

Special Provisions for Jammu and Kashmir, Nagaland and Other Regions, Amendments

Total no Hrs: 15 Hrs

TEXT BOOKS:
1. D D Basu, Introduction to the Constitution of India, 20th Edn.,LexisnexisButterworths, 2012.

REFERENCE BOOKS:

1. *Rajeev Bhargava (ed), Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008.*
2. *Granville Austin, The Indian Constitution: Cornerstone of a Nation, Oxford University Press, Oxford, 1966.*
3. *Zoya Hassan, E. Sridharan and R. Sudarshan (eds), India's Living Constitution: Ideas, Practices, Controversies, Permanent Black, New Delhi, 2002.*
4. *Subhash C. Kashyap, Our Constitution, National Book Trust, New Delhi, 2011.*

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Subject Code: BHS18NC2	Subject Name : The Indian traditional knowledge	T / L/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL	T	2	0/0	0/0	0

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVES:
- To understand the Pre- colonial and Colonial Period, Indian Traditional Knowledge System
- To understand the Traditional Medicine, Traditional Production and Construction Technology
- To Know the History of Physics and Chemistry, Traditional Art and Architecture and Vastu Shashtra, Astronomy and Astrology

COURSE OUTCOMES (COs) : After studying this course the student would be able to

CO1	To understand the Pre- colonial and Colonial Period, Indian Traditional Knowledge System
CO2	To understand the Traditional Medicine, Traditional Production and Construction Technology
CO3	To understand the Origin of Mathematics, Aviation Technology in Ancient India, Crafts and Trade in Ancient India

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		H	H	L		M				M		L
CO2		H	H	L		M				M		L
CO2		H	H	L		M				M		L

COs /	PSO1	PSO2										
CO1	L	L										
CO2	L	L										
CO3	L	L										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

	Basic Sciences	Engg Sciences	Humanities & Social Sciences	Program core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skills	Soft Skills			
			✓									

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Department of Civil Engineering

BHS18NC2	The Indian traditional knowledge	2	0	0	0

UNIT I   **3Hrs**

Historical Background: TKS During the Pre- colonial and Colonial Period, Indian Traditional Knowledge System

UNIT II   **3Hrs**

Traditional Medicine, Traditional Production and Construction Technology

UNIT III   **3Hrs**

History of Physics and Chemistry, Traditional Art and Architecture and Vastu Shashtra, Astronomy and Astrology

UNIT IV   **3Hrs**

Origin of Mathematics, Aviation Technology in Ancient India, Crafts and Trade in Ancient India

UNIT V   **3Hrs**

TKS and the Contemporary World, TKS and the Indian Union, TKS and IT Revolution

Total no Hrs: 15 Hrs

TEXT BOOKS:

1. *Amit Jha (2009) , Traditional knowledge system in india, 1ˢᵗ Edition, Delhi University (North Campus)*
2. *Dr.A.K.Ghosh (2011), Traditional Knowledge of Household Products*

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Subject Code:	Subject Name :		T y/ Lb/	L	T / S.Lr	P/ R	C
	CONCRETE AND CONSTRUCTION		ETL				
BCE18ET1	**TECHNOLOGY**						
	Prerequisite: Building materials		ETL	1	0/1	3/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To understand various construction procedures from sub structure to super structure and also the equipment needed for construction of various types of structures from foundation to super structure
- To develop the ability to solve a specific problem right from its identification till the successful solution of the same

COURSE OUTCOMES (COs) : (3- 5) At the end of the course, the student will be able to:

CO1	understand about concrete making materials , supplementary cementations materials and design the concrete mix for the required strength
CO2	Will acquire knowledge on handling of different types of construction equipments
CO3	On Completion of the project students will be in a position to take up challenging practical problems and find solution by formulating proper methodology.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M			M					M	
CO2	H	H	H			M					M	
CO3	H	H	M			M					M	

COs / PSOs	PSO1		PSO2	
CO1	H		H	
CO2	H		H	
CO3	H		H	

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships /	Soft Skills			
				√								

Subject code: BCE18ET1	Subject Title : CONCRETE AND CONSTRUCTION TECHNOLOGY	Ty/Lb /ETL	L	T / S.Lr	P/ R	C
		ETL	1	0/1	3/0	3

UNIT I   CONCRETE MAKING MATERIALS   8 HRS

Manufacture and Components of Portland Cement- Hydration Process- Types of Cement, Aggregates - Classification and Properties Admixtures.

UNIT II   MIX DESIGN   10 HRS

Properties of Fresh Concrete- Workability, Segregation and Bleeding of Concrete - Factors influencing Mix Proportions - I.S and ACI Methods of Mix Design.

UNIT III   PROPERTIES OF HARDENED CONCRETE   8 HRS

Strength - Creep and Shrinkage - Durability of Concrete - Chemical Attack - Different Types of FRC - Properties and Applications.

UNIT IV   SUB STRUCTURE CONSTRUCTION   9 HRS

Piling techniques – Sheet piles – Under water construction of Diaphragm wall and basement – Driving diaphragm walls – Driving well and caisson – Sinking coffer dam – Shoring for deep cutting – Well points – Dewatering and stand by plant equipment for underground open excavation
.

UNIT V   SUPER STRUCTURE AND CONSTRUCTION EQUIPMENTS   10 HRS

Construction sequences in cooling Towers, Bunkers, Silos and Chimney – Pre- stressed construction – In situ pre-stressing in high rise structures – Erecting light weight components on tall structures. Types of earth work equipment's - Tractors, Motor graders, Scrappers - Equipment for compaction – Batching and mixing and concreting.

Note: A Project report has to be submitted on any of the above topics which will be evaluated during the semester practical exams.

Total No of Hours :   45

TEXT BOOKS

1. *Shetty. M.S., Concrete Technology, S.Chand and Co, Pune,1984*
2. *Arora S.P. And Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Roy and Sons, New Delhi, 1997.*
3. *Peurifoy, R.L., Ledbetter, W.D And Schexnayder, C., 'Consruction Plaaning, Equipment and Methods' V Edition McGraw Hill, Singapore, 1995*

REFERENCES

1. *Krishnasamy. K.T., Concrete Technology, Dhanapt Rai - New Delhi – 1985*
2. *Neville, properties of concrete elbs, 1977.*
3. *Sharma S.C., Building Construction, Khanna Publishers, New Delhi.1998*

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Subject Code: BCE18L03	Subject Name : FLUID MECHANICS & HYDRAULIC MACHINERY LAB	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To learn the aim, working principle, components and function of hydraulic equipments.

- To get hand-on experience in the operation of hydraulic machines.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Measure theoretical discharge in pipes, Venturimeter, orificemeter 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)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M								M	M
CO2	H	M	M								M	M
CO3	H	M	M								M	M

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code: BCE18L03	Subject Title : FLUID MECHANICS & HYDRAULIC MACHINERY LAB	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
		Lb	0	0/0	3/0	1

UNIT I   FLOW MEASUREMENT   6 HRS
    i. Venturimeter.
    ii. Orifice meter.

UNIT II   LOSSES IN PIPES   6 HRS
    Estimation of major energy and minor losses in pipes

UNIT III   PUMPS   10 HRS
    Performance characteristics of

    i.   Rated speed centrifugal pump.
    ii.   Gear pump.
    iii.   Reciprocating pump.

UNIT IV   TURBINES   8 HRS
    Performance characteristics of Pelton wheel turbine and Francis turbine.

              Total No of Hours: 30 hrs

TEXT BOOKS
1. Dr. R. K.Bansal., "Fluid Mechanics And Hydraulic Machines ", Lakshmi Publications (P) Ltd.New Delhi 2005.
2. Fox, Robert w. and Mcdonald, Alan T., "Introduction to Fluid Mechanics ",John Willey & Sons, New Jersey

REFERENCES
1. Streeter, Victor L. And Wylie, Benjamin e., "Fluid Mechanics ", McGraw-Hill Ltd.New Delhi, 1998.
2. Natarajan M.K., "Principles of Fluids Mechanics ", Anuradha agencies, Vidayal karuppur, kumbakonam, 1995

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Subject Code: BCE18L04	Subject Name : **SURVEYING FIELD WORK**	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To train the students with the practical knowledge on basic surveying methods for construction and road purpose

COURSE OUTCOMES (COs) : (3- 5) At the end of the course, the student will be able to:

CO1	Experiments related to finding height and distances by tacheometric, single plane and double plane method.
CO2	Setting out simple curve for construction of road purposes.
CO3	Setting out of works for foundation marking, use of stereoscope for 3-D viewing, Co-ordinate measurements by GPS and Traversing by Total station.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M			M					M	L
CO2	H		M			M					M	L
CO3	H		M			M					M	L

COs / PSOs	PSO1	PSO2										
CO1	M	H										
CO2	M	H										
CO3	M	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18L04	**SURVEYING FIELD WORK**	**Lb**	**0**	**0/0**	**3/0**	**1**

UNIT I   CHAIN SURVEYING   4 HRS

Ranging – Chaining – Traverse

UNIT II   COMPASS SURVEYING   4 HRS

Traverse

UNIT III   PLANE TABLE SURVEYING   6 HRS

Triangulation to find distance between inaccessible points with and without known scale – Three-Point Problem – Two-Point Problem.

UNIT IV   LEVELLING   8 HRS

Study of levels and leveling staff – Fly leveling using dumpy level – Fly leveling using tilting level – Check leveling.

UNIT V   THEODOLITE   8 HRS

Study of Theodolite Measurement of angles by reiteration and repetition – Measurement of vertical angles

Total No of Hours: 30

TEXT BOOKS

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

2.   *N.N Basak, " Surveying and Levelling ", Tata McGraw – Hill Publishing Company Limited New Delhi, 2004.*

REFERENCES

1.   *Clark D., "Plane and Geodetic Surveying ", Vols. II and C.B.S. Publishers, I and Distributors, New Delhi, Sixth Edition, 1991.*
2.   *James M. Anderson and Edward M. Mikhail, "Introduction to Surveying ", McGraw Hill Book Company, New Delhi, 1995*

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Subject Code: BAR18IL2	Subject Name :	**BASICS OF AUTOCADD**	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building Drawing Practice		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To provide the student with an appreciation of the capabilities and limitations of the AutoCAD program.

COURSE OUTCOMES (COs) : (3- 5)

CO1	prepare the building plans satisfying the principles of planning and byelaws.
CO2	draw plan, section and elevation for various structures
CO3	prepare detailed working drawings of doors, windows, roof trusses and staircases

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	H		H			H		M				H
CO2	H		H			H		M				H
CO3	H		H			H		M				H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code: BAR18IL2	Subject Title : **BASICS OF AUTOCADD**	Ty/Lb/ETL **Lb**	L **0**	T / S.Lr **0/0**	P/ R **3/0**	C **1**

List of Experiments:

1. Learn and use basic AutoCAD   commands - manage drawing using layers, colour and line types - complete basic cad drawings, with borders, text and dimensions - use and edit text and text styles – Method of scales in various drawing - understand and the use of blocks.
2. Development of line plan for residential building. one for single storied building
3. Development of line plan for residential building. one for two storied building
4. Submission drawing for residential building including its planning and with area and parking statements and all other details as per the norms and local bye-laws.
5. Industrial buildings with roof truss.
6. To draw the 3D view of residential building.

Total No of Hours: 30 hrs

TEXT BOOKS

1. *Civil Engg. Drawing & House planning – B.P.Verma, Khanna publishers, Delhi,1990*

2. *Building drawing & detailing – Dr. Balagopal & T.S.Prabhu, Spades publishers, Calicut,1989.*

REFERENCES

1. *Building drawing – Shah, Tata McGraw-Hill, New Delhi,2000.*

2. *Building planning & drawing – Dr. N.Kumaraswamy, A.Kameswara Rao, Charotar publishing house. Mumbai,1997.*

3. *Shah, Kale and Patki, Building drawing, Tata McGraw-Hill New Delhi,,1998.*

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Subject Code: BCE18TS1	Subject Name : **BUILDING DRAWING USING CIVIL ENGINEERING SOFTWARES**		Ty/L b/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building Drawing Practice		Lb	0	0/0	0/2	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To provide the student with an appreciation of the capabilities and limitations of the AutoCAD program.

COURSE OUTCOMES (COs) : (3- 5)

CO1	prepare the building plans satisfying the principles of planning and byelaws.
CO2	draw plan, section and elevation for various structures
CO3	prepare detailed working drawings of doors, windows, roof trusses and staircases

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H			H		M				H
CO2	H		H			H		M				H
CO3	H		H			H		M				H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								√				

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18TS1	**BUILDING DRAWING USING CIVIL ENGINEERING SOFTWARES**	**Lb**	**0**	**0/0**	**0/2**	**1**

1. Submission drawing for residential building including its planning and with area and parking statements and all other details as per the norms and local bye-laws.
2. Industrial buildings with roof truss.
3. To draw the 3D view of residential building.

Department of Civil Engineering

Subject Code: BEN18SK1	Subject Name : SOFT SKILL - I CAREER & CONFIDENCE BUILDING	Ty / LB/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	ETL	1	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To create awareness in students, various top companies helping them improve their skill set matrix, leading to develop a positive frame of mind.
- To help students be aware of various techniques of candidate recruitment and help them prepare CV's and resume.
- To help student how to face various types of interview, preparing for HR, technical interviews.
- To help students improve their verbal reading, narration and presentation skills by performs various mock sessions.

COURSE OUTCOMES (COs) : (3- 5) Students will be able to

CO1	Be aware of various top companies leading to improvement in skills amongst them.
CO2	Be aware of various candidate recruitment techniques like group discussion, interviews and be able to prepare CV's and resumes.
CO3	Prepare for different types of interviews and be prepared for HR and technical interviews.
CO4	Improve their verbal, written and other skills by performing mock sessions.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	L	L	M	M	H	M	H	M	H
CO2	L	L	L	L	L	M	M	H	M	H	M	H
CO3	L	L	L	L	L	M	M	H	M	H	M	H
CO4	L	L	L	L	L	M	M	H	M	H	M	H

COs / PSOs	PSO1	PSO2
CO1	L	L
CO2	L	L
CO3	L	L
CO4	L	L

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓						✓			

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Department of Civil Engineering

Subject code: BEN18SK1	Subject Title : **SOFT SKILLS – I CAREER & CONFIDENCE BUILDING SOFTWARES**	Ty/Lb/ETL ETL	L 0	T / S.Lr 0/0	P/ R 3/0	C 1

UNIT I 6 HRS

Creation of awareness of top companies / improving skill set matrix / Development of positive frame of mind / Creation of self-awareness.

UNIT II 6 HRS

Group discussions / Do's and don'ts – handling group discussions / what evaluators look for interpersonal relationships / Preparation of Curriculum Vitae / Resume.

UNIT III 6 HRS

Interview – awareness of facing questions – Do's and don'ts of personal interview / group interview, enabling students to prepare for different proce3dures such as HR interviews and Technical Interviews / self-introductions.

UNIT IV 6 HRS

Verbal aptitude, Reading comprehension / narration / presentation / Mock Interviews.

UNIT V 6 HRS

Practical session on Group Discussion and written tests on vocabulary and reading comprehension

Practical component P : Include case studies / application scenarios

Research component R : Future trends / research areas / Comparative Analysis

Total No of Hours: 30

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V SEMESTER

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Subject Code: BCE18007	Subject Name : APPLIED HYDRAULIC ENGINEERING		Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Mechanics of fluids		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To study theories those explain the behavior and characteristics of fluid in an open channel .
- To study the velocity and discharge measurement in open channel.
- To understand the working principle of hydraulic machines and its uses

COURSE OUTCOMES (COs) : (3- 5)

CO1	The students will 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
C03	They will have knowledge in hydraulic machineries

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M							M	M
CO2	H	M		M							M	M
CO3	H	M		M							M	M

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	√Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Department of Civil Engineering

Subject code: BCE18007	Subject Title : **APPLIED HYDRAULIC ENGINEERING**	Ty/Lb/ETL Ty	L 3	T/ S.Lr 1/0	P/ R 0/0	C 4

FLOW IN OPEN CHANNEL

UNIT I   INTRODUCTION   8 HRS

Open channel flow - types and regime of flow - velocity distribution in open channel - specific energy - critical flow and its computation.

UNIT II   UNIFORM AND RAPIDLY VARIED FLOW   14 HRS

Uniform flow - velocity measurement - manning's and Chezy's formula - determination of roughness coefficients - most economical sections- Rectangular, Circular and Trapezoidal channel sections .Hydraulic jump - types - energy dissipation – surges

HYDRAULIC MACHINES

UNIT III   ROTODYNAMIC PUMPS   12 HRS

   Introduction – classification – Rotodynamic pumps: centrifugal pumps – work done – losses - specific speed - minimum speed to start the pump- multistage pumps- parallel and series.

UNIT IV   POSITIVE DISPLACEMENT PUMPS   12 HRS

Positive displacement pumps   - reciprocating pump –work done- slip - air vessels(theory only)

UNIT V   TURBINES   14 HRS

Classification – Pelton wheel turbine –work done-Francis turbine –work done- draft tube –Kaplan turbine –work done.

Total No of Hours: 60

TEXT BOOKS
1. Subramanian k., "Flow in open channels ", Tata McGraw Hill Publishing Company, New Delhi,   1994
2. Dr. R.K.Bansal., "Fluid Mechanics and Hydraulic Machines ", Lakshmi Publications (p) ltd., Pune,   2015.
3. Kumar K.L., "Engineering Fluid Mechanics ", Eurasia publishing house (p) ltd. New Delhi,
   (7th edition), 1995.
REFERENCES
1. Ven Te Chow, "Open-channel hydraulics ", McGraw Hill Co., 1996 - , New York.
2. Ramamirtham S., "Fluid mechanics, Hydraulics and Fluid Machines ", Dhanpat Rai

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Subject Code: BME18I01	Subject Name : COMPOSITE MATERIALS				Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None				Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

Students will learn

- Different composites and their manufacturing methods
- Design parameters of composites
- To gain knowledge in need and applications of composite materials

COURSE OUTCOMES (COs) : (3- 5)

CO1	Aware of different composites and their manufacturing methods
CO2	Know the mechanics and performance of composite materials
C03	Understand the design parameters of composites

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M		H			H		H			M
CO2	M	M	M	H					H			M
CO3	M	M	M	H			H		H			M

COs / PSOs	PSO1	PSO2										
CO1	M	H										
CO2		H										
CO3	L	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
		√										

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Department of Civil Engineering

Subject code:	Subject Title :	Ty/Lb/ETL	L	T/S.Lr	P/ R	C
BME18I01	**COMPOSITE MATERIALS**	**Ty**	**3**	**0/0**	**0/0**	**3**

UNIT- I   INTRODUCTION   9 HRS
Limitations of Conventional Materials- Definition of Composite Materials- Types and Characteristics Applications.

UNIT- II   MATERIALS   9 HRS
Fibers- Materials- Fiber Reinforced Plastics- Thermo set Polymers- Coupling Agents, Fillers and Additives- Metal Matrix and Ceramics Composites.

UNIT- III   MANUFACTURING   9 HRS
Fundamentals- bag moulding- compression moulding pultrusion- filament winding- other manufacturing process- quality inspection and non-destructive testing.

UNIT- IV   MECHANICS AND PERFORMANCE   9 HRS
Introduction to Micro-mechanics- Unidirectional Lamina-Laminates- Inter laminar Stress- Statics Mechanical Properties- Fatigue Properties- Impact Properties- Environmental Effects- Fracture Mechanics and Toughening mechanisms, Failure Modes

UNIT- V   DESIGN   9 HRS
Failure   Predictions- Design Considerations- Joint Design- Codes- Design Examples. Optimization of Laminated Composites-   Application of FEM for Design.

Total No. of Hrs : 45

TEXT BOOKS

1. *P.K.Mallick, (2006) "Fiber-Reinforced Composites", Monal Deklatr Inc., New York.*
2. *B.D.Agrawal and L.J.Broutmam, (2006) "Analysis and Performance of Fiber Composites", John Wiley and Sons,New York.*

REFERENCES

1. *Micael hyer, (1998) "Stress Analysis of Fiber- Reinforced Composite Materials", Tata McGraw Hill.*
2. *Ronald Gibson, (2007) "Principles of Composite Material Mechanics", Tata McGraw Hill.*

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Subject Code: BCE18ET2	Subject Name : WATER SUPPLY AND SANITARY ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	ETL	1	0/1	3/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

- **OBJECTIVE** :
- To impart knowledge in fundamental theory and design of conventional water treatment facilities.
- To impart knowledge in fundamental theory and design of conventional wastewater treatment facilities .
- To impart knowledge on the principles used to design advanced wastewater treatments.

- . To develop the ability to solve a specific problem right from its identification till the successful solution of the same

COURSE OUTCOMES (COs) : (3- 5)

CO1	an insight into the structure of drinking water supply and waste water systems, including water transport, treatment and distribution and the ability to design and evaluate water supply and waste water project alternatives on basis of chosen
CO2	an understanding of water quality and waste water criteria and standards, and their relation to public health
CO3	On Completion of the project students will be in a position to take up challenging practical problems and find solution by formulating proper methodology.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M		H		H	H				M
CO2	H	H	M		H		H	H				M
CO3	H	H	M		H		H	H				M

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code: BCE18ET2	Subject Title : WATER SUPPLY AND SANITARY ENGINEERING	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
		ETL	1	0/1	3/0	3

UNIT I   PLANNING FOR WATER SUPPLY SYSTEMS   9 HRS

Scope of environmental engineering – role of environmental engineer – Public water supply systems – objectives – design period – population forecasting – water demand – sources of water – sources selection – water quality – characterization – sources of wastewater –estimation of storm runoff.

UNIT II   WATER TREATMENT   9 HRS

Screening - types of screening - plain sedimentation – sedimentation with coagulation – settling & flotation - filtration - disinfection

UNIT III   SEWAGE TREATMENT – PRIMARY TREATMENT   9 HRS

Objectives – unit operations & processes – principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT IV : SEWAGE TREATMENT – SECONDARY TREATMENT   9 HRS

Secondary treatment – activated sludge process and trickling filter; other treatment methods – stabilization ponds and septic tanks – advances in sewage treatment.

UNIT V: SEWAGE DISPOSAL AND SLUDGE MANAGEMENT   9 HRS

Methods – dilution – self purification of surface water bodies – oxygen sag curve – land disposal – sewage farming – deep well injection – soil dispersion system. Thickening – sludge digestion – biogas recovery - drying beds – conditioning and dewatering – sludge disposal.

Note: A Project report has to be submitted on any of the above topics which will be evaluated during the semester practical exams.

                                                                    Total No of Hours: 45

TEXT BOOKS

   1. Garg, S.K., Environmental Engineering, Vols. I &II, Khanna Publishers, New Delhi, 1994
   2. C.S.Shah, Water Supply And Sanitation, Galgotia Publishing Company, New Delhi, 1994

REFERENCES

   1. Manual on Water Supply And Treatment, 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. *H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering, Mcgraw-Hill Book Company, New Delhi, 1995.*

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Subject Code: **BCE18L05**	Subject Name : **ENVIRONMENTAL ENGINEERING LAB**		Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge on preparation of reagents, testing various water and waste water quality parameters .

COURSE OUTCOMES (COs) : (3- 5)

CO1	To get hand-on experience in the operation of equipments like pH meter, TDS meter, turbidity meter, etc.
CO2	To analyze water and wastewater volumetrically and using certain equipments
CO3	The students completing the course will be able to characterize wastewater and conduct treatability studies.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M		H		H	H	M		M	
CO2	H	M	M		H		H	H	M		M	
CO3	H	M	M		H		H	H	M		M	

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title : **ENVIRONMENTAL ENGINEERING LAB**	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L05		**Lb**	**0**	**0/0**	**3/0**	**1**

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 of 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.

Total No of Hours: 30

REFERENCE BOOKS

1. *Trivedi and Goel – Chemical and biological methods for water pollution studies. New Delhi,2000.*
2. *A course Manual – Water and wastewater analysis. National Environmental Engineering Research Institute. Nagpur – publication.*
3. *Standard Methods for Examination of water and Waste water APHa, AWWA and WPCF, 1985 Edition.*

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Subject Code:	Subject Name :		Ty/L	L	T /	P/ R	C
BCE18L06	**ENVIRONMENTAL AND HYDRAULIC STRUCTURES DRAWING**		b/ ETL		S.Lr		
	Prerequisite: None		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The purpose of this course is to impart the knowledge about the design of irrigation and environmental engineering structures.

COURSE OUTCOMES (COs) : (3- 5)

CO1	hand-on experience in drawing of irrigation engineering structures
CO2	hand-on experience in drawing of environmental engineering structures
CO3	To draw plan elevation and section of structures

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H							H	H		M	
CO2	H							H	H		M	
CO3	H							H	H		H	

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code: BCE18L06	Subject Title : ENVIRONMENTAL AND HYDRAULIC STRUCTURES DRAWING	Ty/Lb/ETL Lb	L 0	T/ S.Lr 0/0	P/ R 3/0	C 1

UNIT I   WATER SUPPLY AND TREATMENT   7 HRS

Design & Drawing of flocculate, clarifier – Rapid sand filter – House service connection for water supply and drainage.

UNIT II   SEWAGE TREATMENT & DISPOSAL   8 HRS

Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludge process – Aeration tank – Secondary clarifiers – Sludge digester – Sludge drying beds – Waste stabilization ponds - Septic tanks and disposal arrangements – Manholes.

UNIT III   IMPOUNDING STRUCTURES   5 HRS

Gravity dam, Tank Surplus Weir, Tank Sluice with tower road – Drawing showing plan, Elevation, half section including foundation details.

UNIT IV   CANAL TRANSMISSION STRUCTURES   5 HRS

Aqueducts – Syphon Aqueducts – Super passage – Canal siphon – Canal Drops- Drawing Showing plan, elevation and foundation details.

UNIT V   CANAL REGULATION STRUCTURES   5HRS

Canal head works- Canal Regulator – Canal escape- Proportional Distributors – Drawing showing detailed plan, elevation and foundation.

                                                                                   Total No of Hours: 30

TEXT BOOKS
1.   *Modi, P.N., "Environmental Engineering I & II", Standard Book House, Delhi – 6*
2.   *SathyanarayanaMurthy "Irrigation Design and Drawing" Published by Mrs L.Banumathi, Tuni east Godavari District.A.P. 1998.*
3.   *Sharma R.K. Irrigation Engineering and Hydraulic Structures Oxford and IBH Publishing co., New Delhi 2002.*

REFERENCES
1.   *Peary, H.S., ROWE, D.R., Tchobanoglous, G., "Environmental Engineering", McGrawHill Book Co., New Delhi, 1995.*
2.   *Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4thedition, Tata McGraw-Hill, New Delhi, 2003.*
3.   *Garg S.K., "Irrigation Environmental Engineering and design StructuresI", Khanna Publishers, New Delhi, 17th Reprint, 2003.*
4.   *Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999*
5.   *Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi.*

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Subject Code: BCS18IL7	Subject Name : BASIC COMPUTER SKILL FOR CIVIL ENGINEERS		Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NONE		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart a knowledge on the basic computer skill

COURSE OUTCOMES (COs) : (3- 5) At the end of the course the students will be

CO1	Familiar with MS word.
CO2	Able to create the presentation for the department using Power Point
CO3	Familiar with excel

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M	H							H	H
CO2	H		M	H							H	H
CO3	H		M	H							H	H

COs / PSOs	PSO1		PSO2				
CO1	H		H				
CO2	H		H				
CO3	H		H				

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
		√										

Subject code:	Subject Title :	Ty/Lb/ ETL	L	T/ S.Lr	P/ R	C
BCS18IL7	BASIC COMPUTER SKILL FOR CIVIL ENGINEERS	Lb	0	0/0	3/0	1

APPLICATION PACKAGES

Word

1. To create an advertisement in Word.

2. To illustrate the concept of mail merging in word.

Spread Sheet

3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts.

Power Point

4. To create the presentation for the department using Power Point

Total No of Hours: 30

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Subject Code: BCE18TS2	Subject Name :	SURVEY CAMP	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Survey field work		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The student will go to the outside site so that they will realize the practical difficulties in taking surveys in field

COURSE OUTCOMES (COs) : (3- 5) The student will be able to

CO1	perform survey as per the field condition
CO2	conduct LS and CS by using advanced equipment
CO3	prepare contour map for the given area

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			H	H	H	H	H		M	M
CO2	H	H			H	H	H	H	H		M	M
CO3	H	H			H	H	H	H	H		M	M

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√	√				

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Subject code: BCE18TS2	Subject Title : SURVEY CAMP	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
		Lb	0	0/0	3/0	1

Three weeks survey camp using Theodolite, cross staff, leveling staff, tapes and Plane table

- (i) Triangulation
- (ii) Trilateration
- (iii) Star observation to determine azimuth
- (iv) Rectangulation

* Will be accommodated during preceding winter vacation

REFERENCES

1. Bannister A. and Raymond S., "Surveying ", ELBS,Pune, Sixth Edition, 1992.

2. Heribert Kahmen and Wolfgang Faig, "Surveying ", Walter de Gruyter, 1995.

3. Kanetkar T.P., "Surveying and Levelling", Vols. I and II, United Book Corporation, Pune, 1994.

4. Punmia B.C., "Surveying ", Vols. I, II and III, Laxmi Publications, New Delhi, 1999.

5. Clark D., "Plane and Geodetic Surveying" , Vols. I and II, C.B.S. Publishers and Distributors, Delhi, sixth Edition, 1971.

6. James M. Anderson and Edward M. Mikhail, "Introduction to Surveying ", McGraw Hill Book Company, New Delhi, 1985.

7. Wolf P.R. "Elements of Photogrammetry", McGraw Hill Book Company, New Delhi, 1988

VI SEMESTER

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Subject Code:	Subject Name :		Ty/Lb/	L	T /	P/	C
BCE18008	STRUCTURAL ANALYSIS		ETL		S.Lr	R	
	Prerequisite: Strength of materials		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- This course introduces students to the classical methods of structural analysis, i.e., methods for calculating forces and displacements in structures due to given loads and imposed deformations. Both determinate and indeterminate structures are covered.

COURSE OUTCOMES (COs) : (3- 5)

CO1	analysis of suspension bridges and arches
CO2	will be conversant with classical methods of analysis.
CO3	analyse structures by plastic theory

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H			M	M			M	M
CO2	H	H		H			M	M			M	M
C03	H	H		H			M	M			M	M

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
C03	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18008	STRUCTURAL ANALYSIS	Ty	3	1/0	0/0	4

UNIT I   DEFLECTION OF DETERMINATE STRUCTURES   12Hrs
Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid Plane Frames. Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT II   SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHOD   12Hrs

Analysis of continuous Beams – cantilever beams - Continuous beams and rigid frames (with and without sway) - Symmetry and Asymmetry -Portal Frames. Stiffness and carry over factors –Balance – Distribution and carryover of moments - Analysis of continuous Beams - Plane rigid frames with and without sway – Structural frames

UNIT III   MOVING LOADS AND INFLUENCE LINES (DETERMINATE)   12 Hrs
Influence lines for reactions in statically determinate structures – influence lines for member forces in pin jointed frames – Influence lines for shear force and bending moment in beam sections

UNIT IV   ARCHES AND SUSPENSION BRIDGES   12 Hrs
Arches structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects
Analysis of suspension bridges – Un stiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

UNIT V MATRIX METHOD FOR INDETERMINATE FRAMES AND PLASTIC ANALYSIS   12 Hrs
Equilibrium and compatibility - Determinate Vs indeterminate structures –Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams. Element and global stiffness and flexibility matrices– Co-ordinate transformations – transformations of stiffness matrices - Analysis of Continuous Beams.

Total no of hours: 60

TEXT BOOKS
1. *R.Vaidyanathan,P.Perumal,, Comprehensive Structural Analysis Vol 1 and vol.2, Laxmi Publications,2004*

2. *Bhavikatti S.S Structural Analysis Vol 1 and vol.2 ,Vikas Publishing House Pvt. Ltd New Delhi*
3. **S.Ramamrutham,R.Narayan,Theory of structures,Dhanpatrai publications,1993**

REFERENCES
1. *Analysis of Structures: Strength and Behaviors T.S. Thandavamoorthy, oxford University press, New Delhi, 2005.*
2. *Matrix analysis of framed structures – William Weaver, Jr & James M.Gere, CBS   Publishers & Distributors, Delhi, 1995*
3. *Structural Analysis – A Matrix Approach – G.S.Pandit & S.P.Gupta, Tata McGraw-Hill, New Delhi ,1998*
4. *Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers Mumbai,1990.*
5. *Coates R.C., Coutie M.G. and Kong F.K., Structural Analysis, ELBS   and Nelson, Newjersey,1990.*

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Subject Code: BCE18009	Subject Name : SOIL MECHANICS AND FOUNDATION ENGINEERING		Ty/Lb/ETL	L	T / S.Lr	P/R	C
	Prerequisite: Engineering Geology		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE
- To understand the basic properties and strength nature of various soils and their settlement behaviour in foundations.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Students will have the ability to select type of foundation required for the soil at a place
CO2	Able to design shallow, foundation, deep foundation and retaining structures.
CO3	At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H		H		H				
CO2	H	H	H	H		H		H				
CO3	H	H	H	H		H		H				

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18009	SOIL MECHANICS AND FOUNDATION ENGINEERING	Ty	3	1/0	0/0	4

UNIT I   SOIL PROPERTIES AND COMPACTION OF SOIL   12 Hrs

Nature of Soil – phase relation – Index properties – Soil structure – particle size distribution – Atterberg limits – classification for engineering purposes – BIS Classification system – Soil compaction – factors affecting compaction – laboratory and field compaction methods and monitoring – Clay Minerology.

UNIT II   SOIL MOISTURE – PERMEABILITY, STRESSES IN SOILS   12Hrs

Soil water – Various forms –Capillary rise – Suction – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil – Permeability – Darcy"s Law- Permeability measurement in the laboratory – Factors influencing permeability of soil – quick sand condition – Stress distribution in soil media – Boussinesq"s formula – stress due to line load, Circular and rectangular loaded area – approximate methods – Use of influence charts – Westerguard equation for point load.

UNIT III   SHEAR STRENGTH AND SLOPE STABILITY   12Hrs

Shear strength of cohesive and cohesionless soil – Mohr, Coulomb failure theory –Measurement of shear strength – direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability – Drained and undrained behaviour of clay and sand. Slope failure mechanisms – Modes – Infinite slopes – Finite slopes – Total and effective stress analysis – Stability analysis for purely cohesive and C- Φ soils – Method of slices – Modified Bishop's method – Friction circle method – stability number.

UNIT IV   SOIL   EXPLORATION   12Hrs

Scope and objectives – Methods of exploration – averaging and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Geophysical methods.

UNIT V   FOUNDATION – BEARING CAPACITY AND SETTLEMENT   12Hrs

Introduction – Types of foundation–Contact pressure distribution below footings – Location and depth of foundation – Selection of foundation based on soil condition – codal provisions – bearing capacity of shallow foundation on homogeneous deposits –Terzaghi"s formula and BIS formula – factors affecting bearing capacity – problems – Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision.

Total No. of Hours:60

TEXT BOOKS:
1. *Punmia P.C, Soil Mechanics and Foundations, Laximi Publications Pvt. Ltd, New Delhi, 1995.*
2. *Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1999.*
3. *Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013.*

REFERENCES:
1. *Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1996.*
2. *Arora K.R., " Soil mechanics and Foundation Engineering" , Standard publishers and distributors, Newdelhi,1997.*

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Subject Code: BCE18ET3	Subject Name : REMOTE SENSING AND GIS		Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Engineering Geology, Engineering survey		ETL	1	0/1	3/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- Introduce the principles of remote sensing to students who are beginners in this field.
- Fundamental knowledge on the physics of remote sensing.
- Aerial photographic techniques, image interpretation techniques ,to create basic understanding of GIS concepts.
- To develop the ability to solve a specific problem right from its identification till the successful solution of the same

COURSE OUTCOMES (COs) : (3- 5)

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
C04	Analyze raster and vector data and modeling in GIS, Apply GIS in land use, disaster management, ITS and resource information system
C05	On Completion of the project students will be in a position to take up challenging practical problems and find solution by formulating proper methodology.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		M	M	M						M
CO2	H	H		M	M	M						M
CO3	H	H		M	M	M						M
CO4	H	H		M	M	M						M
CO5	H	H		M	M	M						M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H
CO4	H	H
CO5	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
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Subject code:	Subject Title :	Ty/Lb/ ETL	L	T/ S.Lr	P/ R	C
BCE18ET3	**REMOTE SENSING AND GIS**	ETL	1	0/1	3/0	3

UNIT I   INTRODUCTION TO REMOTE SENSING   9 HRS

Definition – components of remote sensing – , Energy sources and radiation principles, electromagnetic radiation (EMR) –EMR spectrum, active and passive remote sensing – platforms — visible, infra red (IR), near IR, middle IR , thermal IR and microwave – black body radiation - Planck's law – Stefan-Boltzman law.

UNIT II   EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9 HRS

Atmospheric characteristics, scattering of EMR – Raleigh, MIE, non-selective and Raman scattering – EMR interaction with water vapour and ozone – atmospheric windows – significance of atmospheric windows – EMR interaction with earth surface materials – radiance, irradiance, incident, reflected, absorbed and transmitted energy – reflectance – specular and diffuse reflection surface- spectral signature – spectral signature curves – EMR interaction with water, soil and earth surface

UNIT III   OPTICAL AND MICROWAVE REMOTE SENSING SYSTEMS   9 HRS

Satellites - classification – based on orbits – sun synchronous and geo synchronous – based on purpose – earth resource satellites, communication satellites, weather satellites, spy satellites, spectral, radiometric and spatial resolutions, Multispectral, thermal and hyper spectral sensing, along and across track scanners – description of sensors in land sat, spot, irs series – current satellites - radar – speckle - back scattering – side looking airborne radar – synthetic aperture radar – radiometer – geometrical characteristics

UNIT IV   GEOGRAPHIC INFORMATION SYSTEM   9 HRS

GIS – components of GIS, data – spatial and non-spatial – maps – types of maps – projection – types of projection - raster and vector data structures – comparison of raster and vector data structure – GIS analysis using raster and vector data – DEM for Slope, Aspect, Flow direction, Flow pathways, Flow accumulation, Streams, Catchment area delineation, retrieval, reclassification, overlaying, buffering – data output.

UNIT V   IMAGE PROCESSING AND APPLICATIONS OF RS & GIS   9 HRS

Visual interpretation of satellite images – elements of interpretation - interpretation keys, Digital Image Processing - application of remote sensing and GIS – urban applications - integration of GIS and remote sensing – Remote sensing applications for watershed management, Rainfall runoff modeling, Irrigation management, Flood mapping, Drought assessment, Environment and ecology, urban analysis –resources information systems.

Note: A Project report has to be submitted on any of the above topics which will be evaluated during the semester practical exams.

Total No of Hours : 45

TEXT BOOKS

1. *Anji Reddy, Remote Sensing and Geographical Information Systems, B.S. Publications, New Delhi, 2001*

2. *M.G. Srinivas (edited by), Remote Sensing Applications, Nervosa Publishing House, New Delhi, 2001.*

REFERENCE

1. *Lillesand T.M. And Kiefer R.W. Remote Sensing And Image Interpretation, John Wiley And Sons, Inc, New York, 1987.*
2. *Janza.F.J., Blue, H.M., Johnston, J.E.., "Manual of Remote Sensing Vol.I American Society of Photogrammetry, Virginia, U.S.A, 1975.*
3. *Burrough P.A, Principle Of Gis For Land Resource Assessment, Oxford, 1990*

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Subject Code: BCE18L07	Subject Name : SOIL MECHANICS LAB		Ty/L b/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To illustrate some of the principles taught during the soil mechanics course.
- To impart knowledge of laboratory and index testing methods commonly used in Soil & foundation engineering.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Knowledge to determine Index properties of the soils like water content, specific gravity and Atterberg limits
CO2	Knowledge engineering properties like field density, shear strength, permeability, compaction and consolidation
CO3	Test the soil to assess its ability to withstand the load

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H		H			H			
CO2	H			H		H			H			
CO3	H			H		H			H			

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code: BCE18L07	Subject Title : SOIL MECHANICS LAB	Ty/Lb/ETL Lb	L 0	T/ S.Lr 0/0	P/ R 3/0	C 1

LIST OF EXPERIMENTS

1. Specific gravity of soil solids

2. Grain size distribution - Sieve analysis - Hydrometer analysis

3. Atterberg limits test – Liquid limit, Plastic limit and shrinkage limit tests

4. Field density Test

5. Determination of moisture - Density relationship using standard proctor.

6. Permeability determination (constant head and falling head methods)

7. Direct shear test on cohesion less soil

8. Unconfined compression test in cohesive soil

9. Tri axial compression test in cohesion less soil

10. Laboratory Vane shear test in cohesive soil

11. One dimensional Consolidation test (Determination of coefficient of consolidation only)

Total No of Hrs : 30 hrs

REFERENCES

1. *"Soil Engineering Laboratory Instruction Manual ", Published by the Engineering College Co-operative Society, Chennai, 1996.*

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..*

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Department of Civil Engineering

Subject Code:	Subject Name :	Ty/L	L	T /	P/ R	C
	STRUCTURAL ANALYSIS AND DESIGN BASED	b/		S.Lr		
BCE18L08	**ON CIVIL ENGINEERING SOFTWARE**	ETL				
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- Concurrent Engineering based user environment for model development, analysis, design, visualization and verification. The course covers the complete analysis and design of RCC structures.

COURSE OUTCOMES (COs) : (3- 5)

CO1	They will have knowledge of designing a beam ,column and slab as per code
CO2	They will get an idea about member selection and optimized members selection consisting of design .
CO3	able to visualize and interpret data in software

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H							H	H
CO2	H	H	H	H							H	H
CO3	H	H	H	H							H	H

COs / PSOs	PSO1	PSO2			
CO1	H	H			
CO2	H	H			
CO3	H	H			

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L08	**STRUCTURAL ANALYSIS AND DESIGN BASED ON CIVIL ENGINEERING SOFTWARE**	**Lb**	**0**	**0/0**	**3/0**	**1**

LIST OF EXPERIMENTS

1. Introduction to staad pro - Joint, Member/Element, Mesh Generation with flexible user-controlled numbering

2. Analyse and design any beam with any loading type and any kind of supports.

3. Analyse and design of any 2D Frame with any loading type for any load sets.

4. Portal frame with 5 load combinations- Analysis

5. Analysis of beam with moving load

6. Analyse steel structures with truss elements.

Total No of Hours: 30

TEXT BOOK

1. *Structural design and drawing (Reinforced Concrete and Steel)-N. Krishna Raju, University publishers 3rd Edn, 2009.*

2. *Design Of Steel Structures- B.C.Punmia, Ashok Kumar Jain,Arun kumar Jain ,Lakshmi Publications Pvt Ltd, 1999.*

REFERENCE

1. *Krishnamoorthy D- Structural Design and drawing Vol II CBS Publishers and distributors Delhi 1990.*
2. *Krishnamoorthy D- Structural Design and drawing Vol III (steel structures) CBS Publishers and Distributors Delhi 1990.*

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Subject Code: BEN18SK2	Subject Name : SOFT SKILL – II (QUALITATIVE AND QUANTITATIVE SKILLS)		Ty / LB/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Soft Skills – I		ETL	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- The main objective is to strengthen the logical and arithmetic reasoning skills of the students.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Recognize and apply arithmetic knowledge in a variety of contexts.
CO2	Ability to identify and critically evaluate philosophical arguments and defend them from criticism.
CO3	Define data and interpret information from graphs.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	L	L	H	M	H	H
CO2	M	M	M	H	L	H	L	H	H	H	H	L
CO3	H	H	H	H	H	H	M	M	H	H	H	H

COs / PSOs	PSO1	PSO2										
CO1	H	M										
CO2	H	M										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓						✓			

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BEN18SK2	SOFT SKILL – II (QUALITATIVE AND QUANTITATIVE SKILLS)	ETL	0	0/0	3/0	1

UNIT I   LOGICAL REASONING I

Logical Statements – Arguments – Assumptions – Courses of Action.

UNIT II   LOGICAL REASONING II

Logical conclusions – Deriving conclusions from passages – Theme detection.

UNIT III   ARITHMETICAL REASONING I

Number system – H.C.F & L.C.M – Problem on ages – Percentage – Profit & Loss – Ratio & Proportion – Partnership.

UNIT IV   ARITHMETICAL REASONING II

Time & Work – Time & Distance – Clocks – Permutations & Combinations – Heights & Distances – Odd man out and Series.

UNIT V   DATA INTERPRETATION

Tabulation – Bar graphs – Pie graphs – Line graphs.

REFERENCES:

1. R.S.Agarwal, A modern approach to Logical Reasoning, S.Chand & Co., (2017).
2. R.S.Agarwal, A modern approach to Verbal and Non verbal Reasoning, S.Chand & Co., (2017).
3. R.S.Agarwal, Quantitative Aptitude for Competitive Examinations, S.Chand & Co., (2017).
4. A.K.Gupta, Logical and Analytical Reasoning, Ramesh Publishing House, (2014).
5. B.S.Sijwali, Indu sijwali, A new approach to Reasoning (Verbal and Non verbal), Arihant Publishers, (2014).

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Subject Code: BCE18L09	Subject Name : MINI PROJECT / INPLANT TRAINING / INDUSTRIAL TRAINING	Ty/ Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: ALL	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To develop technical skill and practical learning in field work

COURSE OUTCOMES (COs) : (3- 5)

CO1	Student will possess sound knowledge and experience in civil construction field
CO2	Student can correlate theoretical knowledge with practical experience
CO3	Student will be able to prepare report based on the experience gained

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					H		H	H	M	H	H
CO2	H					H		H	H	M	H	H
CO3	H					H		H	H	M	H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
								√				

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L09	MINI PROJECT / INPLANT TRAINING / INDUSTRIAL TRAINING	Lb	0	0/0	3/0	1

INDUSTRIAL TRAINING

Soil Investigation

Construction-different types of foundation, Highways and Embankments

Prestressing- Bridges

Industrial Structures- steel-fabrication and erection

Specification for various works- measurement and Billing

OFFICE TRAINING

Architectural plan

Latest civil Engineering softwares based on design and analysis

Students have to visit at least one industry relevant to civil engineering as part of industrial training and spend a minimum of 15 days during semester break between VI and VII semester. A report of the same should be submitted at the beginning of the 7th semester and evaluation shall be conducted based on the report, presentation and viva-voce.

Subject Code: BCE18TS3	Subject Name : ADVANCED SURVEYING FIELD WORK	Ty/Lb/ETL	L	T / S.Lr	P/R	C
	Prerequisite: Engineering Survey ,Surveying field work, Survey camp	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

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

COURSE OUTCOMES (COs) : (3- 5)

CO1	Knowledge to carryout Triangulation.
CO2	Knowledge for astronomical surveying including general field marking for various engineering projects and curves setting
CO3	knowledge on handling basic GIS instruments

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H				H	H		M	M
CO2	H	H		H				H	H		M	M
CO3	H	H		H				H	H		M	M

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√	√				

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18TS3	ADVANCED SURVEYING FIELD WORK	Lb	0	0/0		1

a. ADVANCED SURVEYING LAB

UNIT I   TACHEOMETRY

Tangential system (using theodolite, leveling staff)

Stadia system (using theodolite, leveling staff)

Sub tense system (using theodolite, tape, cross staff, leveling staff)

UNIT II   SETTING OUT WORKS

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

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

Station

b. Applications of Remote Sensing and GIS Lab

1. Introduction to basics of digital images and Data (Vector and Raster)
2. Interpretation of satellite images
3. Understanding the basic principles of Photogrammetry.
4. An introduction to image classification.
5. Interpreting RADAR images.
6. Extracting information from thermal remote sensing data.
7. Using GIS Software for plotting points, lines, polygons on maps.
8. Use of GIS in selection of Landfill site.

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, New Delhi, 1985.*
3. *Wolf P.R. " Elements Of Photogrammetry", Mcgraw Hill Book Company, New Delhi,*

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Subject Code:	Subject Name:		Ty /	L	T /	P/	C
	ESTIMATION AND QUANTITY SURVEYING		Lb/		S.Lr	R	
BCE18010			ETL				
	Prerequisite: Concrete & construction technology, Water supply & sanitary		Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

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

COURSE OUTCOMES (COs) : (3- 5)

At the end of this course the student shall be able to

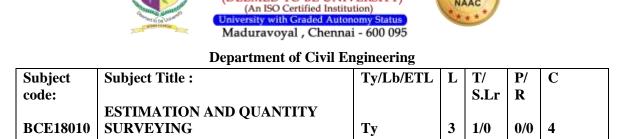| CO1	Prepare various types of estimation and find out the quantity of works involved.
CO2	Carry out analysis of rates and bill preparation.
CO3	Prepare specifications for various items of construction works
CO4	Estimate the quantity of works involved in road works, water supply and sanitary works

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H		M		M	H		H	H
CO2	H	H		H		M		M	H		H	H
CO3	H	H		H		M		M	H		H	H
CO4	H	H		H		M		M	H		H	H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									
CO4	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18010	ESTIMATION AND QUANTITY SURVEYING	Ty	3	1/0	0/0	4

UNIT I   ESTIMATION   12 HRS

Types of estimates- units of measurements-methods of estimates – advantages- estimation of load bearing and framed structures –estimate of quantities in residential building- calculation of quantities of brick work, RCC, PCC, white washing ,color washing and painting / varnishing – calculation of brick work and RCC works in arches – estimate of joineries for paneled and glazed doors ,windows, ventilators, handrails etc.

UNIT II   ESTIMATE OF OTHER STRUCTURES   12 HRS

Estimating of septic tank, soak pit – Sanitary and water supply installations – Water supply pipe line – Sewer line – Tube well – Open well – Estimate of bituminous and cement concrete roads-estimation of retaining walls and culverts.

UNIT III   SPECIFICATIONS AND TENDERS   12 HRS

Data –schedule of rates- analysis of rates-specifications-sources-detailed and general specifications – tenders- e-tender contracts- contracts types– preparation of tender notice and documents-arbitration and legal requirements

UNIT IV   VALUATION   12 HRS

Necessity – basics of value engineering –capitalized value – depreciation and its methods – escalation _ value of building – calculation of standard rent – mortgage- lease.

UNIT V   REPORT PREPARATION AND CASH FLOW   12 HRS

Principle of report preparation – report on estimate of residential building- commercial building -culvert – roads – water supply and sanitary installations – tube wells – open wells.

Total No of Hours: 60

TEXT BOOKS
1. *B.N.Dutta, Estimating And Costing In Civil Engineering –UBS publishers and distribution Pvt Ltd, 2003.*
2. *Mr. B.Kanagasabapathy, M/S. Ehilalarasi Kanagasabapathy,Practical Valuation – Vol I, Thiruchirappalli, 1995.*
3. *Kohl, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & CompanyLtd., 2004.*
4. *Rangwala, "Estimating, Costing and Valuation", Charotar Publishing House Pvt Ltd., 2012.*

REFERENCES
1. *G.S.Birdie, A Text Book On Estimating And Costing, Dhanpat Rai And Sons, New Delhi,1995.*
2. *Mr. B.Kanagasabapathy, M/S. Ehilalarasi Kanagasabapathy, Fixation of Fair Rent , Thiruchirappalli, 1995.*

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Subject Code:	Subject Name:				Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BMG18003	**PRINCIPLES OF MANAGEMENT**								
	Prerequisite: NONE				Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To increasing organizational effectiveness, To achieve optimum utilization of various resources.To have co-ordination between various department in the organization.

COURSE OUTCOMES (COs) : (3- 5)

CO1	students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling
CO2	Have same basic knowledge on international aspect of management
CO3	Able to apply managerial skill in working environment

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						M		M		M	M	H
CO2						M		M		M	M	H
CO3						M		M		M	M	H

COs / PSOs	PSO1		PSO2									
CO1	L		L									
CO2	L		L									
CO3	L		L									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Management Science		
										√		

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Subject code: BMG18003	Subject Title : PRINCIPLES OF MANAGEMENT	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

OBJECTIVES:

- To increasing organizational effectiveness, To achieve optimum utilization of various resources.
- To have co-ordination between various department in the organization.

UNIT-I   **9HRS**
Management: Importance – Definition – Nature and Scope of Management Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.

UNIT-II   **9HRS**

Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Natures and Types of Policies – Decision –making – Process of Decision – making – Types of Decision.

UNIT-III   **9HRS**
Organisation: Types of Organisations – Organisation Structure – Span of Control and Committees – Departmentalisation – Informal Organisation.

UNIT-IV   **9HRS**
Authority – Delegation – Decentralisation – Difference between Authority and Power – Responsibility – Recruitment – Sources, Selection, Training – Direction – Nature and Purpose.

UNIT-V   **9HRS**
Co-ordination – Need, Type and Techniques and requisites for excellent Co-ordination – Controlling – Meaning and Importance – Control Process.

                                                                                              Total No of Hours :45

Reference Books

1. C.B.Gupta, Management Theory & Practice -Sultan Chand & Sons - New Delhi.
2. L.M.Prasad, Principles & Practice of Management - Sultan Chand & Sons - New Delhi.
3. P.C. Tripathi & P.N Reddy, Principles of Managements - Tata Mc.Graw Hill - New Delhi.
4. Weihrich and Koontz, Management – A Global Perspective.
5. N.Premavathy, Principles of Management - Sri Vishnu Publication - Chennai.
6. J.Jayasankar, Business Management - Margham Publication - Chennai.

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Subject Code: BCE18ET4	Subject Name : TRANSPORTATION ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Soil Mechanics, Survey	ETL	1	0/1	3/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To understand the aspects of design, construction and maintenance of tracks for the safe and¬ efficient movement of public and goods.
- To have an overall knowledge of the design and construction of Highway, airport, docks, harbors and ports as a whole .
- To develop the ability to solve a specific problem right from its identification till the successful solution of the same

COURSE OUTCOMES (COs) : (3- 5)

CO1	The students completing this course would have acquired knowledge on planning, design, construction
CO2	the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.
CO3	On Completion of the project students will be in a position to take up challenging practical problems and find solution by formulating proper methodology.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M			H		M			M	
CO2	H	H	M			H		M			M	
CO3	H	H				H		M			M	

COs / PSOs	PSO1	PSO2		
CO1	H	H		
CO2	H	H		
CO3	H	H		

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

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Subject code:	Subject Title :	Category	C	L	T/ S.Lr	P/ R	Ty/Lb/ETL
BCE18ET4	TRANSPORTATION ENGINEERING	PCC	3	1	0/1	3/0	ETL

UNIT I :HIGHWAY PLANNING AND ALIGNMENT   9 HRS
 Significance of highway planning –History of road development in India – Classification of highways – Locations and functions – Factors influencing highway alignment – Soil suitability analysis - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II: GEOMETRIC DESIGN OF HIGHWAYS   9 HRS
Typical cross sections of Urban and Rural roads — Cross sectional elements - Sight distances – Horizontal curves, Super elevation, transition curves, widening at curves – Vertical curves - Gradients, Special consideration for hill roads - Hairpin bends – Lateral and vertical clearance at underpasses.

UNITIII: RAILWAYS PLANNING CONSTRUCTION AND MAINTENANCE   10 HRS
Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings. Tunneling Methods, drainage and ventilation –Calculation of Materials required for track laying - Construction and maintenance of tracks – Modern methods of construction & maintenance

UNIT IV: AIRPORT PLANNING & DESIGN   9 HRS
Airport planning, components of airports, airport site selection Runway design- orientation, geometric design and correction for gradients Terminal area, airport layout, airport buildings, passenger facilities, parking area and airport zoning

UNIT V: HARBOUR ENGINEERING   8 HRS
Definition of terms - harbors, ports, docks, tides and waves. Harbors – requirements, classification – site investigation for locations, planning and layouts Terminal facilities – port buildings, warehouse, transit sheds, inter-modal transfer facilities, mooring accessories, navigational aids coastal structures piers, breakwaters, wharves, jetties, quays.

Note: A Project report has to be submitted on any of the above topics which will be evaluated during the semester practical exams.

Total No of Hours: 45

TEXT BOOKS
1. *Saxena Subhash C and Satyapal Arora, A Course In Railway Engineering, Dhanpat Rai And Sons, Delhi, 1998.*
2. *Khanna S K, Arora M G and Jain S S, Airport Planning And Design, Nemchand And Brothers, Roorkee, 1994.*
3. *Khanna K And Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.*
4. *Kadiyali l r, Principles and Practice of Highway Engineering, Khanna technical Publications, Delhi*
5. *Dr K.P.Subramaniyam, Transportation Engineering, Scitech Publishers, Chennai 2003*

REFERENCES
1. *IRC standards, 2002*
2. *Bureau of Indian Standards (bis) publications on highway materials, 1998*
3. *Rangwala, Railway Engineering, Charotar Publishing House, Mumbai, 1995*

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Subject Code: BCE18L010	Subject Name : TRANSPORTATION ENGINEERING LAB		Ty/L b/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :   The objectives of these laboratory experiments are to determine specific gravity (bulk and apparent), absorption capacity, and fineness modulus of a fine aggregate sample and to plot a gradation curve for the sample.

COURSE OUTCOMES (COs) : (3- 5) At the end of the course the student shall possesses

CO1	Knowledge on testing of aggregates
CO2	Knowledge on testing of bitumen
CO3	Knowledge on deflection of pavements

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H								H			
CO2	H								H			
CO3	H								H			

COs / PSOs	PSO1		PSO2									
CO1	H		M									
CO2	H		M									
CO3	H		M									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L010	TRANSPORTATION ENGINEERING LAB	Lb	0	0/0	3/0	1

LIST OF EXPERIMENTS

1. CBR Test of Given soil sample.

2. Grading Of aggregates.

3. Water Absorption Test on aggregates

4. Abrasion test on aggregates.

5. Impact Test On aggregates

6. Bitumen tests

7. Benklemann Beam apparatus.

Total No of Hours :   30

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Subject Code: **BCE18L011**	Subject Name: **ESTIMATION AND EVALUATION PRACTICAL**		Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart hands on training on estimation of various civil structures and prepare valuation reports

COURSE OUTCOMES (COs) : (3- 5)

CO1	Student able to estimate the various structures as per the norms
CO2	Student able to valuate the existing structures
CO3	Student able to connect the actual scenario in the construction industry

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		H	H	M	H	H
CO2	H	H	H	H		H		H	H	M	H	H
CO3	H	H	H	H		H		H	H	M	H	H

COs / PSOs	PSO1		PSO2		PSO3		PSO4		PSO5			
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L011	ESTIMATION AND EVALUATION PRACTICAL	Lb	0	0/0	3/0	1

LIST OF EXPERIMENTS:

1. Detailed Estimate [Duration and Cost] for a two storey building.
2. Detailed estimate for following projects:

   [i] a culvert.

   [ii] stretch of road about 1 Km long including earthwork.

   [iii] Elevated water tanks.

   [iv] Manholes, Septic tanks.

   [v] Water supply Scheme and

   [vi] Drainage Scheme.

3. Estimate of Electrification Work for a Material Testing Laboratory.
4. Time Estimate by Network Analysis.
5. Estimation of Air Conditioning requirements for a Library.
6. Valuation reports for:

[i] A hotel

[ii] A Theatre

[iii] An Educational Building

Total No of Hours :   30

BOOKS/REFERENCES

1. B.N.Dutta-Estimating and Costing in Civil Engineering, UPSPD
2. Delhi Schedule Rates, C.P.W.D.

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Subject Code: BCE18L012	Subject Name: PROJECT PHASE-I		Ty/L b/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: ALL		Lb	0	0/0	3/3	2

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To guide the students such a way that the students carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Work in a team and develop multidisciplinary ,research skills
CO2	Explore innovative ideas in civil engineering field
CO3	Develop projects based on industrial and field requirements

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	H	H	H	H	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L012	PROJECT PHASE-I	Lb	0	0/0	3/3	2

OBJECTIVE

- To guide the students such a way that the students carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations

The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to civil engineering. Every project work shall have a guide who is a member of the faculty of the university.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusions. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

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Department of Civil Engineering

Subject Code:	Subject Name :		Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
BHS18FLX	**FOREIGN LANGUAGE**						
	Prerequisite: NIL		Lb	0	0/0	3/0	1

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To recognize the cultural values, practices, and heritage of the foreign country, communicate effectively in a foreign language and interact in a culturally appropriate manner with native speakers of that language.

COURSE OUTCOMES (COs) : (3- 5)

CO1	Achieve functional proficiency in listening, speaking, reading, and writing.
CO2	Develop an insight into the nature of language itself, the process of language and culture acquisition.
CO3	Decode, analyze, and interpret authentic texts of different genres.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	L	L	H	L	H	M	H	H	L
CO2	M	L	L	L	L	H	L	H	H	H	H	L
CO3	L	L	M	M	L	H	M	H	M	H	H	L

COs / PSOs	PSO1		PSO2									
CO1	M		H									
CO2	M		L									
CO3	H		M									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
			✓									

VIII SEMESTER

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Department of Civil Engineering

Subject Code: **BCE18011**	Subject Name: **DISASTER MITIGATION AND MANAGEMENT**	Ty/L b/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NONE	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
 To understand various technological options especially Remote Sensing and GIS in Disaster management.

COURSE OUTCOMES (COs) : (3- 5)

CO1	At the end of the course the student will be able to understand the concepts of disaster and disaster management
CO2	Different techniques for analysis of disaster proneness and mitigation measures
CO3	The use of spatial science in four folds of disaster management

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						M		M		M	M	H
CO2						M		M		M	M	H
CO3						M		M		M	M	H

COs / PSOs	PSO1		PSO2									
CO1	L		L									
CO2	L		L									
CO3	L		L									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Management Science		
				√								

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18011	DISASTER MITIGATION AND MANAGEMENT	Ty	3	1/0	0/0	4

UNIT I   DISASTER PRINCIPLES   12 HRS

Basic concepts and principles – Hydrological and geological disasters, characteristics crisis and consequences – Role of Government administration, University research organization and NGO"s – International disaster assistance – Sharing technology and technical expertise.

UNIT II   LONG TERM MITIGATION MEASURES   12 HRS

Needs and approach towards prevention – Principles and components of mitigation Disaster legislation and policy – Insurance – Cost effective analysis – Utilisation of resources -Training – Education – Public awareness – Roles of media.

UNIT III   SAFETY RATING OF STRUCTURES   12 HRS

Slope stability of Ghat roads -Structural safety of Dams, Bridges, Hospitals, Industrial structures, – Disaster resistant structures – Low cost housing for disaster prone areas – Cyclone shelter projects and their implications – Reconstruction after disasters: Issues of practices.

UNIT IV   SPACE SCIENCE INPUT IN DISASTER MANAGEMENT   12 HRS

Remote sensing in Hazard evaluation – Zonation – Risk assessment – Damage assessment- Land use planning and regulation for sustainable development –Communication satellite applicationNetwork- Use of Internet – Warning system – Post disaster review – Case studies.

UNIT V   EMERGENCY PLANNING USING SPATIAL AND NON-SPATIAL DATA   12 HRS

Information systems management – Spatial and non-spatial data bank creation – Operational emergency management – Vulnerability analysis of infrastructure and settlements – Predisaster and post disaster planning for relief operations – Potential of GIS application in development planning – Disaster management plan – Case studies.

Total No of Hours: 60 HRS

TEXTBOOKS:
1. *Bell, F.G. Geological Hazards: Their assessment, avoidance and mitigation. E & FN SPON Routledge, London. 1999.*
2. *David Alexander, Natural Disasters, UCL Press, London, Research Press, New Delhi, 1993.*

REFERENCES :
1. *Nick Carter. W. Disaster Management – A Disaster Manager"s Handbook. Asian Development Bank, Philippines. 1991.*
2. *Mitigating Natural Disasters, Phenomena, Effects and options, A Manual for policy makers and planners, United Nations. New York,1991.*
3. *George G. Penelis and Andreas J. Kappos – Earthquake Resistant concrete Structures. E & FN SPAN, London, 1997.*

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Subject Code:	Subject Name : **DESIGN OF STEEL STRUCTURES**		Ty/Lb/ETL	L	T /S.Lr	P/ R	C
BCE18012							
	Prerequisite: Structural analysis		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE:

- To introduce the student to material behaviour and Load and Resistance Factor Design methodology.
- To design and analyze tension members and compression members.

COURSE OUTCOMES (COs) : (3- 5)

CO1	The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code .
CO2	To know to design structural systems such as roof trusses and gantry girders.
CO3	To design and analyze beams and connections

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M	M	M				
CO2	H	H	H	H		M	M	M				
CO3	H	H	H	H		M	M	M				

COs / PSOs	PSO1		PSO2				
CO1	H		H				
CO2	H		H				
CO3	H		H				

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								
Approval												

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18012	**DESIGN OF STEEL STRUCTURES**	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION   9 HRS

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints.

UNIT II   TENSION MEMBERS   9 HRS

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III   COMPRESSION MEMBERS   9 HRS

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base

UNIT IV   BEAMS   9 HRS

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.

UNIT V   ROOF TRUSSES AND INDUSTRIAL STRUCTURES   9 HRS

Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.

Total No of Hours: 45

TEXTBOOKS:

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., 2 nd 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. *IS 800 :2007, General Construction In Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007*

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Subject Code: BCE18L013	Subject Name: PROJECT PHASE-II		Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: ALL		Lb	0	0/0	12/12	8

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to civil engineering.

COURSE OUTCOMES (COs) : (3- 5) Students will be able to

CO1	Work in a team and develop multidisciplinary ,research skills
CO2	Explore innovative ideas in civil engineering field
CO3	Develop projects based on industrial and field requirements

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	H	H	H	H	H
CO2	H	H	H	H	H	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H	H	H	H

COs / PSOs	PSO1		PSO2				
CO1	H		H				
CO2	H		H				
CO3	H		H				

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L013	PROJECT PHASE-II	Lb	0	0/0	12/12	3

OBJECTIVE

The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to civil engineering. Every project work shall have a guide who is a member of the faculty of the university.

Fourteen periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars the progress made in the project. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusions. This final report shall be typewritten form as specified in the guidelines. The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

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ELECTIVE – I

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Department of Civil Engineering

Subject Code:	Subject Name:		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E01	**HYDROLOGY**						
	Prerequisite: None		TY	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To get exposure in the field of hydrology; To know the basic concepts in hydrology. To study the features of precipitation, evaporation and infiltration; To learn basics, estimation, and modeling of runoff;. To understand estimation, forecasting and control of flood; To familiarize computer applications in hydrology

COURSE OUTCOMES (COs) : (3- 5)

CO1	The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation
CO2	The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing
CO3	The students will know the basics of groundwater and hydraulics of subsurface flows

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H		H			M	M
CO2	H	H		H	H	H		H			M	M
CO3	H	H		H	H	H		H			M	M

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	√Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E01	**HYDROLOGY**	**Ty**	**3**	**0/0**		**3**

UNIT I   INTRODUCTION   9HRS
Definition & Scope- Practical applications-Hydrological cycle – Transitory systems- formation, Types
and forms of precipitation – Winds and their movement–Climate & weather season in India-Catchment area

UNIT II   PRECIPITATION   9HRS
Measurement of Precipitation-Recording & Non- Recording Rain Gauges-Intensity duration Analysis-
Intensity frequency duration Analysis- Average depth of precipitation over an areas-Depth area duration analysis-
Rain gauge network.

UNIT III   EVAPORATION & INFILTRATION   9HRS
Introduction- Evaporation process- Factors affecting Evaporation- Evaporation Eestimation-Evaporation
measurement- Evapotranspiration- Factors affecting infiltration-measurement of infiltration- Infiltration
Equations

UNIT IV   STREAM FLOW MEASUREMENT & HYDROGRAPH ANALYSIS   9HRS
Introduction-Measurement of stage-discharge measument –area velocity method (Current meter method)-moving
boat method- Stage discharge relationships – Flow measurements – Features of hydrograph- base flow-
Hydrograph seperation

UNIT V   GROUND WATER HYDROLOGY   9HRS
Occurrence of ground water – Types of aquifer – Dupuit's assumptions – Darcy's law – Estimation of
aquifer parameters – Pump tests.

Total No. of Hours : 45

REFERENCES

1. *Jeya Rami Reddy.P,Hydrology, Laximi Publications, New Delhi, 2004.*
2. *Subramanya K.,Hydrology,Tata McGraw Hill Co., New Delhi, 1994*
3. *Patra.K.C, Hydrology and Water Resources Engineering, Narosa Publications, 2008, 2 nd Edition, New Delhi.*
4. *Chow V.T., Maidment D.R., Mays L.W., "Applied Hydrology,McGraw Hill Publications, New*

   York, 1995

Subject Code:	Subject Name:		Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E02	**DAM ENGINEERING**						
	Prerequisite: None		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart a knowledge on types of dam,its functions and design principles.

COURSE OUTCOMES (COs) : (3- 5)

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

CO1	Analyse and design gravity dams
CO2	Analyse and design earth and rockfill dams
CO3	Design spillways and energy dissipation structures

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H		H			M	M
CO2	H	H	H	H	M	H		H			M	M
CO3	H	H	H	H	M	H		H			M	M

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
Co3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E02	DAM ENGINEERING	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION 9HRS

Types of Dam, merits and demerits, dam site selection, selection of dam, Forces acting on gravity Dam, Methods of analysis of gravity Dam, Modes of failure and stability requirements, Design criteria and factor of safety.

UNIT II GRAVITY DAM 9HRS

Elementary profile of a gravity dam, Low and high gravity dams, Zoning of dams, Galleries in dams,Temperature control in mass concrete; gravity dams subjected to earthquakes.

UNIT III BUTTRESS AND ARCH DAMS 9HRS

Buttress and Arch dams, Types, selection, merits and demerits, Elementary design Principles of Arch and Buttress dams.

UNIT IV EARTH DAM 9HRS

Earth Dam their component and functions, causes of failure. Factors influencing the design of an earthdam. Design criteria for Earth Dam.

UNIT V SPILLWAY 9HRS

Elementary idea of design for spillway and energy dissipaters.

Total No of Hours: 45

TEXT BOOKS
1. R.S. Varshney "Concrete Dams", by 1982, NCB, Roorkee
2. Design of Small Dams, USBR 1960, Calcutta, Oxford and IBH
3. W.P. Creager, J. Justin,.Daud Hinds, "Engineering for Dams" Vol. I-III, Wiley, N.Y., USA.
4. IS: 6512-1984, Criteria for Design of solid Gravity Dams.
5. IS:1893-1984, , Criteria for Earthquake resistant Design of structures.

REFERENCES

1. *NPTEL course materials from different IITs*

Subject Code:	Subject Name :					TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E03	**INDUSTRIAL STRUCTURES**									
	Prerequisite: None					Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

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

COURSE OUTCOMES (COs) : (3- 5)

At the end of this course the student shall be able to.

CO1	Discuss the planning and functional requirements of Industrial structures**.**
CO2	Discover the need to learn about the design concepts, and constructional aspects of Industrial structure.
CO3	Analyse and evaluate the importance of various construction materials for Industrial Construction.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M	M		M		M	
CO2	H	H	H	H		M	M		M		M	
CO3	H	H	H	H		M	M		M		M	

COs / PSOs	PSO1		PSO2	
CO1	H		H	
CO2	H		H	
CO3	H		H	

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E03	INDUSTRIAL STRUCTURES	Ty	3	0/0	0/0	3

UNIT I   PLANNING   9HRS
Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II   FUNCTIONAL REQUIREMENTS   9HRS
Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT III   DESIGN OF STEEL STRUCTURES   9HRS
Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV   DESIGN OF R.C. STRUCTURES   9HRS
Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V   PREFABRICATION   9HRS
Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Total No. of Hours: 45

TEXT BOOKS
1.   *Reinforced Concrete Structural elements – P. Purushothaman*
2.   *Pasala Dayaratnam – Design of Steel Structure - 1990*

REFERENCES
1.   *Henn W. Buildings for Industry, Vols. I and II, London Hill Books, 1995*
2.   *Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990*
3.   *Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural   Engineering Research Centre, Madras, 1982*

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Subject Code: **BCE18E04**	Subject Name: **ENVIRONMENTAL IMPACT ASSESSMENT**	TY / Lb/ ET L	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE

- To know the objectives, capability, and limitations of environmental impact assessment.

- To learn methodologies and legal aspects of environmental impact assessment;

COURSE OUTCOMES (COs) : (3- 5)

CO1	carry out scoping and screening of developmental projects for environmental and social assessments
CO2	explain different methodologies for environmental impact prediction and assessment
CO3	plan environmental impact assessments and environmental management plans

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H	H	H			H	H
CO2	H	H		H	H	H	H	H			H	H
CO3	H	H		H	H	H	H	H			H	H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	√Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E04	ENVIRONMENTAL IMPACT ASSESSMENT	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION   9HRS

Impact of development on environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) – Objectives – Historical development – EIA capability and limitations – Legal provisions on EIA.

UNIT II   METHODOLOGIES   9HRS

Methods of EIA – Strengths, weaknesses and applicability – Appropriate methodology – Case studies.

UNIT III   PREDICTION AND ASSESSMENT   9HRS

Socio Economic Impact – Assessment of Impact on land, water and air, energy impact; Impact on flora and fauna; Mathematical models; public participation – Reports – Exchange of Information – Post Audit – Rapid EIA.

UNIT IV   MATHEMATICAL MODELS FOR ASSESSMENT   9HRS

Use the mathematical models in EIA – Water quality, air quality and noise; assumptions and limitations.

UNIT V   ENVIRONMENTAL MANAGEMENT PLAN   9HRS

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna, addressing the issues related to the project affected people.

Total No. of Hours:45

TEXT BOOKS
1. *Canter, R.L. Environmental Impact Assessment, McGraw Hill Inc., New Delhi, 1996.*
2. *S.K.Shukla and P.R.Srivastava, Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.*

REFERENCES
1. *John G.Rau and David C Hooten (Ed)., Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1990.*
2. *Environmental Assessment Source book, Vol. I, II & III. The World Bank, Washington, D.C., 1991.*
3. *Judith Petts, Hand book of Environmental Impact Assessment Vol. I & II, Blackwell Science, 1999.*

ELECTIVE – II

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Subject Code: BCE18E05	Subject Name : DESIGN OF CONCRETE STRUCTURES		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Strength of materials		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart comprehensive knowledge on the design of reinforced concrete structural elements such as beams, columns, slabs and footings.
- To bring about an understanding of the behaviour of reinforced concrete and the design philosophies

COURSE OUTCOMES (COs) : (3- 5) The student shall knew

CO1	to design and detailing a slab
CO2	to design and detailing a column
CO3	to design and detailing a footing.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H				M	M		M	M
CO2	H	H	H	H				M	M		M	M
CO3	H	H	H	H				M	M		M	M

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E05	**DESIGN OF CONCRETE STRUCTURES**	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION, LIMIT STATE DESIGN OF BEAMS AND SLABS 9 HRS
Properties of different grades of concrete and steel, Behavior of RC members, Permissible stresses - Stress block parameters, Stress strain relationship - Failure criteria Analysis - Introduction to IS 456-2000, SP: 16 - Design and detailing of singly reinforced & doubly reinforced beam - Design and detailing of one-way and two-way slab panels – Flat Slabs (Design of beams and slabs for combined shear, bending and torsion).

UNIT II LIMIT STATE DESIGN OF COLUMNS AND FOOTINGS 9 HRS
Basic assumptions - Design and detailing of reinforced concrete short columns of rectangular and circular cross sections under axial load - Column under compression and bi axial bending using IS 456:2000 - Design and detailing of isolated footing for column subjected to axial loads, Design and detailing of Axially and eccentrically loaded Rectangular footings, Design and detailing of Combined Rectangular footings for Two Columns.

UNIT III DESIGN OF STAIRCASE AND WATER TANK 9 HRS
Introduction to ductile detailing & provisions of IS 13920, Design of Staircases - Design of circular and rectangular water tanks resting on ground. Design of staging and foundations

UNIT IV RETAINING WALLS 9 HRS
Design of retaining walls – Cantilever and Counter fort retaining walls

UNIT V YIELD LINE THEORY AND INTRODUCTION TO BRICK MASONRY 9 HRS
 Application of virtual work method to square, rectangular, circular and triangular slabs, Design of masonrywalls and pillars as per NBC and IS codes

Total No of Hours: 45

TEXT BOOKS
1. N.Krishna Raju "Design of Reinforced Concrete Structures", CBS publishers & Distributors. Latest Edition, IS456:200.
2. S.Ramamrudham ,Design of Reinforced Concrete Structures, Dhanpat Rai publishing company(p) Ltd New Delhi.
3. Varghese P C, Limit State Design of Reinforced Concrete, Prentice Hal of India, Private, Limited New Delhi, 1997.

REFERENCES
1. Ashok K. Jain Reinforced concrete- Limit state design- New chand & Bros, Roorkee 1997.
2. Dayarathnam.P, Brick and Reinforced Brick Structures, Oxford and IBH Publishing House, 1999.
3. IS: 456- 2000 "Indian Standard for Plain and reinforced concrete – code of practice "Bureau of Indian Standard".
4. A.P Arul Manikam "Structural Engineering"   .
5. Design aids to IS 456-1978 (SP16).
6. SP 34 Handbook on Concrete Reinforcement and Detailing, BIS 1987.
7. IS 1905:1987, Code of practice for structural use of unreinforced masonry Bureau of Indian Standards.

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Subject Code: BCE18E06	Subject Name: HOUSING PLANNING AND DESIGN		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building Drawing Practice		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- A house plan is a set of construction or working drawings that define all the construction specifications of a residential House A truly successful project is one where project goals are identifies early on and where the interdependencies of all building systems are coordinated concurrently from the planning and programming phase.

COURSE OUTCOMES (COs) : (3- 5)

After successful completion of this course, the students should be able to

CO1	Plan the buildings, as per the law and rules and regulations
CO2	Analyze the slum clearance project and prepare plan for plot map cost flow
CO3	identify the financing agencies and its functions

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H				H		H			H	
CO2	H	H				H		H			H	
CO3	H	H				H		H			H	

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E06	HOUSING PLANNING AND DESIGN	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION TO HOUSING   9HRS
Definition of Basic Terms – House, Home, Household, Apartments - Objectives of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Local bodies' Bye-laws at Urban and Rural Level and Development Control Regulations, Institutions for Housing at National, State and Local levels.

UNITII   HOUSING PROGRAMMES   9HRS
Basic Concepts – Contents and Standards for Housing Programmes - Sites and Services, Neighbourhood, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programme, Role of Public, Private and Non-Government Organisations.

UNIT III   PLANNING AND DESIGN OF HOUSING PROJECTS   9HRS
Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems).

UNIT IV   CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS   9HRS
New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation.

UNIT V   HOUSING FINANCE AND PROJECT APPRAISAL   9HRS
Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

Total No of Hours : 45

TEXT BOOKS
   1. *Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.*
   2. *Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.*

REFERENCES
   1. *Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 200.*
   2. *UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.*
   3. *National Housing Policy, 1994, Government of India.*

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Subject Code:	Subject Name	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E07	**BUILDING TECHNOLOGY AND HABITAT ENGINEERING**					
	Prerequisite: none	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To select appropriate construction materials and practices in construction field.

COURSE OUTCOMES (COs) : (3- 5)
After successful completion of this course, the students should be able to

CO1	Recognise the various materials used in building construction
CO2	Understand the importance of climate and its influence in construction
CO3	Understand the importance of thermal control, ventilation and air movement in building.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				H		H				M	
CO2	H				H		H				M	
CO3	H				H		H				M	

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E07	BUILDING TECHNOLOGY AND HABITAT ENGINEERING	Ty	3	0/0	0/0	3

UNIT I   BUILDING STONES   9HRS

Requirement of good building stone- characteristics - testing.Lime: Properties- Classifications -Manufacture - Testing of lime. Pozzolona: Natural and Artificial pozzolonas. Timber - Defects - Seasoning - Decay - Preservation, Tiles- Flooring and roofing tiles-specification-tests. Paints varnishes and distempers, Common constituents, types and desirable properties.

UNIT II   MISCELLANEOUS MATERIALS   9HRS

Insulating Materials - Thermal and sound insulating material desirable properties and type. Geosynthetics and its applications .Lintels –Arches – Stairs- different types and its components. Doors, Windows and Ventilations -Classification - Technical terms-Classification and Types

UNIT III   ROOF   9HRS

Types of roofs – wooden trusses .Finishing works - Plastering, pointing, painting, white washing, colour washing, distempering; Damp proofing ant termite treatment.

UNIT IV   CLIMATE AND COMFORT   9HRS

Global climatic factors – Elements of climates –Classification of tropical climates- site climate .The desirable conditions- Thermal comfort factors-Thermal comfort indices – Effective temperature

UNIT V   THERMAL CONTROL   9HRS

Means of thermal control – Mechanical control- structural control- ventilation and air movement

Total No of Hours : 45

REFERENCES:

1. *Gurucharan Singh, Building materials,,1996*

2. *Rangwala S. C, Engineering Materials, Charotar Publishing House, 1992, Anand*

3. *Punmia B. C, Building Construction, Laxmi Publlications, 1999, New Delhi.*

4. *Rangwala S. C, Building Construction, Charotar Publishing House, 1992, Anand*

5. *Huntington W.C, Building Construction, John Wiley, 1959, New York.*

6. *Koenigsberger,Manual of Tropical Housing and Building, Orient Longman Ltd*

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Subject Code: BCE18E08	Subject Name COST EFFECTIVE BUILDINGS		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Concrete and Construction Technology		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :   The goal of low-cost housing is to save money while also maintaining buildings quality without sacrificing the strength, performance and life of the structure.

COURSE OUTCOMES (COs) : (3- 5)

After successful completion of this course, the students should be able to

CO1	Identify the cost effective techniques and environmental friendly materials in construction
CO2	Identify the effects of global warming in construction
CO3	Understand the green building and its benefits in construction field.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			H	H		H			H	H
CO2	H	H			H	H		H			H	H
CO3	H	H			H	H		H			H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E08	COST EFFECTIVE BUILDINGS	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION TO COST EFFECTIVE CONSTRUCTION   12HRS
Introduction to the concept of cost effective construction -Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime-Poszolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials-Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials.

UNIT II   TECHNOLOGIES & METHODS IN CONSTRUCTION   12 HRS
Environment friendly and cost effective Building Technologies - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies

UNIT III   GLOBAL WARMING & THE RELEVANCE OF GREEN BUILDINGS   7 HRS
Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions - Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits- Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials- Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

UNIT IV   GREEN BUILDING   7 HRS
Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings - Embodied Energy in Materials-Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

UNIT V   GREEN DESIGN   7 HRS
Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)

Total No of Hours : 45

REFERENCES:
1. *K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao ,Alternative Building Materials and Technologies , New Age International Publishers.*
2. *Asko Sarja ,Integrated Life Cycle Design of Structures , SPON Press.*
3. *D S Chauhan and S K Sreevasthava , Non conventional Energy Resources , New Age International Publishers.*
4. *Laurie Backer, Buildings How to Reduce Cost, Cost Ford.*

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ELECTIVE-III

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Department of Civil Engineering

Subject Code: BCE18E09	Subject Name INDUSTRIAL WASTE MANAGEMENT		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Water supply and sanitary engineering		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart knowledge on various environmental legislations.
- To understand the treatment of industrial wastes.
- To impart knowledge on the pollution potential of major industries and the methods of controlling the same.

COURSE OUTCOMES (COs) : (3- 5)
After successful completion of this course, the students should be able to

CO1	Suggest the industrial waste disposal methods on land and water environment.
CO2	Conduct waste audit in an industry and implement waste minimization techniques.
CO3	Identify the impacts on environment due to various industrial effluents.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M	H	H	H	H		M	H	H
CO2	H			M	H	H	H	H		M	H	H
CO3	H			M	H	H	H	H		M	H	H

COs / PSOs	PSO1	PSO2										
CO1	H	H										
CO2	H	H										
CO3	H	H										

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	√ Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E09	**INDUSTRIAL WASTE MANAGEMENT**	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION   9HRS

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

UNIT II   CLEANER PRODUCTION   9HRS

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

UNIT III   TREATMENT OF INDUSTRIAL WASTEWATER   9HRS

Equalisation – Neutralisation – removal of suspended and dissolved organic solids - Chemical oxidation – Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management.

UNIT IV   TREATMENT AND DISPOSAL OF HAZARDOUS WASTES   9HRS

Physio chemical treatment – solidification – incineration – Secured landfills – Legal Provisions.

UNIT V   CASE STUDIES   9HRS

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants.

Total No. of Hours:45

TEXT BOOKS

1. *M.N.Rao & A.K.Dutta, Wastewater Treatment, Oxford IBH Publication, 1995.*
2. *W .W. Eckenfelder Jr., Industrial Water Pollution Control, McGraw-Hill Book Company, New Delhi, 1994.*

REFERENCES

1. *T.T.Shen, Industrial Pollution Prevention, Springer, 1999.*
2. *R.L.Stephenson and J.B.Blackburn, Jr., Industrial Wastewater Systems Hand book, Lewis Publisher, New York,*
3. *H.M.Freeman, Industrial Pollution Prevention Hand Book, McGraw Hill Inc., New Delhi, 1995.*

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Subject Code:	Subject Name		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E10	**CLEANER PRODUCTION**						
	Prerequisite: NIL		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To develop a basic knowledge about the cleaner production and apply the same in the field application.

- To educate the students on complete management principles related to Cleaner Production and Control of Industrial Pollution.

COURSE OUTCOMES (COs) : (3- 5)
The students completing the course will have an

CO1	insight to sustainable development and cleaner production concept
CO2	ability to plan and implement cleaner production program
CO3	ability to conduct waste audit in an industry and implement waste minimization techniques

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H	H	H			H	M
CO2	H	H		H	H	H	H	H			H	M
CO3	H	H		H	H	H	H	H			H	M

COs / PSOs	PSO1		PSO2			
CO1	H		H			
CO2	H		H			
CO3	H		H			

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E10	**CLEANER PRODUCTION**	**Ty**	**3**	**0/0**	**0/0**	**3**

UNIT I   INTRODUCTION   9 HRS

Sustainable Development - Indicators of Sustainability - Sustainability Strategies - Barriers to Sustainability – Cleaner Production (CP) in Achieving Sustainability - Environmental Policies and Legislations - Regulations to Encourage Pollution Prevention and Cleaner Production – Regulatory versus Market Based Approaches

UNIT II   CLEANER PRODUCTION CONCEPT   9 HRS

Definition - Importance - Benefits - Promotion - Barriers - Role of Industry, Government and Institutions - Environmental Management Hierarchy - Source Reduction Techniques - Process and equipment optimisation, reuse, recovery, recycle, raw material substitution.

UNIT III CLEANER PRODUCTION PROJECT DEVELOPMENT AND IMPLEMENTATION 9 HRS

 Overview of CP Assessment Steps and Skills, Preparing for the Site Visit, Information Gathering, and Process Flow Diagram, Material Balance, Establishing a Program - Organizing a Program - Preparing a Program Plan - Measuring Progress - Pollution Prevention and Cleaner Production Awareness Plan - Waste audit - Environmental Statement.

UNIT IV   LIFE CYCLE ASSESSMENT   9 HRS

Elements of LCA - Life Cycle Costing - Eco Labelling - Design for the Environment – International Environmental Standards - ISO 14001 - Environmental audit.

UNIT V   CASE STUDIES   9 HRS

Industrial applications of CP, LCA, EMS and Environmental Audits.

Total No of Hours :45

REFERENCES

1. *Paul L Bishop (2000) " Pollution Prevention: Fundamentals and Practice " McGraw-Hill International New York.*
2. *World Bank Group (1998) "Pollution Prevention and Abatement Handbook"*
3. *"Towards Cleaner Production ", World Bank and UNEP, Washington D.C.*
4. *Prasad modak, C.Viswanathan and Mandar parasnis (1995)"Cleaner Production Audit ", Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok.*

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Subject Code:	Subject Name		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E11	**ARCHITECTURE AND TOWN PLANNING**						
	Prerequisite: NONE		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart knowledge on architectural design of structures as per the zoning regulations

COURSE OUTCOMES (COs) : (3- 5)

After successful completion of this course, the students should be able to

CO1	perform architectural design of structures
CO2	suggest the land requirement as per the zoning regulations
CO3	perform Land scape design

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M			H	H	H	M		H	M
CO2	H	H	M			H	H	H	M		H	M
CO3	H	H	M			H	H	H	M		H	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E11	ARCHITECTURE AND TOWN PLANNING	Ty	3	0/0	0/0	3

UNIT I   ARCHITECTURAL DEVELOPMENT: 9HRS
Natural and built environment, historic examples, factors influence architectural development.

UNIT II   PRINCIPLES OF ARCHITECTURAL DESIGN   9HRS
Design methods, primary elements, form, space, organization, circulation, proportion and scale, ordering principles;

UNIT III   FUNCTIONAL PLANNING OF BUILDINGS: 9HRS
Planning, designing and construction, general building requirements, permit and inspection (as per the National building Code);

UNIT IV   EVOLUTION OF TOWNS: 9HRS
History and trends in town planning: origin and growth, historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town; New Concepts in town planning: Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning;

UNIT V   PLANNING PRINCIPLES, PRACTICE AND TECHNIQUES: 9HRS
 Elements of City plan, Estimating future needs, Planning standards, Zoning - its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan; Concepts of Urban planning, Design and Landscaping.
                                                                      Total No of Hours: 45

TEXT BOOKS

1. *B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers, 5th edition, 2005.*
2. *D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley, 2nd edition 1996.*

REFERENCES
1. *National Building Code of India 2005, BIS, New Delhi.*
2. *S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, John Wiley 6th edition 1996.*

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Subject Code:	Subject Name:		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E12	**CONSTRUCTION MANAGEMENT**						
	Prerequisite: NONE		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To make the students aware of the various construction techniques and practices.
- To introduce a concepts of projects formulation

COURSE OUTCOMES (COs) : (3- 5)

CO1	The student should be able to plan construction projects, schedule the activities using network diagrams,
CO2	Determine the cost of the project, control the cost of the project by creating cash flows and budgeting and to use the project information as decision making tool
CO3	Knowledge about different methods of planning

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					H	M	M		M		H
CO2	H					H	M	M		M		H
CO3	H					H	M	M		M		H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code: BCE18E12	Subject Title : CONSTRUCTION MANAGEMENT	Ty/Lb/ ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I   NETWORK TECHNIQUES   9 HRS

Introduction to network techniques - Use of CPM and PERT for planning - Scheduling and control of construction work, bar charts Error in networks, Types of nodes and node numbering systems.

UNIT II   CONSTRUCTION PLANNING   9 HRS

Basic concepts in the development of construction plan - Planning for construction and site facilities using networks - Preparation of construction schedules for jobs, materials, and equipment using CPM.   .

UNIT III   COST CONTROL OF CONSTRUCTION   9 HRS

Construction quality control and inspection - Significance of variability and estimation of risks - Construction cost control - Crashing of networks.

UNIT IV   QUALITY AND SAFETY DURING CONSTRUCTION   9 HRS

Importance of Quality and safety – Organizing for quality and safety – safety measures – Prevention of fire at construction site – Elements and organization of quality - Quality assurance techniques.

UNIT V   MANAGEMENT INFORMATION SYSTEM   9 HRS

Definition of MIS – Requirement of MIS – Database approach – Types of project information – Accuracy and use of information.

Total No of Hours: 45

TEXT BOOKS

1. *Chitkara, K.K "Consruction Project Management Planning "Scheduling And Control, Tata Mc Graw – Hill Publishing Co., Newdelhi, 1998.*

2. *S. Seetharaman - Construction Engineering & Management, Dhanpat Rai Publications ,Pune,1995.*

REFERENCES

1. *Construction Management - Sangareddy And Meyyappan,Prathibha Publications,Cbe,1994.*
2. *Moder. J., C. Phillips And Davis, "Project Management With Cpm, Pert And Precedence Diagramming,1999.*
3. *Prasanna Chandra, " Project Management ", Tmh ,New Delhi,1997.*

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ELECTIVE-IV

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Department of Civil Engineering

Subject Code:	Subject Name:	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E13	**STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING**					
	Prerequisite: Structural Analysis	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To develop systematically from basic principles of structural dynamics the characteristic of dynamic behaviour of the structure, namely, response spectrum;
- To expose important aspects of various theories of cause of earthquake and measurement of its effects on the structure as loads

COURSE OUTCOMES (COs) : (3- 5)

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

CO1	Identify, formulate and solve free and forced vibrations response of structural systems
CO2	The knowledge to analyse structures subjected to dynamic loading
CO3	The knowledge to design the structures for seismic loading as per code provisions.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		M				M
CO2	H	H	H	H		H		M				M
CO3	H	H	H	H		H		M				M

COs / PSOs	PSO1	PSO2							
CO1	H	H							
CO2	H	H							
CO3	H	H							

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E13	STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING	Ty	3	0/0	0/0	3

UNIT I   SINGLE DEGREE OF FREEDOM SYSTEMS   9 HRS
Formulation of equation of motion-free and forced vibrations-response to dynamic Loading-effect of damping

UNIT II   MODAL ANALYSIS   9 HRS
Free and forced vibration of un-damped and damped MDOF systems- equation of Motions- evaluation of   natural frequencies and modes

UNIT III   INTRODUCTION TO EARTH QUAKE ENGINEERING   9 HRS
Elements of engineering seismology- characteristics of earth quake engineering- earth quake history- Indian seismicity.

UNIT IV   BEHAVIOUR OF STRUCTURES AND SOIL   9 HRS
Performance of structures under past earth quakes- lessons learnt from past earth Quakes- behavior of soil under earth quake loading- soil liquefaction- soil structure Interaction effects.

UNIT V   EARTH QUAKE RESISTANT DESIGN   9 HRS
Concept of Earth quake resistant design- provisions of seismic code IS-1893 (part I)- 2002- response spectrum-design spectrum- seismic coefficient- design of buildings.

Total No of Hours: 45

TEXT BOOKS
1. *Clough R. W, and Penzien J, Dynamics of structures, Second Edition, Mc Graw- Hill International edition,New Delhi, 1993*
2. *Mario Paz, structural dynamics- theory and computations, Third Editions CBS Publishers,New Delhi, 1990.*

REFERENCES
1. *Minoru Wakabayashi, Design of earth quake resistant buildings,Mc Graw- Hill book company, New York 1986*
2. *Anil K Chopra, Dynamics Of Structures- Theory and applications to Earth quake engineering, Prentice hall inc, 2001*

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NAAC A

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Subject Code:	Subject Name		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E14	**BRIDGE STRUCTURES**						
	Prerequisite: Design of concrete structures		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To make the student to know about various bridge structures, selection of appropriate bridge structures and design it for given
- site conditions.

COURSE OUTCOMES (COs) : (3- 5)
At the end of the course, students will be able to

CO1	Understand the basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
CO2	identify the sizing of bridge elements ie., develop a clear understanding of conceptual design
CO3	understand the load flow mechanism and identify loads on bridges and carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		H			M	M
CO2	H	H	H	H		H		H			M	M
CO3	H	H	H	H		H		H			M	M

COs / PSOs	PSO1	PSO2			
CO1	H	H			
CO2	H	H			
CO3	H	H			

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	√Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
		Ty				
BCE18E14	BRIDGE STRUCTURES		3	0/0	0/0	3

UNIT I   INTRODUCTION   9HRS
Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders.

UNIT II   STEEL BRIDGES   9HRS
Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT III   REINFORCED CONCRETE SLAB BRIDGES   9HRS
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading.

UNIT IV   REINFORCED CONCRETE GIRDER BRIDGES   9HRS
Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

UNIT V   PRESTRESSED CONCRETE BRIDGES   9HRS
Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters -Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Total No. of Hours: 45

TEXT BOOKS
> 1. *Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.*
> 2. *Ponnuswamy S., " Bridge Engineering ", Tata McGraw Hill, New Delhi, 1996.*

REFERENCES
> 1. *Phatak D.R., " Bridge Engineering ", Satya Prakashan, New Delhi, 1990.*

Subject Code: BCE18E15	Subject Name					TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	PRESTRESSED CONCRETE STRUCTURES									
	Prerequisite: Nil					Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- Prestressing methods, principles and concepts are essential for the basic concept of the subject .
- Analysis of prestress and the resultant stresses using different concepts is dealt here;
- Determination of losses in concrete & Anchorage zone stresses in end block can be brought out using IS method

COURSE OUTCOMES (COs) : (3- 5)

CO1	Student shall have a knowledge on methods of prestressing
CO2	Student should be able to design various prestressed concrete structural elements.
CO3	Possesses a knowledge on composite construction

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H	H	H	M		M	M
CO2	H	H	H	H		H	H	H	M		M	M
CO3	H	H	H	H		H	H	H	M		M	M

COs / PSOs	PSO1	PSO2							
CO1	H	H							
CO2	H	H							
CO3	H	H							

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Category	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E15	PRESTRESSED CONCRETE STRUCTURES	PEC	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION – THEORY AND BEHAVIOUR   9HRS

Basic concepts – Advantages – Materials required – Systems and methods of pre -stressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons .

UNIT II   DEFLECTION   9HRS

Deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of pre-stress – Losses of prestress - types - losses due to elastic deformation of concrete - shrinkage of concrete - creep of concrete - friction - anchorage slip – Estimation of crack width

UNIT III   DESIGN   9HRS

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.

UNIT IV   CIRCULAR PRESTRESSING   9HRS

General features & Design of prestressed concrete tanks – Prestressed concrete Poles, Shapes, Features & Design- Prestressed concrete sleepers – Development – Types- Design, Static & dynamic loads

UNIT V   COMPOSITE CONSTRUCTION   9HRS

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members– General aspects – pretension pre-stressed bridge decks – Post tensioned pre-stressed bridge decks –Advantages over R.C.C bridges- Design Principles of post tensioned prestressed concrete slab bridge deck, T Beam slab bridge deck & Continuous two span beam deck

Total No of Hours: 45

TEXT BOOKS

1. *Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi, 2011*
2. *S.Ramamrutham, Prestressed concrete,Dhanpatrai Publishing company,2014*
3. *Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH Publishing Co.Pvt. Ltd. 1997.*
4. *Rajagopalan.N, Prestressed Concrete, Alpha Science, 2002.*

REFERENCES

1. *Ramaswamy G.S., Modern Prestressed Concrete Design, Arnold Heinimen, New Delhi, 1990*

2. *Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995*

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Subject Code: BCE18E16	Subject Name TALL BUILDINGS		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Structural analysis		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To introduce various aspects of planning of Tall Buildings ;
- To know about different types of loads ;
- To introduce various structural systems for medium rise buildings with their behaviour and analysis;
- To introduce various structural systems for high rise buildings with their behaviour and analysis;
- To impart knowledge about stability analysis of various systems and to know about advanced topics.

COURSE OUTCOMES (COs) : (3- 5)

CO1	At the end of this course the student should have an understanding on the behaviour of tall buildings subjected to lateral building.
CO2	The students should have knowledge about the rudimentary principles of designing tall buildings as per the existing codes.
CO3	implement design philosophies for the development of high rise structures

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H	H	H	M		M	M
CO2	H	H	H	H		H	H	H	M		M	M
CO3	H	H	H	H		H	H	H	M		M	M

COs / PSOs	PSO1		PSO2				
CO1	H		H				
CO2	H		H				
CO3	H		H				

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E16	TALL BUILDINGS	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION   9HRS
The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II   THE VERTICAL STRUCTURE PLANE   9HRS
Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

**UNIT III   COMMON HIGH-RISE BUILDING STRUCTURES AND
                    THEIR BEHAVIOUR UNDER LOAD   9HRS**
The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV   APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDING   9HRS
Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading – Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT V   OTHER HIGH-RISE BUILDING STRUCTURE   9HRS
Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

                                                                        Total No. of Hours :45

TEXT BOOKS
1.   *Wolfgang Schueller " High-Rise Building Structures", John Wiley&Sons.*
2.   *Bryan Stafford Smith And Alex Coull, " Tall Building Structures ", Analysis And Design, John Wiley And Sons, Inc., 1991.*

REFERENCES

1.   *Coull, A. and Smith, Stafford, B. " Tall Buildings ", Pergamon Press, London, 1997.*

2.   *LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.*

3.   *Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.*

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ELECTIVE- V

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Subject Code:	Subject Name		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E17	**REPAIR AND REHABILITATION OF STRUCTURES**						
	Prerequisite: Concrete and Construction Technology		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE

- To make the students to gain the knowledge on quality of concrete, durability aspects, causes of deterioration.
- To make the students to gain the knowledge on assessment of distressed structures, repairing of structures and demolition procedures.

COURSE OUTCOMES (COs) : (3- 5)
After successful completion of this course, the students should be able to

CO1	suggest maintenance and repair strategies
CO2	assess the durability of concrete due to various climatic conditions
CO3	suggest the suitable materials for repair, rehabilitation and retrofitting techniques

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	H	H	H	H			H	H
CO2	H	H	H	H	H	H	H	H			H	H
CO3	H	H	H	H	H	H	H	H			H	H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code: BCE18E17	Subject Title : REPAIR AND REHABILITATION OF STRUCTURES	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
		Ty	3	0/0	0/0	3

UNIT I   MAINTENANCE AND REPAIR STRATEGIES   9 HRS

Maintenance- Repair and Rehabilitation. Facts of Maintenance - Importance of Maintenance- Various aspects of Inspection- Assessment procedure for evaluating a damaged structure, Causes of deterioration.

UNIT II   STRENGTH AND DURABILITY OF CONCRETE   9 HRS

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

UNIT III   SPECIAL CONCRETES   9 HRS

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength and High-performance concrete, Vacuum concrete, Self-compacting concrete, Whisper concrete Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV   TECHNIQUES FOR REPAIR AND PROTECTION METHODS   9 HRS

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, Cathodic protection.

UNIT V   RETROFITTING AND DEMOLITION TECHNIQUES   9 HRS

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Engineered demolition methods - Case studies.

Total No of Hours: 45

TEXTBOOKS:
1. *Shetty M.S., "Concrete Technology - Theory and Practice", S. Chand and Company, 2008.*
2. *Gambhir. M.L., "Concrete Technology", McGraw Hill, 2013*
3. *Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991.*

REFERENCES:
1. *Ravi Shankar. K. Krishnamoorthy. T.S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.*
2. *Dov Kominetzky. M.S., "Design and Construction Failures", Galgotia Publications Pvt. Ltd., 2001*
3. *CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.*
4. *Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1987*

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Subject Code: BCE18E18	Subject Name **MUNICIPAL SOLID WASTE MANAGEMENT**	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Water supply and sanitary Engineering	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The student is expected to know about the various effects and legislations for the municipal solid waste.
- To understand the various sources, characterization, processing and the disposal methods of municipal solid wastes.

COURSE OUTCOMES (COs) : (3- 5)

After completion of the course, student will be able to:

CO1	understand the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
CO2	ability to plan waste minimisation and design storage, collection, transport, processing and disposal of municipal solid waste
CO3	identify and design waste containment systems

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H	H	H	H	H	M		M	H
CO2	H			H	H	H	H	H	M		M	H
CO3	H			H	H	H	H	H	M		M	H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E18	MUNICIPAL SOLID WASTE MANAGEMENT	Ty	3	0/0	0/0	3

UNIT I   SOURCES AND TYPES   9HRS

Sources and types of solid wastes in a Municipality; Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II   ON-SITE STORAGE & PROCESSING   9HRS

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT III   COLLECTION AND TRANSFER   9HRS

Methods of Collection – types of vehicles – Manpower – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT IV   OFF-SITE PROCESSING   9HRS

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, options under Indian conditions.

UNIT V   DISPOSAL   9HRS

Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills.

Total No. of Hours :45

TEXT BOOKS
1.   *George Techobanoglous et.al., Integrated Solid Waste Management, McGraw Hill Publishers, 1993.*
2.   *B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, Waste Management, Springer, 1994.*

REFERENCES

1.   *Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 200*
2.   *R.E.Landreth and P.A.Rebers, Municipal Solid Wastes – problems and Solutions, Lewis Publishers, 1997*
3.   *Bhide A.D. and Sundaresan, B.B., Solid Waste Management in Developing Countries; INSDOC, 1993.*

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NAAC A

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Subject Code: BCE18E19	Subject Name FINITE ELEMENT ANALYSIS		TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Structural analysis		Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE

- The objective is to equip students with fundamentals of finite element principles so as to enable them to understand the behaviour of various finite elements and to be able to select appropriate elements to solve physical and engineering problems with emphasis on structural and thermal engineering applications.

COURSE OUTCOMES (COs) : (3- 5)
After successful completion of this course, the students should be able to

CO1	Students will be in a position to develop computer codes for any physical problems using FE techniques
CO2	apply the concept of the differential equilibrium equations and their relationship in the analysis of structures
CO3	apply numerical methods to FEM for structural analysis

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H							H	H
CO2	H	H	H	H							H	H
CO3	H	H	H	H							H	H

COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E19	FINITE ELEMENT ANALYSIS					
		Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION – VARIATIONAL FORMULATION   8HRS
General filed problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT II   FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS   8HRS
One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT III   FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS   9HRS
Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices –boundary conditions – solution techniques.

UNIT IV   ISOARAMETRIC ELEMENTS AND FORMULATION   10HRS
Natural coordinates inn 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V   APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSION   10 HRS
Equations of elasticity – plane elasticity problems – axis symmetric problems in elasticity Bending of elastic plates –Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

Total No. of Hours :45

TEXT BOOKS
   1. *J.N.Reddy, "An Introduction to Finite Element Method", McGraw-Hill Book Co., Intl. Edition, 1985.*
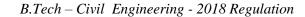 **REFERENCES**
   1.   *1.Rienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1, 4/e, McGraw-Hill,Book Co.*
   2.   **S.S.Rao, "The Finite Element Method in Engineering", Pergaman Press, 1989.*
   3.   **C.S.Desai and J.F.Abel, "Introduction to the Finite Element Method", Affiliated East West Press 1972*

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Subject Code:	Subject Name	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E20	**PRE FABRICATED STRUCTURES**					
	Prerequisite: NIL	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial   SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :
- To impart knowledge to students on modular construction, industrialised construction and design of prefabricated elements and construction methods.

COURSE OUTCOMES (COs) : (3- 5)
The student shall be able to

CO1	design some of the prefabricated elements
CO2	Understand the construction methods in using prefabricated elements
CO3	utilize the various code provisions regarding progressive collapse.

Mapping of Course Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		M			M	M
CO2	H	H	H	H		H		M			M	M
CO3	H	H	H	H		H		M			M	M

COs / PSOs	PSO1	PSO2			
CO1	H	H			
CO2	H	H			
CO3	H	H			

H/M/L indicates Strength of Correlation   H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

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Subject code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E20	PRE FABRICATED STRUCTURES	Ty	3	0/0	0/0	3

UNIT I   INTRODUCTION   9HRS
Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection.

UNIT II   PREFABRICATED COMPONENTS   9HRS
Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls.

UNIT III   DESIGN PRINCIPLES   9HRS
Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV   JOINT IN STRUCTURAL MEMBERS   9HRS
Joints for different structural connections – Dimensions and detailing – Design of expansion joints.

UNIT V   DESIGN FOR ABNORMAL LOADS   9HRS
Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

                                                                Total No. of Hours: 45

TEXT BOOKS

1.   *CBRI, Building materials and components, India, 1990*
2.   *Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994*

REFERENCES
1.   *Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.*
2.   *Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.*