

REGULATION 2015
B.TECH – CIVIL ENGINEERING
CURRICULUM AND SYLLABUS

SEMESTER I

Code No.	Course Title	L	T	P	C
Theory					
BEN101	English – I	3	1	0	3
BMA101	Mathematics – I	3	1	0	3
BPH101	Engineering Physics - I	3	0	0	3
BCH101	Engineering Chemistry – I	3	0	0	3
BCS101	Fundamentals of Computing and Programming	3	0	0	3
BBA101	Personality Development	1	1	0	2
BBT 102	Biology for Engineers	2	0	0	2
BME101	Engineering Graphics – E	2	3	0	4
BME103	Basic Mechanical Engineering	2	0	0	2
Practical					
BCM1L1	Basic Civil and Mechanical Engineering Practices Laboratory	0	0	3	1
BPC1L1	Physics and Chemistry Laboratory	0	0	3	0
	NCC/NSS/ Yoga (Optional) to be conducted during week ends				

Total No. of Contact Hours: 34

Total No. of Credits: 26

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

SEMESTER II

Code No.	Course Title	L	T	P	C
Theory					
BEN201	English – II	3	1	0	3
BMA201	Engineering Mathematics – II	3	1	0	3
BPH201	Engineering physics – II	3	0	0	3
BCH201	Engineering Chemistry – II	3	0	0	3
BFI 201*	Foreign / Indian Language	3	0	0	3
BME202	Engineering Mechanics	3	1	0	3
BEE201*	Basics Electrical and Electronics Engineering	2	0	0	2
Practical					
BCS2L2	Computer Practices Lab	0	0	3	1
BEE2L1*	Basics Electrical and Electronics Engineering Practices Laboratory	0	0	3	1
BPC2L1	Physics and Chemistry Laboratory	0	0	3/3	1

Total No. of Contact Hours: 32

Total No. of Credits: 23

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

SEMESTER III

Code No.	Course Title	L	T	P	C
Theory					
BMA301	Mathematics III	3	1	0	4
BME301	Applied Mechanics	3	1	0	4
BME302	Surveying I	3	0	0	3
BME303	Building Construction	3	0	0	3
BME304	Fluid Mechanics	3	0	0	3
BME305	Engineering Earth Science	3	0	0	3
Practical					
BME3L1	Surveying Practical - I	0	0	4	2
BCE3L3	Strength Of Materials Lab	0	0	4	2

Total No. of Contact Hours: 28

Total No. of Credits: 24

SEMESTER IV

Code No.	Course Title	L	T	P	C
Theory					
BMA402	Numerical Methods	3	1	0	4
BCE401	Theory Of Structures	3	1	0	4
BCE402	Surveying II	3	0	0	3
BCE403	Soil Mechanics	3	0	0	3
BCE404	Basic Structural Design	3	1	0	4
BCE405	Transportation Engineering	3	0	0	3
BCE406	Environmental Studies	3	0	0	3
Practical					
BCE4L1	Surveying Practical II	0	0	4	2
BCE4L2	Soil Mechanics Lab	0	0	4	2

Total No. of Contact Hours: 32

Total No. of Credits: 28

SEMESTER V

Code No.	Course Title	L	T	P	C
Theory					
BCE501	Structural Analysis - I	3	1	0	4
BCE502	Applied Hydraulic Engineering	3	0	0	3
BCE503	Foundation Engineering	3	0	0	3
BCE504	Reinforced Concrete Structures - I	3	1	0	4
BCE505	Environmental Engineering - I	3	0	0	3
BCE507	Construction Technology	3	0	0	3
BCE5E1	Elective - I	3	0	0	3
Practical					
BCE5L1	Construction Engineering Lab	0	0	4	2
BCE5L2	Fluid Mechanics and Machinery Lab	0	0	4	2

Total No. of Contact Hours: 31

Total No. of Credits: 27

SEMESTER VI

Code No.	Course Title	L	T	P	C
Theory					
BCE601	Structural Analysis – II	3	1	0	4
BCE602	Reinforced Concrete Structures - II	3	1	0	4
BCE603	Environmental Engineering - II	3	0	0	3
BCE604	Irrigation Engineering	3	0	0	3
BCE605	Remote Sensing and GIS	3	0	0	3
BCE6E1	Elective -II	3	0	0	3
Practical					
BCE6L1	Computer Aided Building Drawing	0	0	4	2
BCE6L2	Environmental Engineering Lab	0	0	4	2
Project					
BCE6P1	Mini Project	0	0	8	4

Total No. of Contact Hours: 35

Total No. of Credits: 27

SEMESTER VII

Code No.	Course Title	L	T	P	C
Theory					
BCE701	Estimation & Costing	3	0	0	3
BCE702	Computer Aided Design Of Structures	3	1	0	4
BCE703	Design of Steel Structures	3	1	0	4
BCE704	Management Concepts For Civil Engineers	3	0	0	3
BCE7E1	Elective – III	3	0	0	3
BCE7E2	Elective – IV	3	0	0	3
Practical					
BCE7L1	Computer Aided Design Of Structures Laboratory	0	0	4	2
BCE7L1	Computer Aided Design and Drafting Laboratory(R.C.C, Steel, Irrigation & Environment)	0	0	4	2
BCE7V1	In-plant Training (End of 6th Semester -30days)	0	0	0	1

Total No. of Contact Hours: 28

Total No. of Credits: 25

SEMESTER VIII

Code No.	Course Title	L	T	P	C
Theory					
BCE8E3	Elective - V	3	0	0	3
BCE8E4	Elective - VI	3	0	0	3
BCE8E5	Elective - VII	3	0	0	3
Project					
BCE8P1	Project Work and Viva Voce	0	0	12	6

Total No. of Contact Hours: 21

Total No. of Credits: 15

TOTAL NO. OF CREDITS FOR THE PROGRAMME : 195

LIST OF ELECTIVES

Code No.	Course Title	L	T	P	C
Theory					
BCE051	Matrix Methods of Structural Analysis	3	0	0	3
BCE052	Industrial Structures	3	0	0	3
BCE053	Design of R.C. Framed Structures	3	0	0	3
BCE054	Concrete Bridges	3	0	0	3
BCE055	Tall Structures	3	0	0	3
BCE056	Advanced Concrete Design	3	0	0	3
BCE057	Industrial Waste Treatment and Disposal	3	0	0	3
BCE058	Air and Noise Pollution	3	0	0	3
BCE059	Environmental Health Engineering	3	0	0	3
BCE060	Renewable Sources of Energy	3	0	0	3
BCE061	Structures on Expansive Soil	3	0	0	3
BCE062	Soil Dynamics and Machine Foundation	3	0	0	3
BCE063	Hydrology	3	0	0	3
BCE064	Ground Water Engineering	3	0	0	3
BCE065	Coastal Engineering	3	0	0	3
BCE066	Geographic Information System	3	0	0	3
BCE067	Operation and Management of Irrigation Systems	3	0	0	3
BCE068	Transportation Structures	3	0	0	3
BCE069	Optimization Techniques	3	0	0	3
BCE070	Pre stressed Concrete Structures	3	0	0	3
BBA071	Professional Ethics	3	0	0	3
BCE071	Engineering Economics	3	0	0	3

BEN101**ENGLISH I**

L	T	P	C
3	1	0	4

OBJECTIVE

- To make the students learn the basics of communication in order to talk fluently, confidently and vividly.

COURSE OUTCOMES (COs)

CO1- To make them master the techniques of professional communication

CO2- To know about E-mail communication

CO3- To understand about comparison studies

CO4- To improve presentation skill

CO5- To know about marking the stress Connectives

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2			S		M							
CO3		M		S								
CO4				W								
CO5	S	M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I**12**

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

UNIT II**12**

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

UNIT III**12**

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

market.

UNIT IV

12

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

UNIT V

12

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

L=45, T=15, Total No. of Periods: 60

Text Book:

1. Department of humanities and social sciences division, Anna university, oxford university press, 2013.

Reference Books:

2. S.P.Danavel, English and Communication for Students of Science and engineering, Orient Blackswan, Chennai, 2011.
3. Rizvi, M.Asharaf, Effective Technical Communication, New Delhi, Tata McGraw Hill Publishibg Company, 2007. MuraliKrishna and SunithaMoishra, Communication Skills for Engineers, Pearson, New Delhi, 2011.

BMA101

ENGINEERING MATHEMATICS-I

L	T	P	C
3	1	0	3

OBJECTIVE:

- To equip students with adequate knowledge of Mathematics to formulate problems in engineering environment and solve them analytically

COURSE OUTCOME:

- CO1-** To apply matrix operations to solve the relevant real life problems in engineering.
- CO2-** To formulate a mathematical model for three dimensional objects and solve the concerning problems.
- CO3-** To find area and volume based on a function with one or more variables.
- CO4-** To know about Cartesian and Polar coordinates
- CO5-** To get knowledge about Partial derivatives

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2			S		M							
CO3				M								

CO4	S			W								
CO5		M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT-1 MATRICES

12

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

UNIT-II THREE DIMENSIONAL ANALYTICAL GEOMETRY

12

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

UNIT-III DIFFERENTIAL CALCULUS

12

Curvature in Cartesian coordinates- Centre and radius of curvature- Circle of curvature- Evolutes- Envelopes- Evolutes as envelope of normals.

UNIT-IV FUNCTIONS OF SEVERAL VARIABLES

12

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

UNIT-V MULTIPLE INTEGRALS

12

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

L=45, T=15, TOTL NO.OF PERIODS: 60

Text book:

1. Ravish R.Singh and Mukkul Bhatt, " Engineering Mathematics-I" First Reprint, Tata McGraw Hill Pub Co., New Delhi. 2011.

References:

2. Ramana.B.V. “Higher Engineering Mathematics” , Tata McGraw Hill Publishing Company, New Delhi, 2007.
3. Glyn James, “Advanced Engineering Mathematics” , 7th Edition, Pearson Education, 2007.
4. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th Edition, John Wiley and Sons, New York, 2003.
5. Murray R. Spiegel, “Advanced Calculus”, Schaum’s Outline Series, First Edn, McGraw Hill Intl Book Co., New Delhi, , 1981.
6. Grewal.B.S, “Higher Engineering Mathematics” , 40th Edition, Khanna Publications, Delhi. 2007.

BPH 101

ENGINEERING PHYSICS – I

L	T	P	C
3	0	0	3

OBJECTIVES

- To make a bridge between the physics in school and engineering courses.
- To impart a sound knowledge on the basic concepts of modern sciences like engineering applications of ultrasonic, lasers, fundamentals of crystal physics.

COURSE OUTCOMES

- CO1** - To know about Ultrasonic and its application in NDT.
- CO2** - To know the principle of Laser and its application in Engineering and medicine.
- CO3** - Acquire Knowledge on Quantum Physics.
- CO4** – Properties of Electro Magnetic Theory.
- CO5** – To understand the impact of Crystal Physics.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S								M		
CO2			S		M							
CO3		M		S		M						M
CO4				W					S			
CO5		M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey

2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I - ULTRASONICS

9

Introduction – Production- Magnetostriction Effect- Magnetostriction Generator- Piezoelectric Effect- Piezo Electric Generator- Detection Of Ultrasonic Waves- Properties- Cavitation- Acoustic Grating -Industrial Applications- Drilling, Welding, Soldering, Cleaning And Sonar- Velocity Measurement- - Non Destructive Testing(NDT)- Pulse Echo System Through Transmission And Reflection modes- A,B And C- Scan Display- Important Medical Applications- Sonogram--problem.

UNIT II – LASER

9

Introduction- Principle of Spontaneous Emission and Stimulated Emission- Einstien's A & B Coefficients- Derivation-Condition For Producing Laser Beam- Population Inversion- Pumping- Resonance Cavity- Types Of Lasers- ND-YAG- He-Ne- Co₂ Lasers-Industrial Applications- Heat Treatment- Welding-Cutting-Medical Applications-Laser Surgery- Advantages & Disadvantages-problem.

UNIT III - QUANTUM PHYSICS

9

Drawbacks with classical physics- Blackbody radiation: Max Planck theory and concept of energy quantization, deduction of Wien's displacement law, Raleigh-Jeans law – Matter waves- de Broglie wave length-photoelectric effect – Schrödinger equation (time-independent, and time-dependent equations)- wave functions and energy spectrum- application to particle in box-problem.

UNIT IV - ELECTROMAGNETIC THEORY

9

Electric charges-coulombs law of inverse squares- Electric field and its calculations-field lines- Gauss's law-applications of Gauss law. Magnetism - Magnetic field- Magnetic field lines- Magnetic flux- Motion of charged particles in magnetic field- Magnetic field of a moving charge. Electromagnetic wave- speed of and electromagnetic wave and its quantitative deduction-group velocity- energy in electromagnetic wave- electromagnetic waves in matter-problem.

UNIT V - CRYSTAL PHYSICS

9

Lattice- Unit Cell- Bravais Lattice- Lattice Plane- Miller Indices- D-Spacing In Cubic Lattice- Calculation of Number of Atoms Per Unit Cell- Atomic Radius- Coordination Number- Packing

Factor- SC,BCC, FCC, HCP Structures- Polymorphism And Allotropy- Crystal Defects- Point, Line And Surface Defects- Burgers Vector-problem.

Text Books:

1. Marikani, A. 'Engineering Physics' Second Edition PHI Learning Pvt Ltd - 2013
2. Sears.F.W., Zemansky.M.W., Young.H.D.;'University Physics; Narosa Publishing House.
3. Avadhanulu. M.N.; Engineering Physics-Vol-1; S.Chand And Company Ltd, 2010.

Reference Books:

4. Sears., Zemansky., Young.;'College Physics; Addison Wesley Publishing Company.
5. Resnick, R., and Halliday, D. and Walker, J.; Fundamental of Physics; John Wiley and Sons.
6. Senthil Kumar, G. 'Engineering Physics – I' VRB publishers Pvt Ltd. 2010.

Total No. of Periods: 45

BCH 101

ENGINEERING CHEMISTRY – I

OBJECTIVES

L	T	P	C
3	0	0	3

- To impart knowledge to the Students about the principles, water characterization and treatment of portable and industrial purposes.
- To make them understand the Principles of polymer chemistry and engineering applications of polymers
- To impart a sound knowledge about the Principles of electrochemistry, electrochemical cells, emf and applications of emf measurements
- To make the students to have a deep knowledge of the Principles of corrosion and corrosion control and
- To make the students to be well versed with the Conventional and non-conventional energy sources and energy storage devices

COURSE OUTCOMES:

CO1 – Having a knowledge of Water characterization and treatment of portable and Industrial purposes.

CO2 – Having the thinking of Principles of polymer chemistry and engineering applications of polymers

CO3 – Having a deep knowledge about the Principles of electrochemistry

CO4 – With a true wisdom about Corrosion

CO5 - Having a sound knowledge in the Field of the Conventional and non-conventional energy .

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S								
CO2	S		M		M							
CO3		M		S								
CO4												
CO5	S	M				W						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I WATER TECHNOLOGY

9

INTRODUCTION

Characteristics :

Hardness of water – types - temporary and permanent hardness - estimation by EDTA method
 Alkalinity – types of alkalinity - Phenolphthalein and Methyl orange alkalinity - determination –
 Domestic water treatment – disinfection methods (Chlorination, ozonation , UV treatment)
 Boiler feed water – requirements – disadvantages of using hard water in boilers (caustic embrittlement , boiler corrosion , priming and foaming) – Prevention of scale formation –
 softening of hard water - Internal treatment (Calgon treatment method) – External treatment –
 Demineralization process – Desalination and Reverse osmosis.

UNIT II POLYMERS

9

INTRODUCTION

Polymers:

Definition – polymerization – degree of polymerization - types of polymerisation – Addition polymerization and Condensation polymerization – Mechanism of Polymerization - free radical polymerization mechanism only

Plastics:

Classification – thermoplastics and thermosetting plastics – difference between thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, Teflon, nylon-6,6, PET

Rubber :

Types – drawbacks of natural rubber -vulcanization of rubber - properties and uses of vulcanized rubber Synthetic rubbers – butyl rubber and SBR

UNIT III ELECTROCHEMISTRY 9

INTRODUCTION

CELLS :

Types of Cells :

Electrochemical cells , Electrolytic cells – Reversible and Irreversible cells EMF – measurement of emf – Single electrode potential – Nernst equation

Reference electrodes:

Standard Hydrogen electrode -Calomel electrode

Ion selective electrode:

Glass electrode and measurement of pH using Glass electrode

Electrochemical series – significance

Titrations:

Potentiometer titrations (redox - Fe^{2+} vs dichromate titrations)

Conductometric titrations (acid-base – HCl vs. NaOH titrations)

UNIT IV CORROSION AND CORROSION CONTROL 9

INTRODUCTION

Chemical corrosion

Definition - Chemical Corrosion - Electrochemical corrosion – different types (Galvanic corrosion – differential aeration corrosion) – mechanism of Chemical and Electrochemical corrosion factors influencing corrosion

Corrosion control – sacrificial anode and impressed cathodic current methods

Protective coatings :

Paints – constituents of the paint and their functions

Metallic coatings – electroplating of Gold and electroless plating of Nickel.

UNIT V. Non-Conventional Energy Sources And Storage Devices 9

INTRODUCTION :

Nuclear fission and nuclear fusion reactions – differences between nuclear fission and nuclear fusion reactions – nuclear chain reactions – nuclear energy critical mass - super critical mass - sub - critical mass Light water nuclear reactor for power generation (block diagram only) – breeder reactor Solar energy conversion – solar cells – wind energy Fuel cells – hydrogen – oxygen fuel cell Batteries :Primary and secondary Batteries – differences between Primary and secondary Batteries

Secondary batteries :

Lead–acid storage battery –working –uses

Nickel–cadmium battery - working –uses

Solid – state battery : Lithium battery

Total: 45 Periods

Text books:

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

References:

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

BCS101 FUNDAMENTALS OF COMPUTING AND PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To provide a basic understanding of computing

COURSE OUTCOMES

CO1- To enable the student to learn the major components of a computer system.

CO2- To know the correct and efficient way of solving problem.

CO3- To learn to use office automation tools.

CO4- To learn and write program in “C”.

CO5- To learn about C++

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								W				
CO2	S				M							
CO3			M							M		
CO4				W							M	
CO5	S	M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey

3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I: Introduction to Computer **9**

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

UNIT II: Problem Solving and Office Automation **9**

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

UNIT III: Introduction to C **9**

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

UNIT IV: Arrays and Structures **9**

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

UNIT V: Introduction to C++ **9**

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

Total No. of Periods: 45

Text books:

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

Reference books:

5. Pradeep K.Sinha, Priti Sinha "Foundations of Computing", BPB Publications (2013).
6. Byron Gottfried, "Programming with C", 2nd edition, (Indian Adapted Edition), TMH publication.
7. PradipDey,ManasGhosh,Fundamentals of Computing and Programming in 'C' First Edition ,Oxford University Press(2009).
8. The C++ Programming Language ,4thEdition,BjarneStroustrup,Addison-Wesley Publishing Company(2013)

L	T	P	C
1	1	0	2

OBJECTIVE:

- The students should be able to act with confidence, be clear about their own personality, character and future goals.

COURSE OUTCOMES:

- CO1-** To make students understand the concept and components of personality and thereby to apply the acquired knowledge to themselves and mould their personality.
- CO2-** To impart training for positive thinking, this will keep the students in a good stead to face the challenges.
- CO3-** To bring out creativity and other latent talents with proper goal setting so that self-esteem gets enhanced.
- CO4-** To develop an individual style and sharpen the skills in the area of leadership, decision making, time management and conflict management.
- CO5-** To sharpen the employability skills of the professional undergraduate students and aid them in landing in the desired job.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M									
CO2		S			W							
CO3							M					
CO4			M				S					
CO5		S							M			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I Introduction to Personality Development**9**

The concept personality - Dimensions of personality –Theories of Freud & Erickson- Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is

failure - Causes of failure. SWOT analyses.

UNIT II Attitude & Motivation

9

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

UNIT III Self-esteem

9

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

UNIT IV Other Aspects of Personality Development

9

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

UNIT V Employability Quotient

9

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

Total No. of Periods: 45

Text Books:

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

Reference Books:

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

BBT101**BIOLOGY FOR ENGINEERS**

L	T	P	C
2	0	0	2

OBJECTIVE

- To provide a basic understanding of cell, its structure, function, types and about its culture

COURSE OUTCOMES:**CO1-** To understand the fundamentals of the structure of cells**CO2-** To study the types and functions of cell organelles**CO3-** To comprehend the methods involved in the cellular transport**CO4-** To know the cause, and methods of cell signaling**CO5-** To Finally to give a basic knowledge of cell culture and its applications**CO/PO Mapping****S – Strong, M – Medium, W – Weak**

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S										S	
CO2			S		M							
CO3		M		S			S					
CO4				W								
CO5	S	M				S					M	

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I Cell Structure**6**

Cells-definition, Eukaryotic cell and prokaryotic cell – differences and key organelles, Relationship and evolution of Eukaryotic cell and prokaryotic cell, plant cells and animal cells– differences and general structure- Cellular environment, tissues, various types of cell, Extra cellular matrix, cytoskeletal proteins, Cell cycle-Mitosis and meiosis

UNITII Cell Organelles**6**

Cell Organelles and function – Nucleus, Cytoplasm, Endoplasmic reticulum, Golgi complex, lysosomes, cell membranes, chloroplast, mitochondria – structure, importance and function

UNIT III Cellular Transport**6**

Transport across cell membranes – importance, classification – Active and passive, passive transport – movement of water, small lipid across membrane. Active – Na⁺ K⁺ ATPase Pump, Lysosomal and Vacuolar pumps. Cotransport – Symport, antiport – examples, Endocytosis and Exocytosis transport across prokaryotic membrane, entry of viruses and toxins

UNITIV Cell Signaling And Signal Transduction**6**

Cell signaling – process importance, various kinds of Receptors and ligands – Examples, Different modes of action of ligands, Qualification and characterization of receptors, different modes of signal transduction and amplification with examples, signaling through G-Proteins (Monomeric and trimeric), signaling for growth factors, second messengers, protein kinases, Ca ions and cAMP molecule in signaling.

UNIT V Cell Culture**6**

Definition, Media preparation, Propagation of eukaryotic and prokaryotic cell, cell lines, primary cultures, stock cell cultures, maintenance of cell lines in cell culture, explants cultures, differentiation and contamination

Total No.of Periods: 30**Text books:**

1. P.K. Gupta, “Cell and Molecular Biology”, Rastogi Publication, 2003
2. Molecular Biology of the Cell, Bruce Albert et al., Taylor and Francis, 2002

Reference books:

3. Molecular Biology of the Cell, Baltimore, Damell J., Lodish, H. Baltimore, D., Freeman Publications, 2003
4. The Cell, T. Cooper, John Wiley and Sons, 2005
5. Cytology, Verma and Aggarwal, S. Chand Publications, 2003

BME101 ENGINEERING GRAPHICS- E**OBJECTIVES**

L	T	P	C
2	3	0	3

- To visualize and produce two dimensional graphic representation of three dimensional objects and buildings.
- To comprehend and visualize 3D views of objects.
- To understand and generate the different curves used in engineering applications.
- To introduce the fundamental of CAD Graphics used in design.

- To visualize interior portions of object and also to draw the surfaces necessary for producing prisms, pyramids, cone, tray, duct etc.,

COURSE OUTCOMES:

- CO1:** Student Ability of visualization will increase.
- CO2:** Student will understand and develop different engineering curves.
- CO3:** Student will understand the application of computer in graphics.
- CO4:** Will understand the surface necessary for producing different solids
- CO5:** Understand the importance of graphical representations of engineering components .
- CO5:** They will get a clear idea abt LSRW(Listening, Speaking , Reading , Writing)

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S								W			
CO2		W	S		M					W		
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey
Seminar	Industry
Quiz	Alumni
Online Test	
End Semester Examination	

UNIT-I Basic Curves, Projection of points and Straight lines 6+6

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

UNIT-II Projections of Planes and solids 6+6

Projection of planes (Polygonal and circular surfaces) inclined to both the principal planes. Projection of simple solids like prisms, pyramids, cylinder, cone, tetrahedran and truncated solids

when the axis is inclined to one of the principal planes/ both principal planes by rotating object method and auxiliary plane method.

UNIT-III Orthographic Projections, Isometric projections & Free hand sketching 6+6

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

UNIT-IV Projection of Sectioned solids and development of surfaces 6+6

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

UNIT-V Perspective projection, building drawing and Computer aided drafting 6+6

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

Total: 60 Periods

Text Books:

1. N.D.Bhatt and V.M.Panchal, "Engineering drawing", charotar publishing house, 50th edition, 2010.
2. K.V.Natarajan "A Text book of Engineering Graphics",Dhanalakshmi Publishers, Chennai, 2009.

References:

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

1. Special points applicable to University Examinations on Engineering Graphics
 - a) There will be five questions, each of either or type covering all units of the syllabus.
 - b) All questions will carry equal marks of 20 each making a total of 100.

L	T	P	C
2	0	0	2

OBJECTIVE:

- To impart basic knowledge on mechanical engineering required for all branches of engineering students.

COURSE OUTCOMES:

- CO1-** To provide basic knowledge regarding various power plants.
- CO2-** To provide basic knowledge of I.C engines, Refrigeration and Air- Conditioning.
- CO3-** To provide basic Knowledge of basic manufacturing process.
- CO4-** To provide basic knowledge of mechanical design required for engineering.
- CO5-** To know about design soft wares

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S				M						
CO2									W			
CO3		M			S							M
CO4	S							M				
CO5				M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT-I Energy Resources and Power Generation**6**

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

UNIT-II IC Engines**6**

Classification, Working principles of petrol and diesel engines- two stroke and four stroke

cycles, functions of main components of I.C engine. Alternate fuels and emission control.

UNIT-III Refrigeration and Air-Conditioning System

6

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

UNIT-IV Manufacturing Processes

6

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

UNIT-V Mechanical Design

6

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

Total No. of Periods: 30

Text books:

1. T.J.Prabhu et al , “Basic Mechanical Engineering“ , Scitech Publications(p) Ltd, 2000

References :

2. NAGPAL, G.R, “Power plant Engineering”, Khanna Publishers, 2004.
3. RAO.P.N, “Manufacturing Technology”, Tata McGraw-Hill Education, 2000.
4. Kalpakjian, “Manufacturing Engineering and Technology”, Adisso Wesley publishers, 1995.
5. Ganesan. V, “Internal combustion engines”, Tata McGraw-Hill Education, 2000.
6. C.P.Arora, “Refrigeration and Air Conditioning”, Tata McGraw-Hill Education, 2001.
7. V.B.Bhandari, ”Design of Machine elements”, Tata McGraw-Hill Education, 2010.

**BCM1L1 BASIC CIVIL & MECHANICAL ENGINEERING
PRACTICES LABORATORY**

L	T	P	C
0	0	3	1

OBJECTIVE

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

COURSE OUTCOMES

- CO1-** To provide hands on exercises in common plumbing and carpentry works associated with residential and industrial buildings.
- CO2-** To expose the students regarding pipe connection for pumps & turbines and to study the joint used in roofs, doors, windows and furnitures.
- CO3-** To provide hands on exercise on basic welding, machining and sheet metal works.
- CO4-** To provide exposure regarding smithy, foundry operations and in latest welding operations such as TIG, MIG, CO2, spot welding etc.,
- CO5-** To expose the students regarding the construction and working of centrifugal pump, air-conditioner and lathe.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		M			M					M	
CO2												
CO3		S		W				M			S	
CO4	M											
CO5			M				W			S		

Course Assessment Methods:

Direct		Indirect	
Observation Book	1	Course and Survey	
Record Book	2	Faculty Survey	
Model Examination	3	Industry	
	4	Alumni	
End Semester Examinations			

I. CIVIL ENGINEERING PRACTICE

Buildings:

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

Plumbing Works:

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

Carpentry using Hand tools and Power tools:

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

II MECHANICAL ENGINEERING PRACTICE

Welding:

Preparation of butt joints, lap joints and tee joints by arc welding.

Basic Machining:

- a) Simple Turning and Taper turning
- b) Drilling Practice

Sheet Metal Work:

- a) Forming & Bending:
- b) Model making – Trays, funnels, etc.
- c) Different type of joints.
- d) Preparation of air-conditioning ducts.

Machine assembly practice:

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

Moulding:

Moulding operations like mould preparation for gear and step cone pulley etc.,

Fitting:

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

Demonstration:

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

Total No. of Periods: 45

References:

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

BPC1L1 PHYSICS AND CHEMISTRY LABORATORY

L	T	P	C
0	0	3	0

OBJECTIVE:

- To give basic knowledge on physics and chemistry experiments

COURSE OUTCOMES:

- CO1** - To Know about Ultrasonics and its application in NDT.
CO2 - To Know the principle of Laser and its application in Engineering and medicine.
CO3 – Having a deep knowledge about the Principles of electrochemistry
CO4 – With a true wisdom about Corrosion
CO5 - Having a sound knowledge in the Field of the Conventional and non- conventional energy

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2			S		M							
CO3		M		S								
CO4	S		M	W								
CO5					W							

Course Assessment Methods:

Direct		Indirect	
1	Observation Book	1	Course and Survey
2	Record Book	2	Faculty Survey
3	Model Examination	3	Industry
4	End Semester Examinations	4	Alumni

I - LIST OF EXPERIMENTS – PHYSICS

- Determination of particle size using laser
- Determination of wavelength of laser light
- Determination of numerical aperture and acceptance angle of an optical fiber
- Study of photo electric effect
- Determination of velocity of sound and compressibility of liquid-ultrasonic interferometer
- Determination of wave lengths of mercury spectrum - spectrometer grating

II - LIST OF EXPERIMENTS – CHEMISTRY

1. Estimation of hardness of Water by EDTA
2. Estimation of Copper in brass by EDTA
3. Determination of DO in **water (Winkler's method)**
4. Estimation of Chloride in Water sample (Argento metry)
5. Estimation of alkalinity of Water sample
6. Determination of molecular weight and degree of polymerization using Viscometer.

BEN 201

ENGLISH II

L	T	P	C
3	1	0	3

OBJECTIVE

- To make the students learn the basics of communication in order to talk fluently , confidently and vividly.
- To make them master the techniques of professional communication so that they become employable after completing the course

COURSE OUTCOMES

CO1- To make them master the techniques of professional communication

CO2- To know about E-mail communication

CO3- To understand about comparison studies

CO4- To improve presentation skill

CO5- To know about marking the stress Connectives

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2			S		M							
CO3		M		S								
CO4				W								
CO5	S	M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		

UNIT I Orientation**12**

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

UNIT II Oral Skill**12**

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

UNIT III Thinking Skill**12**

Self- introduction - Describing things- Group Discussion – Debate - Role play – Telephone etiquette – Recommendations and suggestions- Sequencing jumbled sentences to make a paragraph advertisement and notices, designing or drafting posters, writing formal and informal invitations and replies.

UNIT IV Writing Skill**12**

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

UNIT V Formal Information**12**

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

Total No. Of Periods: 60**Text book:**

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

Reference books:

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

BMA 201 ENGINEERING MATHEMATICS – II

L	T	P	C
3	1	0	3

OBJECTIVE:

- To impart adequate knowledge of Mathematics to the students so as to formulate problems in engineering environment and solve them using mathematical tools.

COURSE OUTCOMES:

CO1- To solve differential equations, simultaneous linear equations, and some special types of linear equations related to engineering.

CO2- To deal with applications in a variety of fields namely fluid flow, heat flow, solid mechanics, electrostatics, etc.

CO3- To find intensity of degree of relationship between two variables and also bring out regression equations.

CO4- To know the applications integral theorem

CO5- To get basic idea about statistics

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									M		
CO2			S		M			W				
CO3		M		S				W				
CO4				W						M		
CO5	S	M				S				M		M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I ORDINARY DIFFERENTIAL EQUATION**12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Cauchy’s and Legendre’s linear equations - simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS**12**

Gradient, divergence and curl – Directional derivatives – Irrational and solenoidal vector fields – vector integration – Green’s theorem in a plane , Gauss divergence theorem and Stoke’s theorem (without proofs) – simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS

12

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

UNIT IV COMPLEX INTEGRATION

12

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

UNIT V STATISTICS

12

Mean , Median ,Mode – Moments – Skewness and Kurtosis – correlation – Rank Correlation – Regression –Chi Square Test – 2×2 , $M \times N$.

Total No. Of Periods: 60

Text book :

1. Gupta SC, and VK.Kapoor, “Fundamentals Mathematical Statistics”, 11th edition, Sultan Chand Sons, , New Delhi, 2014.[Unit V]
2. Bali.N.P and Manish Goyal , “ Engineering Mathematics “ , 3rd Edition , Laxmi Publications (p) ltd, 2008 .[Units I to IV]

References :

1. Ramana.B.V , “ Higher Engineering Mathematics “ , Tata McGraw Hill Publishing Company , New Delhi, 2007.
2. George B. Thomas and Ross L.Finney. “Calculus and Analytical Geometry” 9th Edn. Narosa Indian Student Edition, New Delhi.
3. Grewal .B.S “ Higher Engineering Mathematics” , 40th Editon , Khanna Publications , New Delhi , 2007 .
4. Douglas C.Montgomery, George C.Runger and Norma F.Hubele. “Engineering Statistics” 4th Edn. Wiley India Pvt Ltd. New Delhi-2. 2007.

**BPH 201
OBJECTIVES**

ENGINEERING PHYSICS – II

L	T	P	C
3	0	0	3

- To make a bridge between the physics in school and engineering courses.
- To expose the students to multiple areas of Science of Engineering materials which have direct relevance to different Engineering applications.

COURSE OUTCOMES

CO1 - To Know about properties and advancements of conducting materials .

CO2 - To Know the principle and properties semiconducting materials.

CO3 - Acquire Knowledge on magnetic and dielectric materials

CO4 – To Know about the creation of new materials with novel properties

CO5 – To Understand the impact of light in technical uses

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									M		
CO2			S		M			W				
CO3		M		S				W				
CO4				W						M		
CO5	S	M				S				M		M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I - CONDUCTING MATERIALS

9

Classical Free Electron Theory of Metals- Drawback of Classical Theory – Wiedemann Franz Law- Density of States- Fermi-Dirac Statistics- Calculation of Fermi Energy and Its Importance - High Resistivity Alloys – Super Conductors – Properties and Applications – Magnetic Levitation, SQUID, Cryotron.

UNIT II - SEMICONDUCTING MATERIALS

9

Elemental and Compound Semiconductors and their Properties- Carrier Concentrations (Electrons and Holes) in Intrinsic Semiconductors - Carrier Concentrations in N- Type and P- Type Semiconductors – Variation of Fermi Level with Carrier Concentration and Temperature - Variation of Conductivity with Temperature – Band Gap Determination – Hall Effect – Experimental Arrangement - Application.

UNIT III - MAGNETIC AND DIELECTRIC MATERIALS

9

Different Type of Magnetic Material And Their Properties – Hard And Soft Magnetic Material – Domain Theory Of Ferromagnetism – Hysteresis – Energy Product of Magnetic Materials – Ferrites and Their Applications – Various Polarization Mechanisms In Dielectric – Frequency and Temperature Dependence – Internal Field and Detection of Classius – Mosotti Equation – Dielectric Loss- Dielectric Breakdown.

UNIT IV - NEW ENGINEERING MATERIAL

9

Shape memory Alloys- Types- General Characteristics- Applications – Metallic Glasses- Properties- Applications –transformer as a Core Material – Nano Phase Materials – Properties – Production – Ball Milling Technique – Sol- Gel Method – Chemical Vapour Deposition - Applications.

UNIT V - OPTICAL MATERIALS & OPTIC FIBERS

9

Light Interaction With Solids- Classification of Optical Material – Optical Properties of Metals, Insulator And Semiconductors – Traps – Colour Centers – Luminescence – phosphorescence – LED – LCD – Construction and Working – Advantages and Disadvantages – Applications. Principle and Propagation of Light In Optical Fibres- Numerical Aperture And Acceptance Angle- Types Optical Fibre(Material, Refractive Index, Mode)- Double Crucible Technique of Fibre Drawing

Total No. of Periods:45

Text Books

1. Avadhanulu. M.N.; Engineering Physics - II; S.Chand And Company Ltd, 2010.
2. Jeyaraman, D. 'Engineering Physics – II' Global Publishing House, 2014

Reference Books

3. Rajendran V and Marikani a, 'material science' tata mcgraw hill publications Ltd, 3rd edition
4. Mukunthan .A., Usha.S.; science of engineering materials; SciTech publications (india) Pvt Ltd; chennai, (2007).\\
5. M.Arumugam, 'material science', anuradha publications, kumbakonam (2006).

BCH 201

ENGINEERING CHEMISTRY – II

OBJECTIVES

- To impart a sound knowledge about the industrial applications of surface

L	T	P	C
3	0	0	3

chemistry

- To make them understand the industrial importance of Phase rule and alloys
- The lectures are to be given in such a way as to make the students to be well versed with Analytical techniques and their importance
- To impart knowledge to the Students about the Chemistry of engineering materials and
- To make the students to have a deep knowledge of the Chemistry of Fuels and combustion

COURSE OUTCOMES :

CO1 – Having a knowledge of industrial applications of Surface Chemistry

CO2– Having the thinking of industrial importance of Phase rule and alloys

CO3 – Having a deep knowledge with Analytical techniques and their importance

CO4 – With a true wisdom about Chemistry of Engineering materials

CO5 - Having a well-versed knowledge of the Chemistry of Fuels and Combustion

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									M		
CO2			S		M							
CO3		M		S								
CO4				W								
CO5	S	M				S						

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT I - SURFACE CHEMISTRY

9

INTRODUCTION :

Adsorption , absorption , desorption , adsorbent , adsorbate and sorption – (definition only) -

Differences between adsorption and absorption

Adsorption of gases on solids – factors affecting adsorption of gases on solids –

Adsorption isotherms – Freundlich adsorption isotherm and Langmuir adsorption isotherm

Role of adsorbents in catalysis (in heterogeneous catalysis ,
Ion-exchange adsorption and pollution abatement.

UNIT II - PHASE RULE AND ALLOYS

9

INTRODUCTION :

Statement of Phase Rule and explanation of terms involved – one component system – water system – Construction of phase diagram by thermal analysis - Condensed phase rule [Definition only]

Two Component System : Simple eutectic systems (lead-silver system only) – eutectic temperature – eutectic composition – Pattinsons Process of desilverisation of Lead

Alloys :

Importance, ferrous alloys – nichrome and stainless steel – 18/8 stainless steel -heat treatment of steel – annealing –hardening – tempering - normalizing – carburizing - nitriding .

Non- ferrous alloys: Brass and Bronze

UNIT III - ANALYTICAL TECHNIQUES

9

INTRODUCTION:

Types of spectroscopy - Atomic spectroscopy – molecular spectroscopy – Explanation – differences between Atomic spectra – molecular spectra

Absorption spectrum and Emission spectrum

Photo physical laws - Lambert's law - Beer-Lambert's law –applications (determination of unknown concentration)

IR spectroscopy

Principle – instrumentation (block diagram only) – working - finger print region

UV-visible spectroscopy

Principle – instrumentation (block diagram only) – working – estimation of iron by colorimetry

Beer-Lambert's law

Flame photometry– principles – instrumentation (block diagram only) – working - estimation of sodium ion by Flame photometry

UNIT IV - FUELS

9

INTRODUCTION :

Calorific value – types of Calorific value - gross calorific value – net calorific value

Analysis of Coal – Proximate and ultimate analysis – hydrogenation of coal - Metallurgical coke – manufacture by Otto-Hoffmann method

Petroleum processing and fractions – cracking – catalytic cracking – types – fixed bed catalytic cracking method- Octane number and Cetane number (definition only)

Synthetic petrol – Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG (definition and composition only)

Flue gas analysis – importance - Orsat apparatus

UNIT V - ENGINEERING MATERIALS

9

INTRODUCTION :

Refractories ;

Definition - characteristics - classification – acidic, basic and neutral Refractories – properties - refractoriness- measurement of refractoriness (Segar Cone Test) ,refractoriness under load measurement of refractoriness under load , dimensional stability- reversible and irreversible dimension stability - porosity, thermal spalling – definition – reason for spalling – points to decrease the spalling)

Manufacture of Refractories : alumina bricks and Magnesite bricks,

Lubricants :

Characteristics - Classification - Liquid lubricants - Properties – viscosity index (definition , determination), flash and fire points, cloud and pour points, oiliness)

Solid lubricants – graphite and molybdenum sulphide

Total No. of Periods: 45

Text books:

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

References:

4. B.K.Sharma “Engineering Chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2001).
5. Sivasankar “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

BFR101/201

FRENCH

OBJECTIVE

L	T	P	C
0	0	3	1

The Basic Course in French is designed to :

- Introduce the basics of the language to beginners
- To develop their knowledge as well as their communicative skills so as to be able to respond in simple everyday contexts.

Synchronies I consists of 13 lessons with each lesson presenting a dialogue and giving the know-how, grammatical and lexical notions as well as activities required for communication. In

addition, Synchronies I includes documents which initiate the learners to another world, another culture and which acclimatize them to the authentic use of the French language through the exploitation of written and iconographic documents. The Indian context has been used.

COURSE OBJECTIVE :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.

CO2: Will able to read and write a foreign language.

CO3: Will get sufficient exposure for developing basic conversational skills.

CO4: Will impart knowledge on foreign lifestyle.

CO5: Will gain confidence to survive in global environment.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey
Seminar	Industry
Quiz	Alumni
Online Test	
End Semester Examination	

UNIT – I: 9

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

UNIT – II 9

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

UNIT – III 9

At the café: Savoir –faire: speaking about one’s likes, giving information, expressing admiration,

asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

UNIT – IV

9

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

UNIT – V

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

UNIT – VI

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

Total: 45 hours

REFERENCES:

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

BGM 101/ 201

GERMAN

L	T	P	C
0	0	3	1

OBJECTIVES:

- At the end of this course, students shall be able to obtain good knowledge of the language, to read, write and speak German, whereby the emphasis is laid on speech.
- At the end of the first course, the students are in the position to communicate in a basic manner.
- An example of their skills would be:
 - Ordering food in a restaurant
 - Expressing their likes and dislikes
 - Going for shopping
 - Booking a room in a hotel
 - Or even making complaints where ever necessary.

Course Objective :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.

CO2: Will able to read and write a foreign language.

CO3: Will get sufficient exposure for developing basic conversational skills.

CO4: Will impart knowledge on foreign lifestyle.

CO5: Will gain confidence to survive in global environment.

CO5: Will gain confidence to survive in global environment.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S					S						
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W		S						
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey
Seminar	Industry
Quiz	Alumni

Course structure:

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

UNIT I 9

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

UNIT II 9

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

UNIT III 9

Addresses, Occupations, Studies - Grammar - ‘to be’, the definite/indefinite articles, individual Training

UNIT IV 9

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

UNIT V

9

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

Total 45 Hours

Resources:

1. Sprachkurs Deutsch 1 (Verlag Diesterweg), New Delhi Learning Centre
- 2.

BJP 101/201

JAPANESE

L	T	P	C
0	0	3	1

OBJECTIVE:

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

Course Objective :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.

CO2: Will able to read and write a foreign language.

CO3: Will get sufficient exposure for developing basic conversational skills.

CO4: Will impart knowledge on foreign lifestyle.

CO5: Will gain confidence to survive in global environment.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey

Seminar	Industry
Quiz	Alumni

UNIT I **9**

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

UNIT II **9**

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

UNIT III **9**

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

UNIT IV **9**

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

UNIT V **9**

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

Total: 45 Periods

Text books

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

Reference Books

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

BKR 101/201
OBJECTIVE:

KOREAN

L	T	P	C
0	0	3	1

- Learning a language is almost akin to a journey of discovery. It not only opens up a whole new dimension but also contributes significantly to the development of an individual's intelligence. Language gives us access and insights into another culture.
- It is a fundamental truth that cultures define themselves through languages. Since language is a symbol of culture, the curriculum for all the languages reflects this spirit. To give students some proficiency in the foreign languages like Korean

COURSE OUTCOME:

Upon completion of the course, students should be able to manage conversation, reading and writing on the topics related to:

- Holiday and travel
- Shopping
- Feelings, advice and introductions
- Hobbies and job requirements
- Plans and preparations
- Appointments and requests
- Ordering for food, rooms and houses

COURSE OBJECTIVE :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.

CO2: Will able to read and write a foreign language.

CO3: Will get sufficient exposure for developing basic conversational skills.

CO4: Will impart knowledge on foreign lifestyle.

CO5: Will gain confidence to survive in global environment.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey
Seminar	Industry
Quiz	Alumni

UNIT I**9**

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

UNIT II**9**

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

UNIT III**9**

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

UNIT IV**9**

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

UNIT V**9**

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

Total: 45 Periods**Course Material:**

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

BCN 101/201**CHINESE**

L	T	P	C
0	0	3	1

OBJECTIVE:

- To enhance the students use this language in day today conversations with ease and confidence.

Course Objective :

CO1: Will have a basic knowledge on Foreign Languages, foreign culture and heritage.

CO2: Will able to read and write a foreign language.

CO3: Will get sufficient exposure for developing basic conversational skills.

CO4: Will impart knowledge on foreign lifestyle.

CO5: Will gain confidence to survive in global environment.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Method

Direct	Indirect
Internal Test	Student Exit Survey
Assignments	Faculty Survey
Seminar	Industry
Quiz	Alumni

UNIT-1 **9**
 History, Origins, Old and middle Chinese, Rise of northern dialects

UNIT-II **9**
 Influences three Varieties of Chinese - Classification - Standard Chinese and diglossia - Nomenclature

UNIT-III **9**
 Chinese characters, Homophones, Phonology

UNIT-IV **9**
 Tones, Phonetic transcriptions, Romanization, Other phonetic transcriptions

UNIT-V **9**
 Grammar and morphology, Vocabulary, Loanwords, Modern borrowings and loanwords

Total: 45 Periods

REFERENCES:

- Hannas, William C. (1997), Asia's Orthographic Dilemma, University of Hawaii Press, ISBN HYPERLINK "<http://en.wikipedia.org/wiki/Special:BookSources/978-0-8248-1892-0>" 978-0-8248- 1892-0.
- Qiu, Xigui (2000), Chinese Writing, trans. Gilbert Louis Mattos and Jerry Norman,

Society for the Study of Early China and Institute of East Asian Studies, University of California, Berkeley,

3. Ramsey, S. Robert (1987), The Languages of China, Princeton University Press,
4. Schuessler, Axel (2007), ABC Etymological Dictionary of Old Chinese, Honolulu: University of Hawaii Press,
5. R. L. G. " Language borrowing Why so little Chinese in English?" The Economist. June 6, 2013

BME 203

ENGINEERING MECHANICS

L	T	P	C
3	1	0	4

OBJECTIVE:

- The vectorial and scalar representation of forces and moments
- Static equilibrium of particles and rigid bodies in two dimensions
- Physical properties of surfaces and solids
- Effect of friction on equilibrium and their application
- Principle of work and energy
- The laws and kinematics of motion of particles and rigid bodies

COURSE OUTCOMES:

- CO1:** Students will gain knowledge regarding the various laws and principles associated with statics and dynamics statics and to apply them for practical solutions.
- CO2:** Students will gain knowledge regarding center of gravity and momenta inertia and apply them for practical problems.
- CO3:** Students will gain knowledge regarding various types of forces and reactions and to draw free body diagram to quicker solutions for complicated problems.
- CO4:** Student will gain knowledge in work and energy
- CO5:** Student will gain knowledge on friction on equilibrium and its application.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5		W	W									

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT – I Basics and Statics Of Particles**12**

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

UNIT – II Equilibrium of Rigid Bodies**12**

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

UNIT – III Properties of Surfaces and Solids**12**

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

UNIT – IV Friction**12**

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

UNIT – V Dynamics Of Particles**12**

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

Total No. of Classes : 60

TEXT BOOK:

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

REFERENCES :

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

BEE201 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

OBJECTIVE:

- To get basic knowledge about electrical and electronics engineering

L	T	P	C
2	0	0	2

COURSE OUTCOMES:

- CO1-** To know about basics about circuits
- CO2-** To get idea about electrical machines and its working principle
- CO3-** To understand about measurement systems
- CO4-** To know about semi conductor devices
- CO5-** To get knowledge about digital electronics

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									M		
CO2			S		M			W				
CO3		M		S				W				
CO4				W						M		
CO5	S	M				S				M		M

Course Assessment Methods:

Direct	Indirect
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1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Quiz	4	Alumni
5	Online test		
6	End Semester Examinations		

UNIT – I D.C. AND A.C CIRCUITS

6

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

UNIT – II ELECTRICAL MACHINES

6

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

UNIT – III BASIC MEASUREMENT SYSTEMS

6

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

UNIT IV – SEMICONDUCTOR DEVICES

6

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

UNIT V – DIGITAL ELECTRONICS

6

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

Total No. of Periods: 30

Text books:

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

Reference books:

4. Edminister J.A. “Theory and problems of Electric Circuits” Schaum's Outline Series. McGraw Hill Book Company, 2nd Edition, 1983

5. Hyatt W.H and Kemmerly J.E. "Engineering Circuit Analysis", McGraw Hill International Editions, 1993.
6. D. P. Kothari and I. J. Nagrath "Electric machines" Tata McGraw-Hill Education, 2004
Millman and Halkias, "Integrated Electronics", Tata McGraw Hill Edition, 2004.

BCS 2L2 COMPUTER PRACTICE LABORATORY

L	T	P	C
0	0	3	1

OBJECTIVE:

- To get knowledge about computer practices

COURSE OUTCOMES:

- CO1-** To know about word processing
- CO2-** To know about spread sheet
- CO3-** To get idea about C programming
- CO4-** To get knowledge on C++ programmes
- CO5-** To know the fundamentals of computer programme

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M						S					
CO2			S		M							
CO3				S								
CO4	S		M									
CO5		S			W							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

LIST OF EXERCISES

A)Word Processing

11

Document creation, Text manipulation with Scientific Notations.

Table creation, Table formatting and Conversion.

Mail merge and Letter Preparation.

Drawing-Flow Chart

B)Spread Sheet

12

Chart – Line,XY, Bar and Pie

Formula – Formula Editor

Spread Sheet-Inclusion of Object , Picture and Graphics, Protecting the document and sheet
Sorting and Import / Export features.

C)Simple C Programming *

11

Data types, Expression Evaluation, Condition Statements.

Arrays

Structures and Unions

Functions

D)Simple C++ Programming

11

Classes and Objects

Constructor and Destructor

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

Total No. of Periods: 45

**BEE2L1 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
PRACTICES LAB**

L	T	P	C
0	0	3	1

OBJECTIVE:

- To get basic knowledge about electrical and electronics engineering lab practices

COURSE OUTCOMES:

CO1- to know about basics about circuits

CO2- to get idea about electrical machines and its working principle

CO3- to understand about measurement systems

CO4- to know about semi conductor devices

CO5- to get knowledge about digital electronics

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S						

CO2			S		M							
CO3		M		S								
CO4	S		M									
CO5		M			W							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

List of Experiments for Electrical Engineering Lab

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

List of Experiments for Electronics Engineering Lab

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

Total No. of Periods: 45

BPC 2L1 PHYSICS AND CHEMISTRY LABORATORY

OBJECTIVE:

- To give basic knowledge on physics and chemistry experiments

COURSE OUTCOMES:

- CO1** - To know about Ultrasonic and its application in NDT.
- CO2** - To know the principle of Laser and its application in Engineering and medicine.
- CO3** – Having a deep knowledge about the Principles of electrochemistry

L	T	P	C
0	0	3	1

CO4 – With a true wisdom about Corrosion

CO5 - Having a sound knowledge in the Field of the Conventional and non- conventional energy .

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2			S		M					S		
CO3		M		S								
CO4	S		M	W				M				
CO5					W							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

I - LIST OF EXPERIMENTS – PHYSICS

1. Determination of resistivity of high resistance alloys and temperature coefficient
2. Study of Hall effect – Hall coefficient determination
3. Determination of electrical conductivity of good conductors
4. Study of magnetic hysteresis and energy product
5. Determination of Band gap of a semiconductor
6. Determination of Dispersive power of a prism – Spectrometer

II - LIST OF EXPERIMENTS – CHEMISTRY

1. Conducto metric titration (Simple acid base)
2. Conducto metric titration (Mixture of weak and strong acids)
3. Conducto metric titration using BaCl_2 vs Na_2SO_4
4. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper Sulphate)
7. Estimation of Ferric iron by spectrophotometer.

BMA301**MATHEMATICS – III**

L	T	P	C
3	1	0	3

OBJECTIVE

- To introduce Fourier series analysis this 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
- To develop Z transform techniques for discrete time systems.

COURSE OUTCOMES

CO01: To learn the problem solving methods in linear differential equations

CO02: To learn Dirichlet's condition and operations using Fourier series

CO03: To have a clear understanding about 2nd order equations and wave equations

CO04: Properties of Laplace transform and problem solving using it

CO05: Properties of Fourier transform and problem solving using it

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2		W	S		M							
CO3		M		S								
CO4	S		M	W								
CO5	M			S	M							

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT – 1**PARTIAL DIFFERENTIAL EQUATIONS**

12

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

UNIT –II**FOURIER SERIES**

12

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

UNIT – III**BOUNDARY VALUE PROBLEMS**

12

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

UNIT IV**LAPLACE TRANSFORMS**

12

Transforms of simple functions – basic operational properties – transforms of derivatives and integrals – initial and final value theorems – inverse transforms – convolution theorem – periodic functions – applications of Laplace transforms for solving linear ordinary differential equation up to second order with constant coefficients and simultaneous equations of first order with constant coefficients.

UNIT – V**FOURIER TRANSFORMS**

12

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

T= 15, L = 45 TOTAL: 60 PERIODS

TEXT BOOKS:

1. Kandasamy, P., Thilakavathy, K. And Gunavathy.K. “Engineering Mathematics “, Vol II & III (4th revised edition) S Chand and co. , New Delhi, 2001.
2. Narayanan.S , Manicavachangam pillay .,T.K., Ramanaiah, G. “ Advanced Mathematics for Engineering Students “, Vol II & III (2nd Edition), S.Viswanathan (Printers and publishers pvt ltd) 1992.
3. Venkatraman, M.K. “ Engineering mathematics” Vol III – A&B , 13th edition National publishing company , Chennai 2002

BCE301**APPLIED MECHANICS****OBJECTIVES:**

- To learn fundamental concepts of Stress, Strain and deformation of

L	T	P	C
3	1	0	4

solids with applications to bars, beams 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

CO01: To apply the fundamental concepts of stress and strain in the design of various structural components and machines

CO02: To analyze and design shafts to transmit required power

CO03: To analyze about the force in member Truss with different methods

CO04: To determine the bending, shear stresses and deflection produced in a beam subjected to system of loads

CO05: To determine stresses due to impact and suddenly applied loads

CO/PO MAPPING

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		M	M					M			
CO2	S		M	M					M			
CO3	S		M	M					M			
CO4	S		M	M					M			
CO5	S		M	M					M			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Simple Stresses and Strains

9

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

UNIT II

Principal Stresses& Torsion

9

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

UNIT III

Analysis of Plane Trusses

9

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

UNIT IV

Beams & Bending

9

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

UNIT V

Strain Energy

9

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

Total No. of Periods: 45

Text Books:

1. Ramamurtham S & Narayanan R, Strength of Materials , Dhanpat Rai Publication 2008.

Reference:

1. Egor P, Popov, Introduction of Mechanics of Solids,1998.
2. Ryder G.H. Strength of Materials, Macmillan India,2002.
3. Dr Bansal R.K, Engineering Mechanics and Strength of Materials, Laxmi Publications (P) Ltd. New Delhi 2010.
4. Khurmi R.S, A Text Book of Engineering Mechanics S.Chand& Co, 2012.
5. Srinath L S, Advanced Mechanics of Solids, Tata McGraw Hill Co, 2009.
6. Jain O.P. &.Jain B.K, Theory and Analysis of Structures Vol I & II 2012,2011

BCE302

SURVEYING – I

OBJECTIVE:

L	T	P	C
3	0	0	3

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

COURSE OUTCOMES

CO01: Carry out preliminary surveying in the field of civil engineering applications.

CO02: Plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse using various conventional instruments.

CO03: Plan a survey for applications such as road alignment and height of building.

CO04: Take horizontal and vertical angles precisely by an optical distance measurement using Theodolite.

CO05: Set out curves, buildings, culverts and tunnels.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M		M	S						M	
CO2		S			M							
CO3	S				S						S	M
CO4	S			M								
CO5					S						S	M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I INTRODUCTION AND CHAIN SURVEYING 9

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

UNIT II COMPASS & PLANE TABLE SURVEYING 9

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

UNIT III LEVELING APPLICATION 9

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

UNIT IV THEODOLITE SURVEYS 9

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

UNIT V ENGINEERING SURVEYS 9

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

Total No of Periods : 45

Text Books:

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

Reference:

2. Kanekar T.P.”Surveying and Levelling” VOls. I and II, united book corporation, pune, 1994.
3. Chandra A.M, “Plane Surveying and Higher Surveying”, New Age International (P) Limited, Publishers, Chennai, 2002.
4. Heribert Kahmen and wolfgang Faig “surveying” Walter de Gruyter, 1995
5. Bannister A and Raymonds. “Surveying” ELBS. Sixth Edition, 1992.

BCE303 BUILDING CONSTRUCTION

L	T	P	C
3	0	0	3

OBJECTIVE:

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

COURSE OUTCOMES

CO01: To learn about the different manufacturing process of the cement

CO02: To know the types of the paint, Plastering, GFRP and geotextile

CO03: To have a clear understanding about foundation and its type, Plate load test.

CO04: About Water supplying, and drainage in the construction site

CO05: To know about Thermal insulation, water proofing, sound acoustic treatments

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M		S	M	M		M	M	W		M
CO2	M		S	M	W	W			M			M
CO3		M	S	S				M	W	M		
CO4	S	W			S							
CO5	S		M	W	M			W	W	W		W

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Cement & Concrete

9

Manufacture of cement – Hydration of cement – Test on coarse and fine aggregates tests on cement, types of cement, tests on fresh & hardened concrete.

UNIT II

Preservatives & Special Materials

9

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

UNIT III

Substructures & Foundation

9

Soil Exploration - investigation report. Plate load test – Bearing Capacity of Soil – Improving the bearing Capacity – Types of Foundations – raft Foundation – pile, Pier & caisson- basements – diaphragm walls.

UNIT IV

Building Services - I

9

Electric Wiring – Water Supply – Drainage- Air Conditioning – Ventilation – ramps, Escalators, Lifts, Stairs.

UNIT V

Building Services II

9

Water Proofing - Thermal Insulation - Termite proofing - Acoustic Treatment (Sound Conditioning) - Fire Protection - Intelligent Buildings

Total No. of Periods: 45

Text Books:

1. Arora S.P.and Bindra S.P. “Building Construction, Planning Techniques and
2. Materials of Construction”. DhanapatRai and Sons.

Reference:

3. Chudley R “Construction Technology”, (Vol.I,II,III,&IV) ELBS / Longman (2nd Edition).
2. Jha J and Sinha S.K. “Construction and Foundation Engineering” Khanna Publishers, 1993.

BCE304

FLUID MECHANICS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.
- To introduce the basics of hydrostatic forces involved in fluid mechanics and also to acquaint the students to learn about the theorems on Pascal’s law and buoyancy
- To understand the various types of fluid flow and to practice the problems based on Bernoullis equations and its applications
- To provide basic ideas on the boundary layer theorem and its classification along with problems underlying the subjects.
- To develops similitude and model studies for the basics of fluid mechanics with buckingham pi theorem as the basic concept.

Course Outcomes

CO01: To learn about the basics of fluid mechanics and various properties of fluids

CO02: To learn about the various forces on plane and curved surfaces and the concepts of buoyancy

CO03: To have a clear understanding about fluid kinematics and dynamics

CO04: To study the basics of boundary layer flow and flow through pipes

CO05: To study about various models like distorted models and various dimensionless numbers

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M						W		
CO2						S		W			M	
CO3				S					M			
CO4						M			S	W		
CO5					M							S

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Definitions & Fluid Properties

9

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

UNIT II

Fluid Statics

9

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

UNIT III

Fluid Dynamics & Kinematics

9

Fluid Kinematics - Stream, streak and path lines, Classification of flows-continuity equation,
Stream and Potential functions, Flow nets, Velocity measurement. Euler and Bernoulli’s
equations- Application of Bernoulli’s equation-Discharge measurement-laminar flows through

pipes and between plates – Hagen Poisuille equation – Turbulent flow, DancyWeisbach formula - moody Diagram – Momentum Principle- Impact of jets on plane and curved plates.

UNIT IV

Boundary Layer and Flow through Pipes

9

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

UNIT V

Similitude and Model Study

9

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

Total No. of Periods: 45

Text Books:

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

References :

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

BCE305 ENGINEERING EARTH SCIENCE

L	T	P	C
3	0	0	3

OBJECTIVES:

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

engineering (i.e., design with earth materials); and discovery, development, and utilization of energy resources.

OUTCOMES:-

At the end of the course, the students would

C001: To understand the role of geology in the design and construction process of underground openings in rock.

C002: Be able to apply geologic concepts and approaches on rock engineering projects.

C003: Be able to identify and classify rock using basic geologic classification systems.

C004: Be able to use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.

C005: To assign projects which test student knowledge and application of intact rock and rock mass properties in geotechnical engineering.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			S		S	S		M			
CO2	S			S		S	S		M			
CO3	S			S		S	S		M			
CO4	S			S		S	S		M			
CO5	S			S		S	S		M			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

General Geology

9

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

UNIT II

Mineralogy

9

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

UNIT III

Petrology

9

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

UNIT IV

Structural Geology and Rock Mechanics

9

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

UNIT V

9

Geological and Geophysical Investigation in Civil Engineering

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE 3L1

SURVEYING PRACTICAL – 1

OBJECTIVES:

- To understand and posses the knowledge about field techniques in

L	T	P	C
0	0	4	2

Surveying

COURSE OUTCOMES

CO01: To know how to do chain surveying, ranging and its importance

CO02: Study about types of compass, local attractions and its errors

CO03: To study plane table surveying and its various methods of finding inaccessible points

CO04: To study about leveling and its types, LS and CS sections of alignment

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M									
CO2	M	S	M									
CO3	M	S	M									
CO4	M	S	M									

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

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

Total No. of Periods: 60

BCE3L2

STRENGTH OF MATERIALS LAB

OBJECTIVES:

- To expose the students to the testing of different materials under the

L	T	P	C
0	0	4	2

action of various forces and determination of their characteristics experimentally.

COURSE OUTCOMES

CO01: To study the failure due to tensile force subjected to a material

CO02: To study the failure due to shear force subjected to a material

CO03: To study hardness properties of materials and its types

CO04: To study impact intensity of materials and its properties

CO05: To study ductility properties of materials

CO06: To study fatigue properties of materials

CO07: To study the deflections in springs

CO08: To study the behavior of different types of columns

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	W	S			M							
CO2	W	S			M							
CO3	W	S			M							
CO4	W	S			M							
CO5	W	S			M							
CO6	W	S			M							
CO7	W	S			M							
CO8	W	S			M							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

I.TESTS ON STEEL

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

7. Fatigue Test.

II TESTS ON TIMBER:

Compression test both parallel and perpendicular to the grains, deflection

III OTHER TESTS:

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

Total No. of Periods: 60

References:

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

BMA402

NUMERICAL METHODS

L	T	P	C
3	1	0	4

OBJECTIVES:

This course aims at providing the necessary basic concepts of a few numerical methods and

give procedures for solving numerically different kinds of problems occurring in engineering and technology.

OUTCOMES:-

At the end of the course, the students would

CO01: Have a fundamental knowledge of the basic solutions of equations and eigen value problems.

CO02: Have a well-founded knowledge of standard numerical differentiation and integration which can describe real life phenomena.

CO03: Acquire skills in handling situations involving first and second order differential equations

CO04: Understand boundary value problems on ordinary and partial differential equations

CO05: Be able to analyze the interpolation techniques.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	S			M	S		M			M		M
CO2			M									
CO3	M			S						M		
CO4					S		S					
CO5	S									S		

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT-I SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS 12

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

UNIT-II INTERPOLATION (FINITE DIFFERENCES) 12

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

UNIT-III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

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

UNIT-IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

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

UNIT-V BOUNDARY VALUE PROBLEMS FOR ODE AND PDE 12

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

T = 15, L = 45 TOTAL: 60 PERIODS

REFERENCES:

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

BCE401 THEORY OF STRUCTURES

L	T	P	C
3	1	0	4

Objectives:

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

Course Outcomes:

CO01: To find the deflection in beams and frames using Energy theorems.

CO02: To analyze indeterminate beams like continuous beams and fixed beams

CO03: To analyze the long and short columns and determine the design loads.

CO04: To assess the state of stress in three dimensions

CO05: To solve problems involving unsymmetrical bending structural members

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		S	M								
CO2	M		S	M								
CO3	M		S	M								
CO4	M		S	M								
CO5	M		S	M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

Energy Theorem

9

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

UNIT II

Deflection of Beam

9

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

UNIT III

Statically Indeterminate Beams

9

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

UNIT IV

Theory of Columns

9

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

UNIT V

Thick Cylinders

9

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

DEFLECTION OF TRUSSES

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE402**SURVEYING – I I**

L	T	P	C
3	0	0	3

OBJECTIVE:

- This subject deals with geodetic measurements and Control Survey methodology and its adjustments. The student is also exposed to the Modern Surveying.

COURSE OUTCOMES

On completion of this course, the students will be able to

CO01: Have the fundamental knowledge to measure both horizontal distance and elevations without the use of sophisticated instruments.

CO02: Acquires knowledge about the principle of control surveying.

CO03: Have knowledge on the survey errors and its adjustments.

CO04: Have knowledge in the advanced topics in astronomy.

CO05: Have knowledge to modern methods of surveying like Photogrammetry, Total station, Hydrographic survey and cartography.

CO/PO MAPPING

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M								S
CO2	S				M							M
CO3	S			M								
CO4	S	M	M								M	
CO5	S				S						S	S

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I**Tacheometric Surveying****6**

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

UNIT II

Control Surveying

8

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

UNIT III

Survey Adjustments

8

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

UNIT IV

Astronomical Surveying

11

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

UNIT V

Miscellaneous

12

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

Total No. of Periods: 45

Text Books:

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

References:

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

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

BCE403

SOIL MECHANICS

L	T	P	C
3	0	0	3

OBJECTIVES:

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

Course Outcomes:

CO1: To carries out soil classification

CO2: To solve three phase system problems

CO3: To solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram.

CO4: To estimate the stresses under any system of foundation loads.

CO5: To solve practical problems related to consolidation settlement and time rate of settlement.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M		S								
CO2	S			S								
CO3				S								
CO4	M			M								
CO5		M		S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Introduction

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

UNIT II

Soil Water and Water Flow

8

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

UNIT III

Stress Distribution and Settlement

9

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

UNIT IV

Shear Strength

9

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

UNIT V

Slope Stability

9

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE404

BASIC STRUCTURAL DESIGN

L	T	P	C
3	1	0	4

OBJECTIVES:

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

COURSE OUTCOMES:

CO01: To study about different materials used in masonry

CO02: To analyse the steel structures.

CO03: To design of trusses and their members.

CO04: To carry out the analysis of simple beams

CO05: To study about different loading conditions on trusses.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	W		S	M								
CO2	W		S	M								
CO3	W		S	M								
CO4	W		S	M								
CO4	W		S	M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Masonry

8

Strength of bricks and masonry – Design of walls – Pillars and roofing as per the latest BIS codes. Timber Structures – Properties and strength of timber used in constructions – permissible

stresses in timber – design of joints, using bolts, and metal connections – design of tension and compression members – beams in bending.

UNIT II

Steel Structures

9

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

UNIT III

Tension Members

10

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

UNIT IV

Beams

9

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

UNIT V

Roof Trusses

9

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

Total No. of Periods: 45

Text Books:

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

References:

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

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

BCE405 TRANSPORTATION ENGINEERING

L	T	P	C
3	1	0	4

OBJECTIVES:

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

Course Outcomes:

CO01: To prepare the plan for highways as per IRC standards.

CO02: To perform geometric design of urban and rural roads

CO03: To design flexible and rigid pavements using IRC methods

CO04: To suggests modern materials and methods of highway construction.

CO05: To evaluate, carry out maintenance and strengthening of existing pavements.

CO/PO MAPPING

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3			S	S								
CO4			S	S								
CO5			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Highway Planning and Alignment

9

Highway Development in India, Macadam’s Method of Road Construction, Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of On-

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

UNIT II

Geometric Design of Highways

9

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

UNIT III

Design of Rigid and Flexible Pavements

9

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

UNIT IV

Highway Materials and Construction Practice

9

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

UNIT V

Highway Maintenance

9

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special

Repairs Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation Overlay Design by Benkleman Beam Method [Procedure only]

Total No. of Periods: 45

Text Books:

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

References:

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

BCE 406

ENVIRONMENTAL STUDIES

L	T	P	C
3	0	0	3

OBJECTIVES:

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

Course Outcomes

After successful completion of this course, the students should be able to

CO1 : Play an important role in transferring a healthy environment for future generations

CO2 : Analyze the impact of engineering solutions in a global and societal context

CO3: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems

CO4: Ability to consider issues of environment and sustainable development in his personal and professional undertakings

CO5: Highlight the importance of ecosystem and biodiversity

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						S	S					
CO2						S	S					
CO3							M					
CO4						W	M	W				
CO5	M					M	M					

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

The Multidisciplinary Nature of Environmental Studies

2

Definition, scope and importance, Need for public awareness.

Natural Resources: Renewable and Non – Renewable Resources

Natural resources and associated problems

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effect on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, flood, drought conflicts over water, dams-benefits and problems.

c) Mineral resources: Uses and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies.

f) Land resources: Land as a resource, Land degradation, man induced landslides, soil erosion and desertification

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

UNIT II

Ecosystems

6

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

UNIT III

Biodiversity and Its Conservation

8

Introduction and Definition - genetic, species and ecosystems diversity, Bio geographical classification of India - Value biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, national and local levels. India as a mega-diversity nation, Hot-spots of biodiversity -Threats to biodiversity, habitat, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation biodiversity - In-situ and Ex-situ conservation of biodiversity. Environmental Pollution Definition, Causes, effects and control measures of :- Air Pollution, Water pollution, Soil Pollution, Marine Pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster Management: floods earthquake, cyclone and landslides.

UNIT IV

Social Issues and The Environment

7

From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation - Ethics : Issues and possible Solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accident and holocaust, case studies, wasteland reclamation, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife protection Act, Forest Conservation Act, Issues involved in enforcement of environmental Legislation, public awareness.

UNIT V

Human Population and The Environment

6

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

Field Work

15

Visit to a local area to document environment environmental assets-river forest / grassland / hill mountain, Visit to a local polluted site-Rural/Industrial/Agricultural. Study of common plants, insects, birds, Study of simple ecosystems-ponds, river, hill slopes.

Total No. of Periods: 60

Text books:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.

References:

1. Bharucha Erach, "The Biodiversity of India", Mapin Publishing Pvt. Ltd., Ahmedabad India.2002
2. Trivedi R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, EnviroMedia 2009
3. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
4. Wager K.D. "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.
5. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", Techno Science Publications 2013
- 6.

BCE4L1**SURVEY PRACTICAL - II**

L	T	P	C
0	0	4	2

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Take angular and linear measurements using total station

CO2: Prepare contour maps for the given area

CO3: Field observation for the calculation of azimuth.

CO4: Determination of personal stereoscopic acuity in laboratory.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			S							
CO2		M			S							
CO3	S	M										
CO4					S							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey

2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

UNIT I

Tacheometry

Tangential system (using theodolite, leveling staff)

Stadia system (using theodolite, leveling staff)

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

UNIT II

Setting out Works

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)

UNIT IV

Electronic Surveying (Using Photogrammetry Accessories / Instruments)

Practicing fusion of stereo pairs of charts and photographs to get 3D

Use of pocket stereoscope and parallax bars

Determination of personal stereoscopic acuity in laboratory

Work on stereo test charts to access stereoscopic ability

Total No. of Periods: 60

BCE4L2

SOIL MECHANICS LABORATORY

OBJECTIVES:

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

L	T	P	C
0	0	4	2

COURSE OUTCOMES

CO01: To learn about the different type of soil according to their classification and their size distribution.

CO02: To determine the soil's property and their atterberg's limit.

CO03: To have a clear understanding about determining the optimum moisture content.

CO04 :About the compressive strength of the soil which is obtain from the site.

CO05 :To know about permeability of the soil, consolidate test on the soil.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M	S	M							
CO2	S	W	S									
CO3			M	S								
CO4	S											
CO5			M	W								

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

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

Total No. of Periods: 60

References:

1. " Soil Engineering Laboratory Instruction Manual ", Published by the Engineering CollegeCo-operatiave Society, Chennai,
2. Lambe T.W., "Soil Testing for Engineers ", John Wiley and Sons, New York, 1990.
3. "I.S.Code of Practice (2720) Relevant Parts ", as amended from time to time.
- 4.

BCE501 STRUCTURAL ANALYSIS – I

L	T	P	C
3	1	0	4

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Analyze the pin jointed plane frames using energy and consistent deformation method

CO2: Analyze indeterminate structures using various classical methods.

CO3: Determine absolute maximum bending moment and shear force in beams due to moving loads.

CO4: Find the maximum moment, shear and stresses produced in arches due to external loads temperature effects and support settlements.

CO5: To find the influence line diagram for determinate structures.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		M	S								
CO2	M		M	S								
CO3	M		M	S								
CO4	M		M	S								
CO5	M		M	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I**Indeterminate Analysis****10**

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

UNIT II**Slope Deflection Method****8**

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

UNIT III

Moment Distribution Method

9

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

UNIT IV

Rolling Loads

8

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

UNIT V

Influence Line Diagrams

10

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

Total No. of Periods: 60

Text Book:

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

Reference:

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

BCE502

APPLIED HYDRAULIC ENGINEERING

OBJECTIVES:

L	T	P	C
3	0	0	3

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

OUTCOMES:-

At the end of the course, the students would

CO01: Be able to apply their knowledge of fluid mechanics in addressing problems in open channels.

CO02: They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.

CO03: They will have knowledge in hydraulic machineries (Turbines)

CO04: Acquire skills in rotodynamic machineries that will help in their day-to-day-life.

CO05: Acquire skills in Reciprocal pumps.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	W	S	S							S
CO2	S	M	W	S	S							S
CO3	S	M	W	S	S							M
CO4	S	M	W	S	S							M
CO5	S	M	W	S	S							M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Open Channel Flow

9

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

UNIT II

Varied Flow

9

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

UNIT III

Turbines**9**

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

UNIT IV**Pumps****9**

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

UNIT V**Reciprocating Pumps****9**

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

Total No. of Periods: 45**Text Book:**

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

Reference:

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

BCE503**FOUNDATION ENGINEERING****OBJECTIVES:**

L	T	P	C
3	0	0	3

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Select type of foundation required for the given soil condition.

CO2: Determine the settlement of the foundation on different types of soil

CO3: Find the dimensions of the foundation for isolated footing, combined footing and floating foundation

CO4: Analyze the group of piles for their load capacity

CO5: Carry out stability analysis of retaining walls.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3	W		S	S								
CO4	M		S	S								
CO5	S		S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Site Investigation and Selection Of Foundation

9

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

UNIT III

Shallow Foundation

9

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

UNIT III

Design of Footing

9

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

UNIT IV

File Foundation

9

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

UNIT V

Retaining Walls

9

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE504 REINFORCED CONCRETE STRUCTURES – I (BIS Codes are permitted in the University Exam)

L	T	P	C
3	1	0	4

OBJECTIVES:

- To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Design RC concrete structural elements using various methods.

CO2: Design reinforced concrete slabs and beams by WSD for flexure

CO3: Design various basic elements of reinforced concrete structures like slabs, beams, columns and footings by LSD

CO4: Design reinforced concrete slabs and beams for shear and torsion by LSD

CO5: Design reinforced concrete Footing

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		S	M								
CO2	M		S	M								
CO3	M		S	M								
CO4	M		S	M								
CO5	M		S	M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

9

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

UNIT II

Working Stress Method

9

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

UNIT III

Design of Beams

9

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

UNIT IV

LSM: Design of Slabs & Columns

9

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

UNIT V

LSM: Design of Footing

9

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE505

ENVIRONMENTAL ENGINEERING –I

L	T	P	C
3	0	0	3

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Plan water supply system for developing area

CO2 : Design the various treatment plant in water supply system

CO3 : Treat the drinking water using advanced techniques

CO4 : Design the water distribution systems

CO5 : Principles of design of water supply and drainage in buildings

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	M								
CO2	M		S	M				M				
CO3			S	M							W	
CO4	W		S	M								

CO5	M		S	M								
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Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Introduction

9

Scope of environmental engineering – Role of Environmental Engineer – Environmental impacts of Development – sustainable development – Environmental pollution – Water, Air and Land.

UNIT II

Planning For Water Supply and Sewerage Systems

9

Public water supply and sewerage systems – Objectives – Design period – Population forecasting – Water demand – Sources of water – Source Selection – Water quality – Characterization – Water quality standards – Sources of wastewater – Quantity of sanitary sewage – Estimation of storm runoff – Characteristics and composition of sewage and their significance – Effluent standards

UNIT III

Conveyance System

9

Water supply – intake structures – Pipe materials - Hydraulics of flow in pipes – Transmission main design – Laying, jointing & testing of pipes – appurtenances – Pumps – Sewerage – Hydraulics of flow in sewers – Design of sanitary and storm sewers – Computer applications – Laying, jointing & testing of sewers – appurtenances – Pumps.

UNIT IV

Water Distribution

9

Requirements of water distribution – Components - Service reservoirs – Network design – Economics – Computer applications – Analysis of distribution networks – Appurtenances – operation and maintenance – Leak detection.

UNIT V

Water Supply and Drainage in Buildings

9

Principles of design of water supply and drainage in buildings – House service connection – Sanitary fixtures and fittings – Systems of sanitary plumbing – House drainage – House sewer connection.

Total No. of Periods: 45

Text Books:

1. Garg, S.K., Environmental Engineering, Vols. I and II, Khanna Publishers, New Delhi, 1994

References:

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993
3. Shah. C.S, Water Supply and Sanitation, Galgotia Publishing Company, New Delhi, 1994
4. Peavy H.S, Rowe D.R. and George Tchobanoglous, Environmental Engineering, McGraw Hill Book Company, New Delhi, 1995.

BCE506 CONSTRUCTION TECHNOLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
- 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.

OUTCOMES:

At the end of the course, the students would

CO01:Have a fundamental knowledge on the planning, different codes of practice, details and sequence of building construction

CO02:Have knowledge on temporary structures such as scaffolding, underpinning and formwork structures in construction

CO03:Will have the ability to understand the principles, types, merits & demerits of Prefabrication of structures

CO04:Will have the knowledge of manufacture, batching, mixing, transporting, placing, compaction of concrete

CO05: Will acquire knowledge on handling of different types of construction equipments

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M	S		M			M		M
CO2			M									
CO3	M			S						M		
CO4					S		S					
CO5	S									S		

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		
6	Quiz		

UNIT I

Planning

9

Principles of Planning - regulations and byelaws, different codes of practice – Indian, American, & British codes of practice – Preparation of layouts - Orientation of Buildings- Specifications - details and sequence of construction – co-ordination – site clearance – marking (setting out)- Earthwork excavations – timbering – Dewatering

UNIT II

Temporary Structure & Shell Structures

9

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

UNIT III

Prefabrication

9

Principles

of prefabrication – Types – materials for prefabrication- standardization – systems – modular - co – ordination- production, transportation-erection-merits & demerits.

UNIT IV

Concrete

9

Process of manufacture of concrete, batching, mixing, transporting, placing, compaction, and curing concrete with admixtures.

UNIT V

Construction Equipments

9

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

Total No. of Periods: 45

Text Books :

1. Sheety, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005.

References:

1. Peurifoy R.L., "Formwork for concrete structures", McGraw Hill Co., 1999
2. Jha J. and Sinha S.S., "Construction and Foundation Engineering", Khanna Publishers, 1993.
3. Chudley.R, "Construction Technology" (Vol. I, II, III,& IV) ELBS / Longman Publishers (second Edition)
4. Arora S.P and Bindra S.P. "Building Construction, Planning Techniques and Materials of Construction", Dhanpat Rai and sons 1997

BCE5L1 CONSTRUCTION ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

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

OUTCOMES:-

At the end of the course, the students would

CO01: Have a fundamental knowledge of the basic test to be performed on the material used in the construction site

CO02: Testing the aggregate material which is used in the laying pavement

CO03: Designing the mix of the concrete for various structures in construction.

CO04: To know about the freshly mixed concrete and check their workability by slump, consistency and compaction.

CO05: To know the ability of the bitumen and their properties for laying pavements.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S				M	M						
CO2					M							

CO3		M	M									
CO4	S			W	M							
CO5						M						

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

UNIT I

Tests on Cement

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

UNIT II

Tests on Aggregates

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

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

UNIT III

Concrete Mix Design

UNIT IV

Tests on Fresh and Hardened Concrete

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

UNIT V

Highway: Tests On Bituminous Materials And Mixes :

- a. Penetration test on Bitumen
- b. Ductility test on Bitumen
- c. Softening point test on Bitumen or tar
- d. Flash and fire point tests on bitumen cut back bitumen
- e. Specific gravity test.

- f. Viscosity test on black bitumen – cutback bitumen or tar (using orifice viscometer).
 g. Marshall stability test on bituminous mix - preparation of bituminous mix and determination of density, voids, stability and flow values.

Total No. of Periods: 60

BCE5L2 FLUID MECHANICS AND FLUID MACHINERY LAB

L	T	P	C
0	0	4	2

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

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

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S										
CO2		S		M				M				
CO3		S				W						

A) Fluid Mechanics Lab Experiments

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

B) Fluid Machinery Lab Experiments

1. Performance characteristics of Centrifugal Pump.
2. Performance characteristics of Multistage Pump
3. Performance characteristics of Gear Pump

4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I 9

ITD for Indeterminate Structures

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

UNIT II 9

Arches & Cables

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

UNIT III 9

Plastic Theory

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

UNIT V 9

Stiffness Method

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

UNIT V 9

Flexibility Method

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

Total No. of Periods: 45

Text Books:

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

References:

1. William Weaver, Computer Programs for structural Analysis, VNR Publishers, 2006
2. Rubinstein M.F, Matrix Computer Analysis of Structures, Prentice Hall, Englewood cliffs, 1990

3. Arya AS. and Jain.” Theory and Analysis of Structures”, Nem Chand & Bros, Dec 1992
4. Pandit G S and Gupta S P,”Matrix methods in structural analysis”, Tata McGrawHill Publishing Company Limited, 2007

BCE602

REMOTE SENSING AND GIS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the students to the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications in civil engineering.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Apply the concepts of Electro Magnetic energy, spectrum and spectral signature curves in the practical problems

CO2: Apply the concepts of satellite and sensor parameters and characteristics of different platforms

CO3: Apply the concepts of DBMS in GIS

CO4: Analyze raster and vector data and modeling in GIS

CO5: Apply GIS in land use, disaster management, ITS and resource information system

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	S				S			
CO2				S	S				S			
CO3				S	S				S			
CO4				S	S				S			
CO5				S	S				S			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Remote sensing

9

Definition Historical Components of Remote Sensing Principles & methods of remote sensing - Active and Passive remote sensing - Remote Sensing platforms -Electro magnetic radiation-Spectrum- Block body radiation – planks law – Stefan – Boltzmann law – satellites classification – based on orbit- sun synchronous and Geosynchronous based on purpose Earth Resources satellites, communication satellite Weather satellites Spy satellites Sensors Description of sensor in landscape, spot, IRS series and current satellites- Radar_SLAR-and SAR.

UNIT II

EMR interactions

9

Interaction with atmosphere Scattering of EMR Raleigh, Mie, Non Selective and Raman Scattering Bach scattering Speckle EMR Interaction with water and Ozone Atmospheric windows and its significance EMR interaction with the earth surface materials Radiance, irradiance, Absorbed and Transmitting energy – reflectance- Specular- and diffuse surface- Spectral signature – and curves EMR interaction with soil Resolution Spectral, Spatial, Radiometric, and Temporal.

UNIT III

Resources Engineering

9

Characteristics of Digital satellite image enhancement Filtering Applications of Aerial photographs and satellite imageries – merits – Limitations – Water resources – watershed management – Urban Studies – Flood Management- Fishing Forestry etc.,

UNIT IV

Geographic Information System

9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.

UNIT V

Miscellaneous Topics

9

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban

Applications- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems

Total No. of Periods: 45

Text Books:

1. Anji Reddy, “Remote Sensing and Geographical Information Systems” , BS Publications 2001

References:

1. Anand P.H, ”Principles of remote Sensing and Geographical Information Systems”, Sri Venkateswara Publishers, 2003.
2. Lillesand T.M and Kiefer R.W. Remote sensing and Image, Interpretation, John Wiley and Sons, INC, New York, 1987.
3. Burrough P A, ”Principle of GIS for land resource assessment”, Oxford University, 1990.

BCE603 REINFORCED CONCRETE STRUCTURES – II

(B.I.S Codes, BIS 3370, ISI 343. and Pigeaud’s Charts are permitted in the Examinations.)

L	T	P	C
3	1	0	4

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Design counter-fort and cantilever retaining walls

CO2: Design underground and overhead water tanks

CO3: Design bridges and flat slab

CO4: Different methods and systems – uniform and non-uniform pre-stressing design

CO5: Design Slab using yield line theory

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	M								
CO2			S	M								
CO3			S	M								
CO4			S	M								
CO5			S	M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Retaining Walls 9

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

UNIT II

Water Tanks 10

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

UNIT III

Bridges 10

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

UNIT IV

Pre stressed Concrete 8

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

UNIT V

Yield Line Theory 8

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

Total No. of Periods: 45

Text Books:

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

Reference Books:

1. Mac Ginley, T.J. Reinforced Concrete Design, Theory and Examples, E and N.Spon. United London, 1978
2. Jaikrishna and Jain O.P, Plain and Reinforced Concrete Vol. I & II", Nem Chand & Bros., 1958

3. Krishna Raju N, Bridge Engineering” Oxford and IBH Publishing,2010
4. Park R. and Paulay T. Reinforced Concrete Structures John Wiley and Sons, 1975.
5. Neville A.M. Properties of Concrete, Pitman Pub., 1981

BCE604 ENVIRONMENTAL ENGINEERING – II

L	T	P	C
3	0	0	3

OBJECTIVES:

- To educate the students on the principles and design of Sewage Collection, Conveyance, treatment and disposal.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1 : Design sewerage systems

CO2 : Choose suitable pumps for discharge of sewage

CO3: Design the various unit operations for waste water treatment

CO4: Design the sludge treatment and disposal methods

CO5: Perform quality analysis of sewage the characteristics and composition of sewage, self Purification of streams.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		S									
CO2	M					S						
CO3	M		S									
CO4	M		S									
CO5	M			S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Water Treatment

Objectives - Unit operations and processes - Principles, functions and design of flash mixers, flocculators, sedimentation tanks and filters. Disinfection - Aeration – iron and manganese removal, de fluoridation and demineralization – Water softening.

UNIT II

Sewage Treatment (Primary Treatment) 9

Objectives – Unit Operations & Processes – Principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT III

Sewage Treatment (Secondary Treatment) 9

Secondary Treatment – Activated Sludge Processes and Trickling filter, other treatment method. Stabilization of Ponds and Septic tanks. Advances in Sewage Treatment.

UNIT IV

Sewage Disposal 9

Method – Dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system.

UNIT V

Sludge Management 9

Thickening – Sludge digestion – Biogas recovery – Drying beds – Conditioning and Dewatering – Sludge disposal.

Total No. of Periods: 45

Text Books:

1. Garg S.K.Environmental Engineering, Vols. I and II, Khanna Publishers, New Delhi,1999

References:

1. Manual on Water Supply and Treatment(CPHEEO),Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Manual on Sewerage and Sewage Treatment(CPHEEO),Ministry of Urban Development, Government of India, New Delhi, 1993.
3. H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering MoGraw Hill Company, New Delhi, 1995.
4. Shah C.S., Water Supply and Sanitation, Galgotia Publishing Company, New Delhi, 1998

L	T	P	C
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OBJECTIVES:

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

CO1: Estimate water requirements for irrigation and drinking

CO2: Estimate consumptive use of water for irrigation

CO3: Perform water resources and prepare water budget.

CO4: Prepare irrigation scheduling and water distribution for various crops.

CO5: Design cross drainage works

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S								
CO2	M			S								
CO3	M			S								
CO4	M		S	S								
CO5	M			S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I**Irrigation as A Science****9**

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

UNIT II**Crop Water Requirements****9**

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

UNIT III

Conveyance and Distribution of Irrigation Water 9

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

UNIT IV

Irrigation Water Management 9

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

UNIT V

Design of Irrigation Structures 9

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE6L1 COMPUTER AIDED BUILDING DRAWING

L	T	P	C
0	0	4	2

OBJECTIVES:

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

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To study about drawing of Residential Building using Autocad

CO2: To study about drawing of RCC framed using Autocad

CO3: To study about drawing of office building using Autocad

CO4: To study about drawing of various types of Truss

CO5: To Study about 3D drawing of a building using revit architecture

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					M							
CO2					M							
CO3					M							
CO4					M							
CO5					M							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

Building Drawing In Accordance With Development And Control Rules Satisfying Orientation And Functional Requirements For The Following:

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

Total No. of Periods: 45

Text Books:

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

References:

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

BCE6L2 ENVIRONMENTAL ENGINEERING LAB

L	T	P	C
0	0	4	2

OBJECTIVES:

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

OUTCOMES:-

At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and waste water

CO01: Have a fundamental knowledge to conduct various quality tests on water and wastewater

CO02: Have a well-founded knowledge to assess the suitability of water for drinking and irrigation purpose.

CO03: Acquire skills in assessing the suitability of water for concreting works

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S	M		M							
CO2		S	M		M							
CO3		S	M		M							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

List of Experiments:

1. a. Determination of pH.

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

Total No. Of Periods:60

References:

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

BCE701 ESTIMATION AND COSTING

L	T	P	C
3	0	0	3

OBJECTIVES:

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

OUTCOMES:

At the end of the course, the students would

CO01: Will have a basic knowledge on methods and types of estimation and its merits and demerits

CO02: Have knowledge on specifications and tendering process for contracts

CO03: Will have the ability to understand the types, formation, terms and conditions in contracts and arbitration

CO04: Will have the knowledge of rate analysis of different item of work and MB and bill of quantities

CO05: Will able to value a property, price escalation recommendations and auditing

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M	S		M			M		M
CO2			M									
CO3	M			S						M		
CO4					S		S					
CO5	S									S		

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		
6	Quiz		

UNIT I

Estimation

9

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

UNIT II

Specifications and Tenders

9

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

UNIT III

Contracts

9

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

UNIT IV

Rate Analysis and Preparation Of Bills

9

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

UNIT V

Valuation

9

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

Total No. of Periods: 45

Text Book:

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

References:

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

BCE702 COMPUTER AIDED DESIGN OF STRUCTURES

L	T	P	C
3	1	0	4

OBJECTIVES:

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

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Prepare wire frame modelling and solid modelling using drafting packages

CO2: Perform structural analysis using computer packages

CO3: Prepare algorithms for the analysis and design of steel and RC structures

CO4: Analysis simple structures using expert systems

CO5: Aalysis and design of structures by using STADD.PRO, STRAP

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S	S	S							
CO2			S	S	S							

CO3			S	S						M		
CO4			S	S	S		W					
CO5			S	S	S							

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		
6	Quiz		

UNIT I

8

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

UNIT II

9

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

UNIT III

10

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

UNIT IV

9

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

UNIT V

9

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

Total No. of Periods: 45

TEXT BOOKS:

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

References:

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

BCE703 DESIGN OF STEEL STRUCTURES

(BIS 800 – 2007, Chimney code, Steel handbook, hand book for light gauge section and IRC loading standards are to be permitted in the Examinations.)

L	T	P	C
3	1	0	4

OBJECTIVES:

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

Course Outcomes

After successful completion of this course, the students should be able to

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

CO2: Design of simple and built up columns subject to combined bending and axial loads

CO3: Design of flexural and compression members, Design of self supporting steel chimneys.

CO4: Design of overhead rectangular, cylindrical and pressed steel tanks

CO5: To study shape factor, plastic hinge ,plastic moment , plastic analysis of beams .

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		S	M								
CO2	M		S	M								
CO3	M		S	M		M				W		
CO4	M		S	M								
CO4	M		S	M								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		
6	Quiz		

UNIT I

Plate Girder

8

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

UNIT II

Columns Subjected To Combined Bending And Axial Loads

10

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

UNIT III

Light Gauge Steel Sections

8

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

UNIT IV

Steel Water Tanks

10

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

UNIT V

Plastic Theory

9

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

Total No. of Periods :45

Text Books:

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

References:

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

BCE7L1 COMPUTER AIDED DESIGN OF STRUCTURES LAB

L	T	P	C
0	0	4	2

OBJECTIVES:

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

OUTCOMES:-

At the end of the course, the students would

CO01: To Study about Microsoft Office

CO02: To Study about drawing of buildings using Autocad in 2D

CO03: To Study about drawing of buildings using Autocad in 3D

CO04: To Study about Modeling

CO05: To Study about 3D objects

CO06: To Study about Solid Editing

CO07: To Study about drawings of plans and layouts

CO08: To Study about various mode of drawing in Autocad

CO09: To Study about file management

CO10: To Study about analysis of trusses and frame

CO11: To Study about analysis of different component in staad pro

CO12: To Study about analysis and design of different component in staad pro

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					M							
CO2					M							
CO3					M							
CO4					M							
CO5					M							
CO6					M							
CO7					M							
CO8					M							
CO9					M							
CO10					M							
CO11					M							
CO12					M							

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	

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

Total No. of Periods: 45

**BCE7L2 COMPUTER AIDED DESIGN AND DRAFTING
LABORATORY**

(R.C.C, Steel, Irrigation & Environment)

L	T	P	C
0	0	4	2

OBJECTIVES:

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

OUTCOMES:-

.At the end of the course, the students would

CO01: Have a fundamental knowledge of the design of irrigation structures.

CO02: Have a fundamental knowledge of the design of environmental works which can describe real life phenomena.

CO03: To learn about design and Drawing for concrete structures

CO04: To learn about design and Drawing for steel structures

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S				W		M		S	
CO2	S		S				W		M		S	
CO3	S		S				W		M		S	
CO4	S	M	S		M		M		M		S	

Course Assessment Methods:

Direct		Indirect	
1	Lab Exercise	1	Course End Survey
2	Model Exam	2	
3	Observation	3	
4	Viva-Voce	4	

UNIT – I

15

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

- a. Typical building floors consisting of slabs and beams.
b. Flat slabs using BIS code formula.
- Isolated and combined footings.

UNIT-II

15

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

- a. Columns and base plate
b. Grillage foundation
- Plate Girder

UNIT- III

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

15

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

UNIT-IV

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

15

- General layout of water supply scheme

2. Mixing basin, flocculation and sedimentation tanks
3. Slow and rapid sand filters – Service and clear water reservoirs

Total No. of Periods: 60

Text Book:

1. Satyanarayana Murthy, “Irrigation Design and Drawing”, Published by Mrs. L. Banumathi, Tuni, East Godavari District, A.P. 1998
2. Punmia, B.C., Jain, A.K., and Jain.A., Environmental Engineering, Vol.I& Vol.II, Lakshmi Publications, Newsletter, 2005.

REFERENCES:

3. Krishnamurthy D, Structural Design Drawing CBS Publication. New Delhi 1985.
4. 2..Shah M.G & Kale C.M, Building Drawing to Built to Environment –Tata McGraw Hill Co.
5. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
6. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1993.
7. H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering MoGraw Hill Company, New Delhi, 1995.
8. Shah C.S, Water Supply and Sanitation, Galgotia Publishing Company, New Delhi 1994

BCE051 MATRIX METHODS AND STRUCTURAL ANALYSIS

OBJECTIVES:

L	T	P	C
3	0	0	3

- To introduce the students to advanced methods of analysis like matrix methods, structural analysis stiffness method, Flexibility method and also analysis of space structures.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

- CO1:** Apply the basic concepts of matrix methods in structural Analysis
- CO2:** Find out the deflections in beams and trusses using various methods
- CO3:** Analyze the structures using flexibility and stiffness method
- CO4:** Determine member forces using element and system matrices for determinate and indeterminate structures
- CO5:** Determine the forces in various members due to lack of fit and thermal expansion.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		M	S	S							
CO2	M		M	S								
CO3	M		M	S								
CO4	M		M	S								
CO4	M		M	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I **9**

Concept of Indeterminate Structural Analysis –Indeterminacy - flexibility method stiffness method – choice of method.

UNIT II **9**

Stiffness Method: Three dimensional structures – space trusses – grid structures – rigid frame structures.

UNIT III **9**

Analysis of Structural system using substructure: Basic concepts – analysis of substructure – simple examples.

UNIT IV **9**

Flexibility method: Trusses, beams and space frames.

UNIT V **9**

Preparation of Computer Programmes: Trusses – beam – space frames

Total No. of Periods: 45

TEXT BOOKS:

1. L.S. Negi & R.S. Jangid, “Structural Analysis”, Tata McGraw-Hill Publications, New Delhi, 2003.

References:

1. BhaviKatti, S.S, “Structural Analysis – Vol. 1 Vol. 2”, Vikas Publishing House Pvt. Ltd., New Delhi, 2008

2. William Weaver, "Computer Programs for Structural Analysis", Van Nostrand, 1967)
3. Rubinstein M.E, "Matrix Computer Analysis of Structures", Prentice Hall, 1969.

BCE052 INDUSTRIAL STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- This course deals with some of the special aspects with respect to Civil Engineering structures related to industries

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Prepare the layout for industrial buildings

CO2: Design for functional requirements

CO3: Design steel girder, bunker and silos

CO4: Design RC structures like chimneys, silos and folded plates

CO5: Design prestressed precast concrete units.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		M	M								
CO2			S	S								
CO3			S	S								
CO4			S	S								
CO4			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

General

Specific equipments for industries like Engineering. Textile, Chemical etc., - Site layout and external facilities classification of industries minimum standards internal calculation – Materials – Works.

UNIT II

Functional requirements

10

1. Lighting – Natural and artificial – protection from the sun – sky light.
2. Services, Layout, wiring fixtures, cable and pipe bridges – Electrical installations – lighting - Substations - effluent.
3. Ventilation and fire protection, ventilation & air – conditioning, fire escapes and, chutes, fire alarms, extinguishers and hydrants.

UNIT II

Planning & Design

9

(Requirement of factory and other rules)

Layout stages. Loading Design of single bay and design of multi bay multi storied frames in RCC and steel – Analysis of industrial structures.

UNIT IV

Design Of Apartment Structures

10

Cranes - Different types - principles - design of girder – open web and solid web bunkers – silos – R.C. ducts.

UNIT V

Construction Techniques

8

Expansion joints- design of machine foundations and other foundations as per I.S. Code - Water proofing – roof drainage – joints – sound, shock proof mountings.

Total No. of Periods: 45

TEXT BOOKS

1. Purushothaman P ,”Reinforced Concrete Structural elements”, Tata McGraw-Hill, 1984.

References:

1. Pasala Dayaratnam,”Design of Steel Structure”, Wheeler publishers Allahabad , 1990.
2. Planning industrial structures Dunham, Industrial Structures McGraw-Hill Book Co; 1st edition (1948)
3. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.
4. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.
5. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.

BCE053 DESIGN R.C.FRAMED STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- The design aspects and analysis methodologies of tall buildings will be introduced. The stability analysis of tall buildings is another important objective of this course.

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: Computation of design moments and shears.

CO2: Analysis for wind and earthquake effects , Design of beams, columns and slabs.

CO3: Design by empirical and rigid frame analysis.

CO4: Design of various types of shear walls and detailing

CO5: Moment distribution and FEM methods of analysis of tall building using standard packages.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S	S							
CO2			S	S								
CO3			S	S								
CO4			S	S								
CO5	M		S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I**8**

Single Storey Industrial Frames: Estimation of member forces in single storey R.C.C. Industrial bents -of flat Top & gabled configuration from handbooks – Design of members, rigid joints and footing detailing.

UNIT II**10**

Medium – Rise Framed Buildings : Computation of design moments and shears using substitute frame methods of IS 456 and explanatory handbooks – Analysis for wind and earthquake effects – Design of beams, columns and slabs by Sp-16 Design aid – Detailing of reinforcement – Design of staircases and footings.

UNIT III **9**

Flat Slab Design, Design of heavily loaded warehouse type – Multi storey frames using flat – slab type of construction – Design by empirical and rigid frame analysis – Detailing – Design of pile foundations.

UNIT IV **9**

Tall building - functional details – wells, stairs and shear walls – lateral deflection - Frame and shear wall interaction - Design of various types of shear walls and detailing – Design of pile foundations.

UNIT V **9**

Computer Methods. Moment distribution and FEM methods of analysis of tall building using standard packages.

Total No. of Periods : 45

Text Books:

1. Vazirani V.N & Ratwani MM, "Concrete Structures", Khanna Publishers, New Delhi, 1995

References:

1. P.Purushothaman, Reinforced Concrete Structural elements Tata McGraw Hill Co, New Delhi.
2. R.Park&T.Paulay, Design of Reinforced Concrete Structural Elements – John Wiley & Sons, New York, 1975.
3. C.M.Reynolds& J.C. Steedam Reinforced Concrete Designers Handbook Rupa& Co, Calcutta, 1987.
4. V.Baikov, and E.Singalov, Reinforced Concrete Structures, Mir Publishers, Moscow,1971.
5. W.H.MosleyandW.J.Spencer, Micro Computer Application in Structural Engineering McMilfan Press, London, 1986.

BCE054 **CONCRETE BRIDGES**

OBJECTIVES:

- To make the student to know about various bridge structures, selection

L	T	P	C
3	0	0	3

of appropriate bridge structures and design it for the given site conditions.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Design of through type and deck type steel highway bridges.

CO2: Design various type of plate girder and truss girder railway bridge

CO3: Design various types of RC slab bridges for IRC loading

CO4: Design various types of RC girder bridges for IRC loading

CO5: Design prestressed concrete bridges

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3			S	S								
CO4			S	S								
CO4			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

General

8

- a. Types of concrete bridges, advantages, Limitation, Selection of site and Spacing of piers.
- B. I. R.C. code provisions, loading standards impact load theories of load distribution for Bridges, decks – Usage of Charts and curves for deck slab design.

UNIT II

R.C. Girder Bridges

9

- T. Beam and slab bridges, Balanced Cantilever bridges: Advantages – General proportions for spans, Impact factor – Design of main girder and articulation.

UNIT III

Box Culverts and Continuous Beams

8

Design of single, multiple vent box Culverts – Moment distribution method - Design of continuous beams.

UNIT IV

Pre – Stressed Concrete Bridges

12

Advantages – Examples of prestressed concrete Bridges - types – Design principles – Simply supported bridges.

UNIT V

Bearing and Substructures

8

Types of bearings, design of bearings for girder bridges- Types bridge substructure - Piers abutments, shallow and deep foundations - General arrangements.

Total No. of Periods: 45

Text Books:

1. Ratwani NM, Vazirani VN , “Design of Concrete Bridge”, Khanna Publishers, New Delhi,1975

References:

1. Johnson Victor W, ”Essentials of Bridge Engineering”, Oxford IBH Publishing Co, New Delhi, 1980
2. Dr Krishnamorthy, "Introduction to Bridges", Two Editions, 1959, 1963
3. Jain OP and Jaikrishna, ”Plain and reinforced Concrete Vol.2”, Nemchand and bros, Roorkee, 1958
4. Rowe, R.E. “Concrete Bridges Design”, John Wiley & Sons, Inc, New York, 1962
5. Jacques Ramsay Robinson, ”Piers, Abutments and Formwork for Bridges”, C. Lockwood, 1964

BCE055

TALL STRUCTURES

OBJECTIVES:

L	T	P	C
3	0	0	3

- The design aspects and analysis methodologies of tall structures will be introduced. The stability analysis of tall structures is another important objective of this course.

Course Outcomes

After successful completion of this course, the students should be able to

- **CO1:** implement design philosophies for the development of high rise structures
- **CO2:** find out the design loads for high rise buildings
- **CO3:** analyse the behavior of tall buildings subjected to lateral loading.
- **CO4:** perform computerized general three dimensional analysis for high rise building

- **CO5:** perform stability analysis using various methods for tall buildings

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3			S	S								
CO4	M		S	S								
CO4			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

9

Historical Development & Design Criteria: Design philosophy Loading, strength and stability. Stiffness and dirt limitations. Human comfort, Creep, shrinkage and temperature effects – Fire – Foundation -settlement – Soil structure interaction.

UNIT II

9

Gravity loading Methods and lively hood reduction- Impact loading - Construction loads – Wind loading – Static and dynamic approach – Analytical and experimental method – Earthquake loading – Model analysis.

UNIT III

9

Behaviour of Various Structural system: Factors affecting growth, height and structural form. High Rise behavior- Rigid frames - Braced frames - Infilled frames – Shear walls – Coupled shear walls – Walls frames – Tubular cores and hybrid mega systems.

UNIT IV

10

Analysis & Design: Modeling – Analysis of building as total structural system considering overall integrity and major sub – system interaction. Analysis of member forces- Drift and twist - Computerised general three dimensional analysis - Section shapes, Properties and resisting

capacity – Design of differential movement – Creep and shrinkage effects- Temperature effects and fiber resistance.

UNIT V

8

Stability of Tall Buildings : Overall buckling analysis - Wall frames - Approximate methods – Second order effects – P – Delta – Simultaneous first – order and P – Delta analysis – Translational – Torsional instability – Out of plumb – Effect of foundation rotation.

Total No. of Periods: 45

TEXT BOOKS

1. Wolfgang Schueller " High Rise Building Structures", John Wiley And Sons, New York, 1976.

References:

1. Tung-Yen Lin & Sidney D. Stotesbury, “Structures Concept and Systems for Architects and Engineers”, John Wiley & Sons, 1981
2. Lynn Baedle S., “Advances in Tall Buildings”, CBS Publishers and Distributors. New Delhi, 1986.
3. Bryan Stafford Smith And Alex Coull, " Tall Building Structures ", Analysis And Design, John Wiley And Sons, Inc., 1991.

BCE056 ADVANCED CONCRETE DESIGN

L	T	P	C
3	0	0	3

OBJECTIVES:

- To apprise the students about the basics of design of flat slabs, folded plates and cylindrical shells.

Course Outcomes

After successful completion of this course, the students should be able to

- **CO1:** To study Limit Analysis of beams in Flexure.
- **CO2:** Limit analysis and design of Portal frames
- **CO3:** Analysis and design of orthogrid floors/roofs.
- **CO4:** Analysis and design of prismatic folded plates and circular cylindrical shells

CO5: To study the Design of bunkers and silos.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3			S	S								

CO4			S	S								
CO4			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I 9

Limit Analysis of beams in Flexure: Behaviour of reinforced concrete members in bending and shear. Plastic hinge Rotation capacity. Factors affecting rotation capacity of a section. Plastic moment. Moment curvature relationship.

Redistribution of moments – Analysis and limit state design of continuous beams.

UNIT II 9

Limit Analysis & Design: Limit analysis and design of Portal frames.

UNIT III 9

Design of Flat Slabs Using BIS 456: Analysis and design of orthogrid floors/roofs.

UNIT IV 9

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

UNIT V 9

Design of bunkers and silos.

Total No. of Periods: 45

Text Books:

1. Krishna Raju N, "Advanced Concrete Design", CBS Publishers and Distribution, Delhi, 1988.

References:

1. Jain OP and Jaikrishna, "Plain and reinforced Concrete Vol.2", Nemchand and bros, Roorkee, 1958
2. Dunham C W, "Advanced Concrete Design", Mc Graw Hills Company, 1992
3. Malick and Rangasamy, "Reinforced Concrete Design", Khanna Publishers, Delhi, 1976

BCE057 INDUSTRIAL WASTE TREATMENT AND DISPOSAL

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide knowledge on sources and characteristics of industrial wastewater, techniques and approaches for minimizing the generation and application of physio chemical and biological treatment methods for recovery, reuse and disposal.

OUTCOMES:-

At the end of the course, the students would

CO01: Have a fundamental knowledge of the effluent discharge standards and waste minimization technology

CO02: Have a well-founded knowledge of characteristics of industrial wastewater and treatment methods.

CO03: Acquire knowledge about conventional methods of treatment for industrial waste.

CO04: Understand various biological treatment methods

CO05: Have a fundamental knowledge of combined treatment of industrial and municipal wastes.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							S	M			S	M
CO2			W				M					
CO3	W	M	M				M					
CO4	W	M	M				M					
CO5	W	M	M				S		S			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course end Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		

UNIT I**9**

Effects of industrial wastes on streams, land and air, waste water treatment plants, water quality criteria – effluent standards : Process modification, method and material changes, housekeeping

etc., to reduce water discharges and strength of the waste and established recovery methods for bye products within the plant operations.

UNIT II **9**

Characteristics of major industrial waste water (liquid wastes)

Chemical Industries: Petrochemicals & refineries, pharmaceuticals.

Apparel Industries: Textile, synthetic fibres, leather, paper.

Agro Industries: Fertilizer

Food Industries: Heat – packing pickles, canning poultry and eggs, distillers, sugar.

Metallurgical Industries: Thermal power station, nuclear power plants.

UNIT III **9**

Conventional methods of treatment and disposal of industrial wastes. Equalisation and neutralization, separation of solids – sedimentation and filtrations.

UNIT IV **9**

Removal of organic contents: Biological treatment methods, aerobic and anaerobic, digestion, tickling filters, stabilization ponds, activated sludge process – oxidation ditch.

UNIT V **9**

Physico Chemical Treatment Method – Neutralization, coagulation, flocculation, adsorption and precipitation. Combined treatment of industrial and municipal wastes.

Total No. of Periods: 45

Text Books:

1. Eckenfalder W.W, "Industrial Water Pollution Control", McGraw Hill, New York, 1989

References:

1. Arceivala S.J & Shyam Asolekar R, "Waste Water Treatment and Pollution Control Tata McGraw Hill, 1998.
2. Nelson Leonard Nemerow, "Theories and practice of industrial waste treatment", Addison Wesley Pub. Co., 1963
3. World Bank Group "Pollution prevention and Treatment Hand Book" World Bank and UNEP Washington DC, 1998

BCE058 AIR & NOISE POLLUTION

OBJECTIVES:

- This subject covers the sources, characteristics and effects of air and

L	T	P	C
3	0	0	3

noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.

- The emphasis in this course will be the monitoring and control of particulate and Gaseous pollutants, Minimization of the noise and noise pollution including technical measures, Codes, regulations, directives and standards about noise pollution.

COURSE OUTCOMES

CO01: To learn about the air pollutants, sources and its effects.

CO02: To have a clear understanding on the air quality standards and its techniques.

CO03: To determine the fluid resistance for organic materials.

CO04: To find the Properties of air pollution and its control measures.

CO05: To learn about the effects and the sources of noise pollution.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	W				M	S					
CO2			S						W			M
CO3		M		S			S		S			
CO4	S							M	M			
CO5				S					S			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		

UNIT I

Introduction

9

Definition of clean air, nature, air pollutants, sources of air pollutants, effects of air pollution on man, animal, vegetation and properties.

UNIT II

Ambient Air Quality Standards and Air Quality Monitoring

10

Harmful concentration – geographical factors in air pollution – air pollution control legislation. Classification sampling; sampling techniques; monitoring atmospheric pollution.

UNIT III

Fluid Resistance to Particle Motion**9**

Principles of removal of a gaseous constituent; adsorption and combustion; catalytic combustion of organic materials; catalytic oxidation and decomposition.

UNIT IV**Air Pollution and Control Measures****9**

Setting chambers; momentum separators, fibrous filters; electro static precipitators; bag houses centrifugal spray scrubbers; venture scrubbers; elementary principles of air pollution e-control techniques.

UNIT V**Noise Pollution****8**

Sound and noise; sources of noise pollution, environmental and industrial noise; effects of noise pollution: measures for prevention and control of noise; environmental and industrial noise; noise control legislation.

Total No. of Periods: 45**TEXT BOOKS:**

1. Anjaneyulu D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.

References:

1. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
2. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.
3. Stern A.C. *ed*, " Air Pollution Vol. I, II & III", Academic Press, New York, 1968
4. Cunniff P.F, "Environmental Noise Pollution", John Wiley & Sons, New York. 1977.
5. Docks H.M., "Environmental Pollution", John Wiley & Sons. New York 1981.
6. Chanlett T Emit,"Environmental Protection", McGraw Hill series in Water Resources and Environmental Engineering, New York. 1973.
7. Patrick C.F,"Environemental noise pollution", John Wiley & Sons, 1977.

BCE059 ENVIRONMENTAL HEALTH ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce types of pollution and its impacts
- To acquaint the student with various methods and techniques of disposing and management of waste

- To give an insight into the various diseases that affect human beings and introduces the importance of sanitation processes

Course Outcomes

CO01: To learn about the various environmental pollution and the impacts of land use and overuse of natural resources.

CO02: To learn the various water acts and the sources of water pollution

CO03: To learn the various Air acts and the sources and the effects of Air and noise pollution

CO04: Insight into the solid waste management and various disposal techniques.

CO05: Insight into food sanitation and the effects of food borne diseases

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	W	M	S									
CO2		S	M		W							
CO3		S		S							M	
CO4					M	W	S					

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		

UNIT I 9

Impact of Development and Water Pollution – Ecology and ecosystems Impact of development, land use and natural resource management, Cause and effects of environmental pollution.

UNIT II 9

Natural Processes: Pollution due to industrial, agriculture and municipal wastes – Limitation of disposal of dilution. BOD considerations in streams. Water Pollution control legislation.

UNIT III 9

Air and Noise Pollution and Control- Pollutants and their sources- Effect of pollution of human wealth, vegetation- Air pollution control legislation -noise pollution- sources and effects – Control measures.

UNIT IV 9

Solid Wastes Management and Water Control Sources - Characteristics Quantities – Collection methods and disposal techniques - Sanitary -landfill -Incineration and pyrolysis – composting - water borne diseases – of mosquitoes, flies, rodents.

Rational control and naturalistic methods of control, uses and limitations of pesticides, engineering measures of water control.

UNIT V

9

Food & Milk Sanitation : Relation of food to disease – principles of food sanitation – Sanitation of Kitchen in restaurants and other catering establishments – Quality changes in milk – Milk as carrier of infection – Pasteurization of milk – HTST and LTLT processes. Cattle shed sanitation.

Total No. of Periods: 45

Text Books:

1. Ehlw V.M. and E.W. Steel. Municipal and Rural Sanitation – McGraw Hill Co. Inc, New York, 1954

References:

1. Park J.E. and Park K.,”Text Book of Preventing and Social Medicine”,M/s. Banarsidos, Bhanot, Jabalpur, 1980.
2. Stern A.C. *ed*, “ Air Pollution Vol. I, II & III”, Academic Press, New York, 1968
3. Cuniff P.E,”Environmental Noise Pollution”, John Wiley & Sons, New York. 1977.

BCE060 RENEWABLE SOURCES OF ENERGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on sources and characteristics of various renewable source of energy and strategies for its implementation.

OUTCOMES:-

At the end of the course, the student is expected to

- CO01:** Have knowledge about the various renewable sources of energy
- CO02:** Have a well-founded knowledge about the Primary energy sources
- CO03:** Acquire skills in assessing the suitability of direct energy conversion
- CO04:** Have knowledge about bio – energy
- CO05:** Have knowledge about solar energy.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S	S									

CO2		S	S									
CO3		S	S									
CO4		S	S									
CO5		S	S									

Course Assessment Methods:

Direct		Indirect	
1	Internal test 1	1	Course end Survey
2	Internal test 2	2	Faculty Survey
3	Internal test 3	3	Industry
4	Assignment	4	Alumni
5	End semester exam		

UNIT I

General

9

Primary energy sources -direct energy - conversion -comparison with conventional energy-conversion devices.

SOLAR ENERGY – Principles of solar energy collection – solar radiation – measurement instruments - data and estimation - types of collectors - characteristics and design principles of different types of collectors - testing of collectors.

UNIT II

Solar Energy Applications

9

Solar thermal applications – water heaters and air heaters performance and applications - simple calculations on solar cooling, solar drying, solar ponds, solar tower concepts and solar furnace.

UNIT III

Wind and Tidal Energy

9

Energy from the wind – general theory of windmills – design aspects of horizontal axis and vertical axis windmills – applications. Energy from tides and waves – working principles of tidal plants and ocean thermal energy conversion plants – power from geothermal energy – principles of working of geothermal power plants.

UNIT IV

Bio – Energy

9

Energy from bio – mass bio – gas plants – various types -design principles of bio – gas plants applications- Energy from waste burning- power plants, utilization of industrial and municipal wastes – energy from the agricultural wastes.

UNIT V

Direct Energy Conversion

9

(Description, principle of working and basic design aspects only) Magneto hydrodynamic systems, thermo electric generators, thermionic generators fuel cells solar cells types, e.m.f. generated, power output, losses and efficiency and applications.

Total No. of Periods: 45

Text Books:

1. . D. Yogi Goswami, Frank Kreith & Jan F. Kreider,” Principles of Solar Energy Engineering”, CRC Press, 2000

References:

2. John A. Duffie, William A. Beckman,”Solar Energy Thermal processes”, John Wiley & Sons; 4th Edition edition (17 May 2013).
3. Sukhatme K, Suhas P. Sukhatme,” Solar Energy”, Tata McGraw-Hill Education, 1996
4. Rai G.D,”Solar Energy Utilisation”,Khanna Publishers, 1987
5. Shao-lee Soo,”Direct Energy conversion”, Prentice-Hall, 1968

BCE061

STRUCTURES ON EXPANSIVE SOILS

L	T	P	C
3	0	0	3

OBJECTIVE

- To understand the dynamics of earth and to estimate dynamic properties of soils
- To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential.
- To design these structures in expansive soil
- To study the effectiveness of some super structure resting on treated expansive soil
- Factors influencing mechanisms in expansive soils

Course Outcomes

CO01: To understand the dynamics of earth and to estimate dynamic properties of soils

CO02: To improve the engineering properties and make it suitable for construction

CO03 - The engineering properties, problems and solution need to be considered when constructing a foundation on expansive soils.

CO04: To develop the site specific design spectrum for design of sub structure and evaluation of liquefaction potential.

CO05: To study the behaviour of the stabilized soil subjected to cyclic loading

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	S	M	W	S	M							
CO2	S	M	S	M	M							
CO3	M	M	W	S	M							
CO4	S	S	M	S	M							
CO5	M	M	M	S	M							

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

Geotechnical Problem

9

Occurrence and distribution - moisture equilibrium - Soil, structure, environmental interaction- distress symptoms - case histories.

UNIT II

Expansive Soil Properties

9

Clay mineralogy - swell potential - field exploration - laboratory tests for identification.

UNIT III

Soil Heaving

9

Heave Prediction - Method of prediction of heave- Empirical methods - double of dometer tests - soil moisture suction - field observations, shrinkage.

UNIT IV

Design of Footing

9

Foundation Design – Design consideration – individual and continuous footings- stiffened mats- underreamed piles- codal provisions.

UNIT V

Stabilization

9

Stabilization methods

Total No. of Periods: 45

Text Books:

1. John .D.N & Debora .J.M, “Expansive Soils Problems And Practice In Foundation & Pavement Engineering”, J. Wiley, 1992.

References:

1. Satish Grower, The Architecture of India, Buddhist, Hindu Period and Islamic Period. Vikas Publishing HousPvt Ltd., New Delhi, 1984.
2. Chen F.R,” Foundation on Expansive Soils”, Elseivier ,1973.
3. Parcher J.V & Means R.E, Soil Mechanics & Foundation, Columbus, 1968.
4. Perkk R.E., Hansen W.E, Thombum T.H, “Foundation Engineering”, John Wiley, 1974.
5. Kameswarao N.S.V,” Dynamic Soil Test & Applications”, Wheeler Publishing Co., 2002

BCE062 SOIL DYNAMICS & MACHINE FOUNDATION

L	T	P	C
3	0	0	3

OBJECTIVE

- To understand the soil properties and suitable remedial measures to improve their behavior.
- To familiarize students with the dynamic properties of soil.
- To create an understanding about the importance of designing machine foundation for reciprocating and impact machines.

Student will demonstrate the ability to design machine foundations.

COURSE OUTCOMES

CO01: To understand the Vibration of elementary systems

CO02: To improve the engineering properties and application in soil dynamics.

CO03: The engineering dynamic properties of soil Field & Laboratory methods.

CO04: To develop specific design Impact type machine and Rotary type machines

CO05: To study the principles of vibration neutralizer

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M	S	M							
CO2	M	W	S	M	M							
CO3	M	M	W	S	M							
CO4	M	S	M	S	M							
CO5	M	M	M	S	M							

Course Assessment Methods:

Direct	Indirect
---------------	-----------------

1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

Introduction

8

Vibration of elementary systems – vibratory – single degree freedom -system – free and forced vibrations with and without damping – transient response of single degree freedom systems.

UNIT II

Waves & Wave Propagation

9

Wave propagation in an elastic homogeneous isotropic medium - Shear and compression waves - wave propagation in elastic, half space (no theoretical treatment or derivation) properties of compression, shear and Raleigh waves – application in soil dynamics.

UNIT III

Dynamic Properties Of Soils

9

Elastic properties of soils – soil treated as spring or elastic half space – Co – efficient – provision of dynamic properties of soil as per latest BIS 5249 -Co efficient of elastic, uniform and non-uniform compression and shear- Determination of dynamic properties of soil- Field & Laboratory methods.

UNIT IV

Design of Machine Foundation

10

General requirements of machine foundations – Design criteria – principles of & simple procedures of design of foundations for machineries of reciprocating type, Impact & Rotary type (treated as single degree freedom only) – dynamic loads, simple design procedures for foundations under Reciprocation machines. Impact type machine and Rotary type machines.

UNIT V

Vibration Isolation & Screening

9

Vibration isolation technique mechanical isolation, foundation isolation, isolation by location isolation by barriers – active and passive isolation tests – problems – types of Isolation – active, passive – principles of vibration neutralizer (no derivation)

Total No. of Periods: 45

Text Books:

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 2010.

References Books:

1. Rtehart F.E, R.D.Woods & J.R. Hall, vibrations of Soils and Foundations, Prentice Hall, 1970.
2. Prakash S.& Pun V.K, Soil Dynamics & Design foundation, McGraw Hill Co. 1998.
3. Srinivasulli P &Vaidanathan C, " Handbook on machine Foundations", McGraw Hill Co.1976.
4. Code Practice of Design and Construction of Machine Foundations, I.S.2974, 1987 Part I to IV.
5. Prakash .S and Puri V.K, "Foundation for Machines", McGraw Hill Publishing Company, Newyork, 1988

BCE063

HYDROLOGY

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on hydrological cycle, spatial and temporal measurement and analysis of rainfall and their applications including flood routing and ground water hydrology.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Measure the rainfall intensity , duration and frequency

CO2: Assess the losses of precipitation due to evaporation

CO3: Prepare the unit hydrograph for surface runoff

CO4: Solve the flood routine and channel routine problems

CO5: Conduct yield test on aquifers

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	M							
CO2				S	M							
CO3				S	M							
CO4	M			S	M							
CO4				S	M							

Course Assessment Methods:

Direct	Indirect
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1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

Hydrometeorology

9

Hydrological cycle -Hydro meteorological factors -Cloud formation- Winds and their movement -types of precipitation.- Forms for precipitation- Density and Adequacy of rain gauges – Recording and non-recording gauges.

UNIT II

Precipitation and Abstractions

9

Spatial distribution – Consistency analysis – Frequency analysis – Intensity, duration, frequency relationships- Evaporation –Infiltration- Norton’s equation Infiltration indices – Types of streams – Stage discharge relationships – Flow measurements – Currents meter method for velocity measurements.

UNIT III

Hydrograph Analysis

9

Factors affecting the shape of hydrograph- Components of DRH. Baseflow- Unit hydrograph - Scurve hydrograph- Synthetic unit hydrograph.

UNIT IV

Ground Water Hydrology

9

Occurrence of ground water – Types of aquifer – Dupuifs assumptions – Darcy’s law – Estimation of aquifer parameters – Pump tests.

UNIT V

Flood Analysis

9

Flood estimation – Gumbel’s method – log Pearson types III method – Reservoir flood routing, Channel routing, Other methods of routing.

Total No. of Periods: 45

Text Books:

1. Subramanya K. Engineering Hydrology, Tata McGraw Hill. Publishing Company Limited, 2006

References:

1. Raghunath H M, Hydrology, Witey Eastern Limited, New Delhi 1998.

2. Vijay Singh P, Elementary Hydrology -Prentice Hall of India, 1998.
3. Mutreja K N, Applied Hydrology, Tata McGraw Hill Publications, New Delhi, 1998.
4. Jayaram Reddy P Hydrology, Tata McGraw Hill Publications, New Delhi, 1998.

BCE064 Ground Water Engineering

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
- To understand the techniques of development and management of groundwater.

COURSE OUTCOMES

CO01: To learn about the basics of ground water Engineering including the hydrogeological cycle and water level fluctuations

CO02: To learn about the basics of hydrology of ground water and to make a clear understanding of ground water flow equations of velocity equations.

CO03: To study the basics of unsteady flow and various methods unsteady flow.

CO04: To know about the various sources of ground water like collector wells, infiltration galleries.

CO05: To study about the ground water quality chemistry its origin and water quality standards.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M						W		
CO2						S		W			M	
CO3				S					M			
CO4						M			S	W		
CO5					M							S

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I

Fundamentals of Ground Water **9**

Introduction – Characteristics of Ground water – Global distribution of water – ground water column- Permeability- Darcy’s Law, laboratory permeability test Types of aquifers. Hydro geological Cycle, water level fluctuations.

UNIT II

Hydraulics of Flow **9**

Storage coefficient, Specific yield, Heterogeneti and Anisotrophy Transmissivity – governing equations of ground water flow – Steady state flow – DupuitForchheimer assumption. Velocity potential flow nets.

UNIT III

Estimation of Parameters **9**

Transmissivity and Storativity Pumping test - Unsteady state flow- Thies method- Jacob methods - Image well theory - Effect of partial penetrations of well – collectors wells.

UNIT IV

Ground Water Development **9**

Collector wells – infiltration gallery – Conjunctive use – Artificial recharge – Safe yield – Yield test – Geophysical method – Selection of pumps.

UNIT V

Water Quality **9**

Ground water chemistry – origin, movement and quality – water quality standards – salt water intrusion – Environmental concern.

Total No. of Periods: 45

Text Books:

- 1. Reghunath H.M. “Ground Water Hydrology”, Wiley Eastern Ltd., Second reprint, 2000.

References:

- 1. Tood D.K,”Ground Water Hydrology”, Johnand Sons, 2000.
- 2. Ramakrishnan S,”Ground Water Groundwater”„Ramakrishnan Publication,Chennai 1998.
- 3. William C Walton, “Ground Water Resource Evaluation”, McGraw Hill New York 1970.

BCE065 COASTAL ENGINEERING

OBJECTIVES:

- To provide an overview of the analysis and design procedures used in

L	T	P	C
3	0	0	3

the field of coastal engineering.

- To introduce the processes of including coastal and estuarine circulation, coastal and shelf waves, surf zone hydrodynamics, sediment transport, hurricane-induced storm surge and inundation, beach nourishment etc
- To enable students apply these engineering principles to solve the problems in this environment such as shoreline erosion, natural flooding hazards, water quality deterioration and coastal habitat evanescence.

OUTCOMES

CO01: To provide an overview of the fundamental principles of ocean science and technology.

CO02: To provide the background needed to undertake coastal oceanographic investigations and sets them in context by incorporating case studies and sample problems based on local and global examples.

CO03: To facilitate students to work across disciplinary boundaries and develop an approach that will enable them to incorporate human society in their exploration and analysis of coastal areas.

CO04: To be able to “see” the features and components of the natural, engineering and human aspects of the coast, the functions of components and relationship between them.

CO05: To provide students understanding of the materials and processes associated with the major natural natural and artificial harbours.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											M
CO2	S		M									M
CO3	S					S				M		M
CO4	S											M
CO5	S											M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Waves Generation, Propagation and Force

Definition – Wave classification – Linear theory of waves- Assumptions and derivations of relationship of wave characteristics- Pressure within progressive wave- Wave energy - Fundamental aspects of stokes theory.

UNIT II

Wave Forecasting **9**

Need for forecasting – SMB and PNJ methods of wave forecasting.

UNIT III

Tides **9**

Origin and classification of tides - Karwin’s equilibrium theory of tides- Effects on structure - Seiches, surges and Tsunamis.

UNIT IV

Sediment Movement **8**

Types of sediment movement – Types of beaches and beach profile – long shore drift and its engineering significance – Causes of coastal erosion and methods of protection.

UNIT V

Harbours **10**

Classification - types of their requirements – Requirements of modern port -Selection of site. BreakWater and their types of selection - Functional design of entrance Channel and breakwaters- Dredging - Need & types of selection of dredgers.

Total No. of Periods : 45

Text Books:

1. Garrison .T, “Oceanography”, Wadsworth Publications, 4th edition, 2002.

References:

1. Sorenson .R. M, “Coastal Zone Engineering”, Chapman & Hall, 3rd edition, 2006.
2. Wiegall. R.L., Oceanographical Engineering Prentice Haff, Englewood Cliff’s, New Jersey, 1964.

BCE066 GEOGRAPHICS INFORMATION SYSTEM

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the students to the basic concepts and principles of various components of Geographic Information System

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To procure knowledge about History and development of GIS

CO2: Apply the concept of Data Entry, Storage & Maintenance

CO3: Apply the concepts of DBMS in GIS

CO4: Analyze raster and vector data and modeling in GIS

CO5: Apply GIS in land use, disaster management, ITS and resource information system

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S	S				S			
CO2	M			S	S				S			
CO3	M			S	S				S			
CO4	M			S	S				S			
CO5	M			S	S				S			

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Introduction

9

Definition – Map and amp analysis – Automated cartography, History and development of GIS.
Hardware requirement -system concepts Coordinate systems - Standard GIS packages.

UNIT II

Data Entry, Storage & Maintenance

9

Type of data. Spatial and non-spatial data – Data structure – points – Lines – polygon - Vector and raster Piles and data formats- Data compression.

UNIT III

Data Analysis of Modeling

9

Spatial analysis - Data retrieval- Query Simple analysis- Record overlay- vector data analysis- raster data analysis - Modeling in GIS- Digital elevation model- DIM cost and path analysis - Artificial intelligence- Expert system.

UNIT IV

Data Output & Error Analysis

9

Types of output data – Display on screen – Printer – Plotter – Other output devices – Sources of errors – Types of error – Elimination. Accuracies.

UNIT V

Application

9

GIS Application: Application areas – Resources management – Agriculture Soil – Water Resources management – Cadestral records and US – Integrated remote sensing application with GLS – Knowledge based techniques.

Total No. of Periods: 45

Text Books:

1. Anji Reddy .M, “Remote sensing and Geographical information system”, B.Publications, 2011.

References:

1. Chester (England), Geo informational System, Application of GIS and Related Spatial Information Technologies – ASTER Publication Co. 1992.
2. Burrough .P.A, “Principles of GIS for Land Resources Assessment”, Oxford Publication,2000.
3. Jeffrey Star and Join Estes, “Geographical Information System An Introduction” – Prentice Hall, 1990.

BCE067

OPERATION & MANAGEMENT OF IRRIGATION SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To enable the students for a successful career as water management professionals. 2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
- To expose the students the need for an interdisciplinary approach in irrigation water management and providing a platform to work in an interdisciplinary team.
- To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
- To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOMES:-

At the end of the course, the students would

CO01: Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.

CO02: Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management

CO03: The students will be able to understand an irrigation system, its components, its performance, and management of irrigation complexities to tackle different issues.

CO04: Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.

CO05: The students will acquire knowledge about the need for participatory approach and irrigation management transfer along with irrigation policy and institutional aspects.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

Cos	Programme Outcomes (Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	W	S	S							S
CO2	S	M	W	S	S							S
CO3	S	M	W	S	S							M
CO4	S	M	W	S	S							M
CO5	S	M	W	S	S							M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Irrigation System Requirements

8

Irrigation system – requirements – Gravity and lift irrigation – Supply and demand of water – cropping pattern – Estimation of total and peak crop water requirements – Effective and dependable rainfall -allowable deficit – irrigation efficiency.

UNIT II

Irrigation Scheduling

9

Frequency of irrigation – Methods of scheduling irrigation – Developing typical schedules – Case studies – Water conveyance Systems – Water measurements.

UNIT III

Management

9

Structural and non structural strategies in water use and management. Conductive use of surface and ground water.

UNIT IV

Operation

10

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Physical and administrative control – Water law.

UNIT V

Farmers Involvement

9

Farmers role in system operation – Farmers committee for water distribution, On – farm management and maintenance of the irrigation system -Government – Father Partnership in irrigation.

Total No. of Periods : 45

Text Books:

1. Dilip Kumar Majumdar, “Irrigation Water Management – Principles and Practice”, Prentice Hall of India Pvt. Ltd., New Delhi, 2000

References:

1. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water management Division, Department of Agriculture, Ministry of Agriculture, New Delhi
2. R.T.Gandhi, et .al, Handbook on Irrigation Water Requirements, Water management Division, Defantment of Agriculture, ministry of Agriculture, New Delhi, 1989.
3. R.E.Robinson, control, C.M.Laurizen and D.C.Muckel, Distribution control and measurement of irrigation water on the Form USDA Mise publication No.926.1989.
4. W.Cly AM, Max , Lowdermilk K and Gilbert Lorey L,”A Research Development process for improvement of on Form water management” - Technical Report No.47, ColoradoState, University, Colorado, USA, 1977.
5. Max, K. Lowdermilk Farmer Involvement Planning Guide No.11,”water management Synthesis Project”, Utah state University Logan, Utah, 1981.

BCE068 TRANSPORTATION STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the students to the basic concepts and principles of transport structures such as bridges, parking facilities

COURSE OUTCOMES

After successful completion of this course, the students should be able to

CO1: To learn about the IRC codes.

CO2: To analyze and design the Deck slab and columns in bridges.

CO3: Designing the substructures.

CO4: To perform the design of Steel Bridges

CO5: To perform the designing of parking, and different amenities related to transportation.

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2	S					S						
CO3			S									
CO4			S									
CO5	M		S									

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

General

8

IRC Code provision, loading standard, impact loads, theories of load distribution in bridge docks – Charts and curves for deck slab design.

UNIT II

Balanced Cantilever Bridges

9

Balanced cantilever bridges and bearing. Advantages, general proportions for spans, impact factors – Influence lines for B.M. and S.F. at critical sections. Design of main girders and articulation. Types of bearings, design of bearings for girder bridges.

UNIT III

Bridge Substructures

10

Types of bridge structures-Piers abutments-shallow and deep foundations – General arrangements (descriptive study only) - Design of single and multiple vent box culverts. Moment distribution method.

UNIT IV

Steel Bridges **9**

Steel bridges for highway and railway locations – Selection of Types and its advantages – Comparison with R.C.C. bridges – Design of deck and through bridges and bearing.

UNIT V

Amenities **9**

Design of depot buildings, parking lots, terminals, box culverts.

Total No. of Periods: 45

TEXT BOOKS

1. Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 1990.

References:

1. JaiKrishna & Jain O.P.. “Plain and Reinforced Concrete” Vol. 1 NemChand & Bros. Roorkee. 1987
2. Ramachandra, “Design of Steel Structures”,Standard Pub, New Delhi 2013.
3. Fredrick W. Taylor E.Thompson & Edward Smulski, “Reinforced Concrete Bridges”,John Wiley & Sons, Inc, New York 1939.

BCE069 OPTIMIZATION TECHNIQUES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the students to the basic concepts and principles of optimization, linear programming and queuing theory

COURSE OUTCOMES

After successful completion of this course, the students should be able to

- CO1:** Understanding the Concept of optimization and classification of optimization problems.
CO2: Formulation simplex methods variable with upper bounds
CO3: Study the Queuing Model, poisson and exponential distributions
CO4: Understand the maximization and minimization of convex functions
CO5: To study equality constraints, inequality constraints

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							M	S				M
CO2							M	S				M
CO3	W			M			M	S				M
CO4							M	S				M
CO5							M	S				M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
6	End Semester Examinations		

UNIT I

Introduction

8

Concept of optimization – classification of optimization – problems.

UNIT II

Linear Programming

10

Examples of linear programming problems – formulation simplex methods variable with upper bounds – principle- duality -dual simplex method - sensitivity analysis – revised simplex procedure – solution of the transportation problem – assignment – network minimization – shortest route problem – maximal two problem – L.P.representation of networks.

UNIT III

Queuing Theory

9

Queuing Model, poisson and exponential distributions -Queues with combined arrivals and departures- random and series queues.

UNIT IV

Unconstrained Optimization

9

Maximization and minimization of convex functions. Necessary and sufficient conditions for local minima – speed and order of convergence – univariate search – steepest and descent methods- metcher reeves method -conjugate gradient method.

UNIT V

Constrained Optimization

9

Necessary and sufficient condition – equality constraints, inequality constraints -kuhu – tucker conditions – gradient projection method – penalty function methods – cutting plane methods of sibel directions.

Total No. of Periods: 45

Text Books:

1. Rao S.S,”Optimization – Theory and applications”, Wiley Easter Ltd., 1979.

References:

1. David G.Luerbeggan, “Introduction to linear and non linear programming”, Addison Wesley Publishing Co. 1973.
2. Hadley G. “Nonlinear and – dynamic programming” Addison Wesley Publishing Co. 1964.
3. Cordan C.C. Beveridge and Robert S. Schedther, “optimization, theory and practice” McGraw Hill Co.1970.
4. HarndyA.Tahh. “operations Research, An Introduction”, Macmillan Publishers Co.NewYork,1982.
5. Beightferand S. others, “Foundations of optimization pill”, New Delhi, 1979.

BCE070 PRESTRESSED CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the students to the basic concepts and principles of Prestressed concrete structures

COURSE OUTCOMES:

CO1: To design prestressed concrete beam

CO2: To design prestressed composite beams

CO3: To design flexural members with partial prestressing

CO4: To design prestressed concrete tanks, poles and sleepers

CO5: To design prestressed concrete bridges

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S	S								
CO2			S	S								
CO3			S	S								
CO4			S	S								
CO5			S	S								

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	End Semester Examinations		

UNIT I

Introduction – Theory and Behaviour 8

Basic concepts – Advantages – Materials required – Systems and methods of prestressing. Analysis of sections. Stress concept, Strength concept, Load balancing concept -. Effect of loading on the tensile stresses in tendons - Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections – Losses of prestress – Estimation of crack width.

UNIT II

Design of End Block 10

Flexural strength – Simplified procedures as per codes – strain compability method – Basic concepts in selection of cross section for bending – stress distribution in end block- Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing- Applications.

UNIT III

Circular Prestressing 9

Design of prestressed concrete tanks – Poles and sleepers

UNIT IV

Composite Construction 8

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members.

UNIT V

Prestressed Concrete Bridges 10

General aspects pretensionedprestressed bridge decks - Post tensioned prestressed bridge decks - Advantages over R.C.bridges - Principles of design only.

Total No. of Period: 45

Text Books:

1. Krishna Raju N. “Prestressed concrete”, Tata McGraw Hill Company, New Delhi 2007

References:

1. MallieS.K.and Gupta A.P. “Prestressed concrete”, Oxford and VB publishing Co. Pvt Ltd., 1987.

BBA071 PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

OBJECTIVES:

To introduce the students to the concepts and principles of ethics of engineering

Course Outcomes

After successful completion of this course, the students should be able to

CO1: understand the ethical theories and concepts

CO2: understanding an engineer's work in the context of its impact on society

CO3: understand and analyze the concepts of safety and risk

CO4: understand the professional responsibilities and rights of Engineers

CO5: understand the concepts of ethics in the global context

CO/PO Mapping

S – Strong, M – Medium, W – Weak

COs	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							M	S				M
CO2							M	S				M
CO3							M	S				M
CO4							M	S				M
CO5							M	S				M

Course Assessment Methods:

Direct		Indirect	
1	Internal Tests	1	Course and Survey
2	Assignments	2	Faculty Survey
3	Seminar	3	Industry
4	Online test	4	Alumni
5	Quiz		
5	End Semester Examinations		

UNIT I**Engineering Ethics****9**

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professional and Professionalism – Professional ideals and virtues – Theories about right action – Self – interest – Customs and religion – Use of Ethical Theories.

UNIT II

Engineering as Social Experimentation 9

Engineering as experimentation – Engineers as responsible experiments – Codes of Ethics – A Balanced Outlook on law – The Challenger Case Study.

UNIT III

Engineer’s Responsibility for Safety 9

Safety and risk – Assessment of safety and risk – Risk Benefit Analysis – Reducing risk – The Three Mile Island and Chemobyl Case Studies.

UNIT IV

Responsibilities and Rights 9

Collegiality and loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Discrimination.

UNIT V

Global Issues 9

Multinational Corporations - Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample code of conduct.

Total No. of Periods: 45

Text Books:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering McGraw Hill, New York 1983.

References:

1. Charles Fleddeman D, “Engineering Ethics”, Prentice Hall, New Mexico, 1999.
2. Laura Schlesinger, “How Could You Do That: The Abdication of Character, Courage, and Conscience”, Harper Collins, New York, 1996.