NATIONAL ENGINEERING COLLEGE

(An Autonomous Institution – Affiliated to Anna University Chennai)

K.R.NAGAR, KOVILPATTI – 628 503
www.nec.edu.in

REGULATIONS – 2011

DEPARTMENT OF

CIVIL ENGINEERING

CURRICULUM AND SYLLABI OF

B.E. - CIVIL ENGINEERING

REGULATIONS 2011

CURRICULUM AND SYLLABI FOR FULL TIME

B.E. CIVIL ENGINEERING

SEMESTER – I (Common to all B.E. / B.Tech. Programmes)

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BEG101	Technical English – I	3	1	0	4
2.	BMA101	Mathematics – I	3	1	0	4
3.	BPH101	Engineering Physics – I	3	0	0	3
4.	BCY101	Engineering Chemistry – I	3	0	0	3
5.	BCS101	Fundamentals of Computing and Programming	3	0	0	3
6.	BME101	Engineering Graphics	2	3	0	4
PRACTICAL						
7.	BCS131	Computer Practice Laboratory – I	0	0	3	2
8.	BPC131	Physics and Chemistry Laboratory –I	0	0	3	2
9.	BME131	Engineering Practices Laboratory	0	0	3	2
		Total Number of Credits :				**27**

SEMESTER – II

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BEG201	Technical English – II*	3	0	0	3
2.	BMA201	Mathematics – II*	3	1	0	4
3.	BPH201	Engineering Physics – II *	3	0	0	3
4.	BCY201	Engineering Chemistry – II *	3	0	0	3
5. a.	BME201	Engineering Mechanics (For Mechanical & Civil branches)	3	1	0	4
b.	BEE201	Circuit Theory (For EEE & EIE branches)	3	1	0	4
c.	BEC201	Electric Circuits and Electron Devices (For CSE, IT & ECE branches)	3	1	0	4
6. a.	BEE202	Basic Electrical & Electronics Engineering (For Mechanical & Civil branches)	4	0	0	4
b.	BME202	Basic Civil & Mechanical Engineering (For CSE, IT, EEE, EIE & ECE branches)	4	0	0	4
PRACTICAL						
7.	BCS231	Computer Practice Laboratory – II*	0	1	2	2
8.	BPC231	Physics & Chemistry Laboratory – II*	0	0	3	2
9. a.	BME231	Computer Aided Drafting and Modeling Laboratory (For Mechanical & Civil branches)	0	1	2	2
b.	BEE231	Electrical Circuits Laboratory (For EEE & EIE branches)	0	0	3	2
c.	BEC231	Circuits and Devices Laboratory (For ECE, CSE & IT branches)	0	0	3	2
10.	BEG231	English Language Skill Laboratory* (Skill of Listening)	0	0	3	2
		Total Number of Credits :				**29**

- *** Common to all B.E. / B.Tech. Programmes**

SEMESTER – III

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BMA301	Transforms and Partial Differential Equations	3	1	0	4
2.	BCE301	Environmental Science and Engineering	3	0	0	3
3.	BCE302	Applied Geology	3	0	0	3
4.	BCE303	Mechanics of Solids	3	1	0	4
5.	BCE304	Mechanics of Fluids	3	1	0	4
6.	BCE305	Construction Techniques, Equipment and Practice	4	0	0	4
7.	BCE306	Surveying – I	3	0	0	3
PRACTICAL						
8.	BCE331	Survey Practical – I	0	0	4	2
9.	BCE332	Computer Aided Building Drawing	0	0	4	2
10.	BEG331	Communication Skills and Technical Seminar – I	0	0	3	2
Total Number of Credits :						**31**

SEMESTER – IV

S.No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BMA404	Numerical Methods (Common to EEE, Civil)	3	1	0	4
2.	BCE401	Applied Strength of Materials	3	1	0	4
3.	BCE402	Soil Mechanics	3	0	0	3
4.	BCE403	Applied Hydraulic Engineering	3	1	0	4
5.	BCE404	Surveying – II	3	0	0	3
6.	BCE405	Highway Engineering	3	0	0	3
PRACTICAL						
7.	BCE431	Strength of Materials Laboratory	0	0	3	2
8.	BCE432	Hydraulic Engineering Laboratory	0	0	3	2
9.	BCE433	Survey Practical – II	0	0	4	2
10.	BEG431	Communication Skills and Technical Seminar –II	0	0	3	2
Total Number of Credits :						**29**

SEMESTER V

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE501	Irrigation Engineering	3	0	0	3
2	BCE502	Structural Analysis – I	3	1	0	4
3	BCE503	Design of Reinforced Concrete Elements	3	0	0	3
4	BCE504	Environmental Engineering – I	3	0	0	3
5	BCE505	Foundation Engineering	3	0	0	3
6	BCE506	Concrete Technology	3	0	0	3
Practical						
7	BCE531	Concrete and Highway Engineering Laboratory	0	0	3	2
8	BCE532	Soil Mechanics Laboratory	0	0	3	2
9	BCE533	Irrigation and Environmental Engineering Drawing	1	0	3	2
		TOTAL	19	1	9	25
		Total Number of Credits : 25				

SEMESTER VI

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BGE501	Professional Ethics and Human Values	3	0	0	3
2	BCE601	Design of Reinforced Concrete and Brick Masonry Structures	3	0	0	3
3	BCE602	Structural Analysis – II	3	1	0	4
4	BCE603	Design of Steel Structures	3	1	0	4
5	BCE604	Environmental Engineering – II	3	0	0	3
6		Elective – I	3	0	0	3
Practical						
7	BCE631	Environmental Engineering Laboratory	0	0	3	2
8	BCE632	Computer Aided Design and Drafting Laboratory	0	0	3	2
9	BCE633	Survey Camp	0	0	0	2
		TOTAL	18	2	6	26
		Total Number of Credits : 26				

SEMESTER VII

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE701	Structural Dynamics and Earthquake Engineering	3	0	0	3
2	BCE702	Prestressed Concrete Structures	3	0	0	3
3	BCE703	Estimation and Quantity Surveying	3	0	0	3
4	BCE704	Railways, Airports and Harbour Engineering	3	0	0	3
5	BMG601	Principles of Management	3	0	0	3
6		Elective – II	3	0	0	3
Practical						
7	BCE731	Civil Software Application Laboratory	0	0	4	2
8	BCE732	Design Project	0	0	4	2
9	BCE733	Comprehension	0	0	3	1
		TOTAL	**18**	**0**	**11**	**23**
		Total Number of Credits : 23				

SEMESTER VIII

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE801	Construction Planning and Scheduling	3	0	0	3
2		Elective – III	3	0	0	3
3		Elective – IV	3	0	0	3
4		Elective – V	3	0	0	3
Practical						
5	BCE831	Project Work	0	0	12	8
		TOTAL	**12**	**0**	**12**	**20**
		Total Number of Credits : 20				

TOTAL CREDITS BY THE AWARD OF THE DEGREE: 210

LIST OF ELECTIVES

SEMESTER VI (ELECTIVE – I)

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE001	Hydrology	3	0	0	3
2	BCE002	Remote Sensing Techniques and GIS	3	0	0	3
3	BCE003	Pavement Engineering	3	0	0	3
4	BCE004	Housing Planning and Management	3	0	0	3
5	BCE005	Ground Water Engineering	3	0	0	3
6	BCE006	Management of Irrigation Systems	3	0	0	3
7	BCE007	Coastal Zone Management	3	0	0	3

SEMESTER VII (ELECTIVE – II)

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE008	Water Resources Engineering	3	0	0	3
2	BCE009	Ground Improvement Techniques	3	0	0	3
3	BCE010	Contract Laws and Regulations	3	0	0	3
4	BCE011	Environmental Impact Assessment	3	0	0	3
5	BCE012	Introduction to Soil Dynamics and Machine Foundations	3	0	0	3
6	BCE013	Industrial Waste Management	3	0	0	3
7	BCE014	Finite Element Techniques	3	0	0	3

SEMESTER VIII – (ELECTIVE – III, IV & V)

S.No	Course Code	Course Title	L	T	P	C
Theory						
1	BCE015	Ecological Engineering	3	0	0	3
2	BCE016	Bridge Structures	3	0	0	3
3	BCE017	Architecture and Town Planning	3	0	0	3
4	BCE018	Municipal Solid Waste Management	3	0	0	3
5	BCE019	Storage Structures	3	0	0	3
6	BCE020	Design of Plate and Shell Structures	3	0	0	3
7	BCE021	Tall Buildings	3	0	0	3
8	BCE022	Prefabricated structures	3	0	0	3
9	BCE023	Experimental Stress Analysis	3	0	0	3
10	BCE024	Computer Aided Design of Structures	3	0	0	3
11	BCE025	Industrial Structures	3	0	0	3
12	BCE026	Smart Structures and smart Materials	3	0	0	3
13	BCE027	Air Pollution Management	3	0	0	3
14	BCE028	Earthquake Geotechnical Engineering	3	0	0	3
15	BCE029	Repair and Rehabilitation of Structures	3	0	0	3
16	BMG701	Total Quality Management	3	0	0	3
17	BGE003	Intellectual Property Rights (IPR)	3	0	0	3
18	BGE801	Engineering Economics and Cost Analysis	3	0	0	3

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BEG101   **TECHNICAL ENGLISH – I**   **L T P C**
                                                                                        3 1 0 4

UNIT I   12

General Vocabulary – Changing words from one form to another – Adjectives, Comparative adjectives – Active and Passive voice – Tenses – simple present, present continuous – Nouns – compound nouns – Skimming and scanning – Listening and transfer of information – bar chart, flowchart – Paragraph writing, description – Discussing as a group and making an oral report on the points discussed, Conversation techniques – convincing others.

Suggested activities:
1. Matching words & meanings - Using words in context – Making sentences.
2. Changing sentences from active to passive voice & vice versa.
3. Skimming, cloze exercises, exercises transferring information from text to graphic form – bar charts, flow charts.
4. Writing descriptions using descriptive words & phrases, and technical vocabulary.
5. Role play, conversation exercises, discussions, oral reporting exercises.

Any other related relevant classroom activity.

UNIT II   12

Vocabulary – prefixes & suffixes – simple past tense – Spelling and punctuation – 'wh' Question forms – Scanning, inference – Listening & note-taking – Paragraph writing – Comparison and contrast – Creative thinking and speaking.

Suggested Activities:

1. a. Vocabulary activities using prefixes and suffixes.
   b. Exercises using questions – asking & answering questions.
2. Scanning the text for specific information.
3. Listening and note-taking – Writing paragraphs using notes, giving suitable headings and subheadings for paragraphs. Using expressions of comparison and contrast.
4. Discussion activities and exploring creative ideas.

Any other related relevant classroom activity.

UNIT III   12

Tenses – simple past, simple future and past perfect – Reading in Context – Reading & note-making – single line – Definitions – sequencing of sentences – instruction writing – Persuasive speaking.

Suggested activities:

1. Providing appropriate context for the use of tenses
2. Listening and note-taking
3. (a) Writing sentence definitions and instructions
   (b) Identifying the discourse links and sequencing jumbled sentences.
4. Speaking exercises, discussions, role play exercises using explaining, convincing and persuasive Strategies.

Any other related relevant classroom activity.

UNIT IV   12

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Modal verbs and Probability – Concord subject verb agreement (Correction of errors) – Cause and effect expressions – Extended Definition – Speaking about the future plans.

Suggested activities:
1. a. Making sentences using modal verbs to express probability
   b. Gap filling using relevant grammatical form of words.
2. Writing extended definitions
3. Speaking – role play activities, discussions, extempore speaking exercises speculating about the future.
   Any other related relevant classroom activity

UNIT V   **12**

'If' conditionals – Gerunds – Intensive reading – Speaking – Presentation of problems & solutions – Itinerary – planning for an industrial visit – Formal Letter writing – Letter to the editor, invitation letter, accepting, declining letter and permission letter.

Suggested activities:
1. a) Sentence completion exercises using 'If' conditionals.
   b) Gap filling exercises using gerunds and present participle forms
2. Reading comprehension exercises.
3. Role play, discussion, debating and speaking activities for stating, discussing problems and suggesting solutions.
4. Writing letters to officials and to the editor in formal/official contexts.
   Any other related relevant classroom activity.

TOTAL: 60 PERIODS

AREAS TO BE COVERED UNDER DIFFERENT HEADINGS:

A) Language focus
1. Suffixes and Prefixes
2. Transformation of words from one form to another (Derivatives from root words)
3. Matching words & meanings (synonyms)
4. Compound nouns
5. Degrees of comparison
6. Active and passive voice-impersonal passive
7. Tenses: simple present, simple past, simple future, present continuous, past continuous, Present Perfect.
8. Modal verbs
9. 'Wh' Question forms
10. Conditional clause
11. Gerunds and infinitives
12. Expressing Cause and effect
13. Concord
14. Punctuation
15. Writing definitions

B) Reading
1. Reading in context
2. Skimming and scanning
3. Scanning the text for specific information
4. Reading and note-making
5. Intensive reading for making inferences
6. Reading comprehension

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C) Listening:

1. Listening and transfer of information
2. Listening & note taking

D) Writing:

1. Transformation of information from graphical data to written form and from written form to graphical Form.
2. Paragraph writing – Description
3. Paragraph Writing – comparison and contrast.
4. Note-making
5. Writing Instructions
6. Jumbled sentences
7. Letter writing – Formal letters (Invitation, Accepting, Declining, Permission Letters) Letters to the editor

E) Speaking:

1. Discussing as a group and making oral reports,
2. Role play-Conversation techniques – convincing others
3. Creative thinking and speaking, Exploring creative ideas
4. Persuasive strategies
5. Speaking about the future plans
6. Extempore speech – Speaking exercises speculating about the future
7. Presentation of problems and solutions
8. Debates

TEXT BOOK:
1. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006. Themes 1– 4 (Resources, Energy, Computer, Transport)

REFERENCES:
1. Meenakshi Raman and Sangeeta Sharma, 'Technical Communication English skills for Engineers', Oxford University Press, 2008.
2. Andrea, J. Rutherford, 'Basic Communication Skills for Technology', 2nd Edition, Pearson Education, 2007.

Extensive Reading:
A.P.J.Abdul Kalam with Arun Tiwari, 'Wings of Fire' An Autobiography, University Press (India) Pvt. Ltd.,1999, 30th Impression 2007.

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BMA101   **MATHEMATICS – I**   **L T P C**
                                                                                3 1 0 4

UNIT I   MATRICES   12
Characteristic equation – Eigen values and eigen vectors of a 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 a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

UNIT III   DIFFERENTIAL CALCULUS   12
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV   FUNCTIONS OF SEVERAL VARIABLES   12
Partial derivatives – Euler's theorem for homogenous 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 co-ordinates – Area as double integral – Volume as triple integral.

TOTAL: 60 PERIODS

TEXT BOOK:
1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Ltd., (2008).

REFERENCES:
1. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).
2. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2007).
3. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).
4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

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BPH101   **ENGINEERING PHYSICS – I**   **L T P C**
                                                                                            3 0 0 3

UNIT I   ULTRASONICS   9
Introduction – Production – magnetostriction effect – Magnetostriction generator– piezoelectric effect – piezoelectric generator – Detection of ultrasonic waves – properties – Cavitations – Velocity measurement – acoustic grating – Industrial applications – drilling, welding, soldering and cleaning – SONAR – Non Destructive Testing – pulse echo system through transmission and reflection modes – A,B and C – scan displays, Medical applications – Sonograms.

UNIT II   LASERS   9
Introduction – Principle of Spontaneous emission and stimulated emission, Population inversion, pumping, Einsteins A and B coeffcients – derivation. Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers (homojunction & heterojunction) Qualitative Industrial Applications - Lasers in welding, heat treatment, cutting – Medical applications – Holography (construction & reconstruction).

UNIT III   FIBER OPTICS & APPLICATIONS   9
Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing – Splicing, Loss in optical fibre – attenuation, dispersion, bending – Fibre optical communication system (Block diagram) – Light sources – Detectors – Fibre optic sensors – temperature & displacement – Endoscope.

UNIT IV   QUANTUM PHYSICS   9
Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory – Compton effect – Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Electron microscope – Scanning electron microscope – Transmission electron microscope.

UNIT V   CRYSTAL PHYSICS   9
Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy – Crystal defects – point, line and surface defects – Burger vector.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003)
2. M.N.Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics' S.Chand and company, Ltd., New Delhi, 2005.

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REFERENCES:

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007)
2. Rajendran, V and Marikani A, 'Engineering Physics' Tata Mc Graw Hill Publications Ltd, III Edition, New Delhi (2004).
3. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai (2007).
4. Jayakumar. S, 'Engineering Physics', R.K. Publishers, Coimbatore (2003).
5. Chitra Shadrach and Sivakumar Vadivelu, 'Engineering Physics', Pearson Education, New Delhi (2007).

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BCY101   **ENGINEERING CHEMISTRY – I**   **L T P C**
                                                                                    3 0 0 3

UNIT I   WATER TECHNOLOGY   9
Characteristics – alkalinity – types of alkalinity and determination – hardness – types and estimation by EDTA method (problems), Domestic water treatment – disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water – requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination and reverse osmosis.

UNIT II   POLYMERS AND COMPOSITES   9
Polymers – definition – polymerization – types – addition and condensation polymerization – free radical polymerization mechanism ,Plastics – classification – preparation, properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET, Rubber – vulcanization of rubber, synthetic rubbers – butyl rubber, SBR, Composites – definition, types polymer matrix composites – FRP only.

UNIT III   SURFACE CHEMISTRY   9
Adsorption – types – adsorption of gases on solids – adsorption isotherms – Frendlich and Langmuir isotherms – adsorption of solutes from solution – role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement.

UNIT IV   NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES   9
Nuclear energy – fission and fusion reactions and 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 – alkaline batteries – lead-acid, nickel-cadmium and lithium batteries.

UNIT V   ENGINEERING MATERIALS   9
Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. Lubricants – mechanism of lubrication, liquid lubricants – properties – viscosity index, flash and fire points, cloud and pour points, oilyness – solid lubricants – graphite and molybdenum sulphide. Nanomaterials – introduction to nanochemistry – carbon nanotubes and their Applications.

                                                                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).

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

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BCS101   FUNDAMENTALS OF COMPUTING AND PROGRAMMING   L T P C
                                                                                          3 0 0 3

UNIT I   INTRODUCTION TO COMPUTERS   9
Introduction – Characteristics of Computers – Evolution of Computers – Computer Generations – Classification of Computers – Basic Computer Organization – Number Systems.

UNIT II   COMPUTER SOFTWARE   9
Computer Software – Types of Software – Software Development Steps – Internet Evolution – Basic Internet Terminology – Getting connected to Internet – Applications.

UNIT III   PROBLEM SOLVING AND OFFICE AUTOMATION   9
Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode –Application Software Packages – Introduction to Office Packages (not detailed commands for examination).

UNIT IV   INTRODUCTION TO "C"   9
Overview of **"C"** – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making –Branching and Looping.

UNIT V   FUNCTIONS AND POINTERS   9
Handling of Character Strings – User-defined functions – Definitions – Declarations – Call by reference – Call by value – Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a **"C"** Program : Some Guidelines.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", Second Edition, Brooks-Cole Thomson Learning Publications (2007).

REFERENCES:
1. Pradip Dey and Manas Ghoush, "Programming in C", Oxford University Press (2007).
2. Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications (2006). (Unit II, III, IV, and V).
3. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
5. E.Balagurusamy,"Computing fundamentals and C Programming", Tata McGRaw-Hill Publishing Company Limited (2008).
6. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers (2008).

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BME101   **ENGINEERING GRAPHICS**   **L T P C**
                                                                                       2 3 0 4

UNIT I   PLANE CURVES AND FREE HAND SKETCHING   12
CURVES USED IN ENGINEERING PRACTICES:
Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

FREE HAND SKETCHING:
Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACES   12
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III   PROJECTION OF SOLIDS   12
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV   SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES   12
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   12
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones, Combination of any two simple solids. Perspective projection of prisms, pyramids and cylinders by visual ray method and vanishing point method.

TOTAL: 60 PERIODS

TEXT BOOK:
   1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46th Edition, (2003).

REFERENCES:
   1. K.V.Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
   2. M.S. Kumar, "Engineering Graphics", D.D. Publications (2007).
   3. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).
   4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
   5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol. I & II), Subhas Publications (1998).
   6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited (2008).
   7. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi (2008).

BCS131   **COMPUTER PRACTICE LABORATORY – I**   **L T P C**
                                                                    0 0 3 2

LIST OF EXERCISES
I. MS Office

a) WORD PROCESSING
   1. Document creation, Text manipulation with Scientific notations.
   2. Table creation, Table formatting and Conversion.
   3. Mail merge and Letter preparation.
   4. Drawing - Flow Chart.

b) SPREAD SHEET
   1. Chart - Line, XY, Bar and Pie.
   2. Formula - formula editor.
   3. Spread sheet - inclusion of object, picture and graphics, protecting the document and sheet.
   4. Sorting and Import / Export features.

II SIMPLE C PROGRAMMING
   1. Data types, Expression evaluation, Conditional statements.
   2. Arrays.
   3. Structures and Unions.
   4. Functions.

                                              TOTAL: 45 PERIODS

For programming exercises Flow chart and pseudocode are essential.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 60 STUDENTS

HARDWARE
   - LAN System with 66 nodes (OR) Standalone PCs – 66 Nos.
   - Printers – 3 Nos.

SOFTWARE
   - OS – Windows / UNIX Clone
   - Application Package – Office suite
   - Compiler – **"C"**

BPC131   PHYSICS AND CHEMISTRY LABORATORY – I   L T P C
0 0 3 2

PHYSICS LABORATORY – I

LIST OF EXPERIMENTS
1.   (a) Particle size determination using Diode Laser.
    (b) Determination of Laser parameters – Wavelength and angle of divergence.
    (c) Determination of acceptance angle in an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of Hysteresis loss in a ferromagnetic material.

B. CHEMISTRY LABORATORY – I

LIST OF EXPERIMENTS

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

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BME131   ENGINEERING PRACTICES LABORATORY   L T P C
                                                                                   0 0 3 2

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE
BUILDINGS:
   (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

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

CARPENTRY USING POWER TOOLS ONLY:
   (a) Study of the joints in roofs, doors, windows and furniture.
   (b) Hands-on-exercise:
       Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE

WELDING:
   (a) Preparation of arc welding of butt joints, lap joints and tee joints.
   (b) Gas welding practice.

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.

MACHINE ASSEMBLY PRACTICE:
   (a) Study of centrifugal pump.
   (b) Study of air conditioner.

DEMONSTRATION ON:
   (a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
   (b) Foundry operations like mould preparation for gear and step cone pulley.
   (c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

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GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE

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

IV ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor colour coding, measurement of AC signal parameters (peak-peak value, rms value period, frequency) usindg CRO.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor for HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES:

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

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BEG201   TECHNICAL ENGLISH – II   L T P C
                (*Common to all branches*)   3 0 0 3

AIM

    To encourage students to actively involve in participative learning of English and to help them acquire communication skills.

OBJECTIVES

1. To help the students to develop listening skills for academic and professional purposes.
2. To help the students to acquire the ability of effective speaking in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help the students to improve their active and passive vocabulary.
5. To familiarize the students with different rhetorical functions of scientific English.
6. To enable the students to write letters and reports effectively in formal and business situations.

UNIT I   10

Technical   Vocabulary –   meanings in context, sequencing words, Articles   – Prepositions, intensive reading and predicting content, Reading and interpretation, extended definitions, process description.

Suggested activities

1. Exercises on word formation using the prefix 'self' – Gap filling with preposition Exercises – Using sequence words
2. Reading comprehension exercise with questions based on inference – Reading heading and predicting the content – reading advertisements and interpretation
3. Writing extended definitions – Writing description of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future

UNIT II   10

Phrases / structure indicating cause/purpose – Adverbs – Skimming – Non-verbal communication – Listening – correlating verbal and non-verbal communication – speaking in group discussion – Formal Letter writing – Writing analytical paragraphs.

Suggested Activities

1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) – Reading comprehension exercises with texts including graphic communication – Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categories data in tables.
3. Writing formal letters – quotations, placing orders, clarification, and complaint, Letter seeking permission for industrial visits, writing analytical paragraphs on different debatable issues.

UNIT III   10

Cause and effect expressions – Different grammatical forms of the same word – speaking – stress and intonation, Group Discussions – reading – critical reading – listening – writing – using connectives, report writing – types, structure, data collection, content, form, recommendations.

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Suggested Activities

1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word.
2. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, multiple choice questions.
4. Sequencing of jumbled sentences using connectives – Writing different types of reports like industrial accident report and survey report – writing recommendations.

UNIT IV   **10**

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application – content, format (CV/Bio-data) – instructions, imperative forms – preparing checklists, Yes/No question form – Email communication

Suggested Activities

1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking – Role Play – group discussions – Activities giving oral instructions.
5. Writing descriptions, expanding hints – writing argumentative paragraphs – Writing formal letters – writing letter of application with CV/Bio-data – Writing general and safety instructions – Preparing checklists – Writing e-mail messages

UNIT V   **5**

Speaking – Discussion of problems and solutions – Creative and critical thinking – writing an essay, Writing a proposal.

Suggested Activities

1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements

TOTAL 45 periods

AREAS TO BE COVERED UNDER DIFFERENT HEADINGS

A. Language Focus

1. Technical vocabulary
2. Sequencing words
3. Articles
4. Prepositions
5. Word formation using prefixes
6. Phrases / Structure indicating purpose
7. Adverbs
8. Cause and effect expressions
9. Tense forms

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10. Different grammatical forms of the same word
11. Numerical adjectives
12. Extended definitions

B. Reading

1. Intensive reading and predicting content
2. Reading and interpretation
3. Skimming
4. Critical reading
5. Reading comprehension exercises

C. Listening

1. Correlating verbal and non-verbal communication
2. Listening comprehension

D. Speaking

1. Group Discussions
2. Stress and intonation
3. Role plays and giving oral instructions
4. Discussion of problems and solutions

E. Writing

1. Process description
2. Formal letter writing
3. Writing analytical paragraphs
4. Report Writing
5. Descriptive writing
6. Argumentative paragraphs
7. Letter of application
8. Instructions
9. Recommendations
10. Checklists preparation
11. Email Communication
12. Writing critical essays
13. Writing proposals

TEXT BOOK:

1. **'**English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Department of Humanities & Social Sciences, Anna University, Chennai: Orient Longman Pvt. Ltd., 2006. Themes 5 – 8 (Technology, Communication, Environment, Industry)

REFERENCES:

1. Mark Abbot son, "Technical English for professionals" (2009).
2. P.K.Dutt, G.Rajeevan and C.L.N Prakash, 'A Course in Communication Skills', Cambridge University Press, India 2007.
3. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills', Macmillan India Ltd., (Reprinted 1994 – 2007).
4. Edgar Thorpe, Showick Thorpe, 'Objective English', Second Edition, Pearson Education, 2007.
5. Rodney Huddleston and Geoffrey Pullum, 'A students introduction to English Grammar', Cambridge University Press, 2007.
6. Jack C.Richards, Jonathan Hull and Susan Protor, 'English for International

Communication', Third Edition, Cambridge University Press, 2004.

Extensive Reading:

1. Robin Sharma**, '**The Monk Who Sold His Ferrari', Jaico Publishing House, 2007

Note:

The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BMA201   **MATHEMATICS – II**   **L T P C**
                    (*Common to all branches*)   **3 1 0 4**

UNIT I   ORDINARY DIFFERENTIAL EQUATIONS   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 derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelpipeds.

UNIT III   ANALYTIC FUNCTIONS   12
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – 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 applications 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   LAPLACE TRANSFORM   12
Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

                                                            TOTAL: 60 PERIODS

TEXT BOOK:
1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Ltd., (2008).
2. G rewal.B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications', Delhi (2007).

REFERENCES:
1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi (2007).
2. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Pearson Education (2007).
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India (2007).
4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

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BPH201   ENGINEERING PHYSICS – II   **L T P C**
             (*Common to all branches*)   **3 0 0 3**

UNIT I   CONDUCTING MATERIALS   **9**
Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II   SEMICONDUCTING MATERIALS   **9**
Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III   MAGNETIC AND SUPERCONDUCTING MATERIALS   **9**
Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti-ferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives. Superconductivity – Properties – Types of super conductors – BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV   DIELECTRIC MATERIALS   **9**
Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – Internal field – Claussius-Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferro electricity and applications.

UNIT V   MODERN ENGINEERING MATERIALS   **9**
Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): Characteristics, properties of Ni-Ti alloy, application, advantages and disadvantages of SMA. Nanomaterials: synthesis – plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling – properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition – structure – properties and applications.

                                                                TOTAL: 45 PERIODS

TEXT BOOKS:
1. Charles Kittel 'Introduction to Solid State Physics', John Wiley & sons 7th Edition, Singapore (2007)
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India (2007) (for Unit V)

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REFERENCES:
1. G.Senthil Kumar, 'Engineering Physics – II' VRB Publishers Pvt Ltd., Chennai (2010)
2. B.N.Sankar and S.O.Pillai, 'Engineering Physics', New Age International   Publishers (2008) New Delhi.
3. Jayakumar .S. 'Materials Science', R.K. Publishers, Coimbatore (2008).
4. Palanisamy.P.K, 'Materials Science', Scitech publications (India) Pvt. Ltd., Chennai, 2nd Edition (2007).
5. M.Arumugam, 'Materials Science' Anuradha Publications, Kumbakonam (2006).
6. Rajendran.V and Marikani.A, 'Materials Science' Tata McGraw Hill publications, New Delhi (2004).

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BCY201   ENGINEERING CHEMISTRY – II   **L T P C**
              (*Common to all branches*)   **3 0 0 3**

AIM

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

OBJECTIVES

1. The student should be conversant with the principles of electrochemistry, electrochemical cells, emf and applications of emf measurements.
2. Principles of corrosion control.
3. Chemistry of Fuels and combustion.
4. Industrial importance of Phase rule and alloys.
5. Analytical techniques and their importance.

UNIT I   ELECTROCHEMISTRY   9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode – calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometric titrations (redox Fe^{2+} vs dichromate and precipitation – $Ag+$ vs Cl^- titration) and conductometric titrations – acid-base (HCI vs NaOH) titrations.

UNIT II   CORROSION AND CORROSION CONTROL   9

Chemical corrosion – Pilling-Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed current cathodic methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT III   FUELS AND COMBUSTION   9

Calorific value – classification – Coal – proximate and ultimate analysis – metallurgical coke – manufacture by Otto-Hoffmann by product oven method – Petroleum processing and fractions – cracking – catalytic cracking and methods. knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG – Flue gas analysis – Orsat apparatus – theoretical air for combustion.

UNIT IV   PHASE RULE AND ALLOYS   9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V   ANALYTICAL TECHNIQUES   9

Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem) (block diagram only) – estimation of iron by Colorimetry. flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry. atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

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TOTAL: 45 PERIODS

TEXT BOOKS:
1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub. Co., New Delhi, 15th Edition (2009).
2. S.S.Dara "A text book of Engineering Chemistry" S.Chand & Co. Ltd., New Delhi (2006)

REFERENCES:
1. A Text book of Physical Chemistry by A.S.Negi & S.C. Anand, New Age International Pvt. Ltd., New Delhi (2009)
2. B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd., New Delhi (2008)
3. Principles of Physical Chemistry, AR Puri, LR Sharma, M.S. Pathania, Vishal Publication, (2005)
4. B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001)

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(a) BME201   **ENGINEERING MECHANICS**   **L   T   P   C**
                                    (For Mechanical & Civil Branches)   **3   1   0   4**

OBJECTIVE

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I   BASICS & STATICS OF PARTICLES   12

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a 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 – Examples

UNIT III   PROPERTIES OF SURFACES AND SOLIDS   12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

UNIT IV   DYNAMICS OF PARTICLES   12

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V   FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS   12

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction. Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

                                                                    TOTAL: 60 PERIODS

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, 9th edition (2010)

REFERENCES:

1. Rajasekaran.S, Sankarasubramanian.G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., 3rd Edition (2010).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 12th Edition (2010).
3. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
4. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).
5. Palanichamy.M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill (2001).

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(b) BEE201   **CIRCUIT THEORY**   **L T P C**
                        (For EEE & EIE Branches)   **3 1 0 4**

UNIT I   BASIC CIRCUITS ANALYSIS   12

Ohm's Law – Kirchoffs laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits.

UNIT II   NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS   12

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Norton Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III   RESONANCE AND COUPLED CIRCUITS   12

Series and parallel resonance – their frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV   TRANSIENT RESPONSE FOR DC CIRCUITS   12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. input (Sinusoidal).

UNIT V   ANALYSING THREE PHASE CIRCUITS   12

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4- wire circuits with star and delta connected loads, balanced & unbalanced loads – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

                                                                TOTAL: 60 PERIODS

TEXT BOOKS:
1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, (2007).
2. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill publishers, 6th edition, New Delhi, (2002).

REFERENCES:
1.   1. John Bird "Electrical Circuit Theory and Technology" Fourth Edition, Newnes Publications (2010)
2.   2.   Charles K.Alexander, Mathew N.O.Sadik, "Fundamentals of Electric circuits", 2nd Edition, McGraw Hill (2003).
3.   3.   Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi (2001).
4.   4. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, (1996).
5.   5. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi (1999).

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(c) BEC201 ELECTRIC CIRCUITS AND ELECTRON DEVICES   **L   T   P   C**
                    (For ECE, CSE and IT Branches)   **3   1   0   4**

UNIT I   CIRCUIT ANALYSIS TECHNIQUES   12
Kirchoff's current and voltage laws – series and parallel connection of independent sources – R, L and C – Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT II   TRANSIENT & RESONANCE IN RLC CIRCUITS   12
Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response – Parallel and series resonances – Q factor – single tuned and double tuned circuits.

UNIT III   SEMICONDUCTOR DIODES   12
Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – Effect of temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV   TRANSISTORS   12
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V   SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only)   12
Tunnel diodes, PIN diode, varactor diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

                                                                          TOTAL: 60 PERIODS
TEXT BOOKS:
1. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" – Shaum series, Tata McGraw Hill (2001)
2. Salivahanan, N. Suresh kumar and A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition (2008).
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition (2008).

REFERENCES:
1. William H. Hayt, J.V. Jack, E. Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill (2011.)
2. A.Sudhakar, Shyammohan S Palli, "Circuits and Networks-Analysis and Synthesis", Tata McGraw Hill, 4th edition (2010)
3. Robert T.Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Education (2008).
4. J.Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2nd Edition (2008).
5. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition (2002).

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(a) BEE202   BASIC ELECTRICAL & ELECTRONICS ENGINEERING   L T P C
                (For Mechanical & Civil Branches)   4 0 0 4

UNIT I   ELECTRICAL CIRCUITS & MEASURMENTS   12
Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II   ELECTRICAL   MACHINES   12
Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS   12
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier

UNIT IV DIGITAL ELECTRONICS   12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (simple concepts)

UNIT V   FUNDAMENTALS OF COMMUNICATION ENGINEERING   12
Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).
                                                                TOTAL: 60 PERIODS

TEXT BOOKS:
1. R.S. Sedha, "Applied Electronics" S. Chand & Co., 2006.
2. V.N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.

REFERENCES:
1. Gnanavadivel,C. Senthilkumar, A. Vijaykumar, S. Joseph Gladwin, "Basic Electrical and Electronics Engineering", Anuradha Publishers (2011).
2. Muthusubramanian.R, Salivahanan.S and Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition (2006).
3. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
4. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers (2003).
5. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum Outline Series, McGraw Hill (2002).
6. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd., (1994).

(b)   BME202 BASIC CIVIL & MECHANICAL ENGINEERING   L T P C
                (For CSE, ECE, EEE, EIE & IT branches)   4 0 0 4

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS   15
Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.
Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT II   BUILDING COMPONENTS AND STRUCTURES   15
Foundations: Types – Bearing capacity – Requirement of good foundations.
Superstructure: Brick masonry – stone masonry – Beams –Columns – Lintels – Roofing – Flooring – Plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

                                                        TOTAL: 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III   POWER PLANT ENGINEERING   10
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV   IC ENGINES   10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V   REFRIGERATION AND AIR CONDITIONING SYSTEM   10
Terminology of Refrigeration and Air Conditioning: Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

                                                        TOTAL: 30 PERIODS

REFERENCES:
1. Shanmugam.G and Palanichamy.M.S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi (1996).
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. 1999.
3. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies (2005).
4. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam (2000).
5. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai (2000).

BCS231   COMPUTER PRACTICE LABORATORY – II   L T P C
                   (*Common to all branches*)   **0 1 2 2**

LIST OF EXPERIMENTS

1. UNIX COMMANDS

Study of Unix OS – Basic Shell Commands – Vi Editor.

2. SHELL PROGRAMMING

Simple Shell program – Conditional Statements – Testing and Loops.

3. C PROGRAMMING ON UNIX

Dynamic Storage Allocation – Pointers – Functions – File Handling.

TOTAL: 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- UNIX Clone Server – 1 No
- Nodes (thin client or PCs) – 33 Nos
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

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BPC231   PHYSICS AND CHEMISTRY LABORATORY – II   **L T P C**

(*Common to all branches*)   **0 0 3 2**

PHYSICS LABORATORY – II

LIST OF EXPERIMENTS
1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
4. Determination of viscosity of liquid – Poiseuille's method.
5. Spectrometer dispersive power of a prism.
6. Determination of Young's modulus of the material – uniform bending.
7. Torsional pendulum – Determination of rigidity modulus.

• **A minimum of FIVE experiments shall be offered.**

• **Laboratory classes on alternate weeks for Physics and Chemistry.**

CHEMISTRY LABORATORY – II

LIST OF EXPERIMENTS
1. Conductometric titration (Simple acid base)
2. Conductometric titration (Mixture of weak and strong acids)
3. Conductometric titration using $BaCl_2$ Vs Na_2SO_4
4. Potentiometric Titration (Fe^{2+} Vs $K_2Cr_2O_7$)
5. pH Titration (Acid & Base)
6. Determination of water of crystallization of a crystalline salt ($CuSO_4$)
7. Estimation of Ferric ion by spectrophotometry.

• **A minimum of FIVE experiments shall be offered.**

• **Laboratory classes on alternate weeks for Physics and Chemistry.**

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(a) BME231 COMPUTER AIDED DRAFTING AND MODELING LABORATORY   L   T   P   C
(For Mechanical & Civil Branches)   0   1   2   2

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: **Plotting of drawings must be made for each exercise and attached to the records written by students.**

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility – 30 Nos.
2. Licensed software for Drafting and Modeling – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 Nos.

(b)   BEE231   ELECTRICAL CIRCUITS LABORATORY   **L T P C**
          (For EEE & EIE branches)   **0 0 3 2**

LIST OF EXPERIMENTS

- Verification of ohm's laws and kirchoff's laws.
- Verification of Thevenin's and Norton's Theorem
- Verification of superposition Theorem
- Verification of maximum power transfer theorem.
- Verification of reciprocity theorem
- Measurement of self inductance of a coil
- Verification of mesh and nodal analysis.
- Transient response of RL and RC circuits for DC input.
- Frequency response of series and parallel resonance circuits.
- Frequency response of single tuned circuits.

TOTAL: 45 PERIODS

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(c)   BEC231 CIRCUITS AND DEVICES LABORATORY   **L T P C**
(For ECE, CSE & IT branches)   **0 0 3 2**

- Verification of KVL and KCL
- Verification of Thevenin and Norton Theorems.
- Verification of superposition Theorem.
- Verification of Maximum power transfer and reciprocity theorems.
- Frequency response of series and parallel resonance circuits.
- Characteristics of PN and Zener diode
- Characteristics of CE configuration
- Characteristics of CB configuration
- Characteristics of UJT and SCR
- Characteristics of JFET and MOSFET
- Characteristics of Diac and Triac.
- Characteristics of Photodiode and Phototransistor.

TOTAL: 45 PERIODS

BEG231   ENGLISH LANGUAGE SKILL LABORATORY (Skill of Listening)   L T P C
              (Common to all branches)   0 0 3 2

UNIT I (Micro Skills I)   4
Tasks (Type I): Lexical word identification
A. Identifying the homophones/words with silent letters/often mispronounced words
B. Identifying the missing words in native speech (Native accent)

Tasks (Type II): Decompressing structures
A. Expanding sound units into word clusters (Ex: verbs with multiple auxiliaries/contracted forms)
B. Identifying the constituent words in collocations/compound words/idiomatic phrases

UNIT II (Micro Skills II): Identifying tonal variations for meaning making   6
Tasks:
A. Punctuating the script after listening to it.
B. Marking word chunks/tone groups in transcript after listening to it.
C. Marking syllable stress in words.
D. Identifying tonal variations expressing rhetorical questions/ information seeking Questions / Exclamations / General statements.

UNIT III Content Comprehension and Making Inferences   12
Tasks:
A. Listening and filling in the chart
B. Multiple choice questions (Negative/factual)
C. True/False questions
D. Questions with multiple answers (choosing two/three correct answers)
E. Matching information
F. Filling the blanks (not more than three words)
G. Comprehending the text organization

UNIT IV Listening and act   8
Tasks:
A. Locating spots in a map following the given directions
B. Transferring data to graphs/diagrams/flow charts
C. Diagram/Picture completing tasks
D. Finding the answer through the process of elimination

TOTAL: 30 PERIODS

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BMA301   TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS   L T P C
                                  (Common to all branches)   3 1 0 4

OBJECTIVES

The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I   FOURIER SERIES   (9L+3T)

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT II   FOURIER TRANSFORMS   (9L+3T)

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

UNIT III   PARTIAL DIFFERENTIAL EQUATIONS   (9L+3T)

Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS   (9L+3T)

Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT V   Z - TRANSFORMS AND DIFFERENCE EQUATIONS   (9L+3T)

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

Lectures: 45   Tutorials: 15   Total: 60 Periods

TEXT BOOK

1. Grewal, B.S, "*Higher Engineering Mathematics*", 40th Edition, Khanna publishers, Delhi, (2007)

REFERENCES

1. Bali.N.P and Manish Goyal, "*A Textbook of Engineering Mathematics*", 7th Edition, Laxmi Publications(P) Ltd,007.
2. Ramana.B.V., "*Higher Engineering Mathematics*", Tata Mc-GrawHill Publishing Company limited, New Delhi ,2007.
3. Glyn James, "*Advanced Modern Engineering Mathematics*", 3rd Edition, Pearson Education, 2007.
4. Erwin Kreyszig, "*Advanced Engineering Mathematics*", 8th edition, Wiley India,2007.

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BCE301   ENVIRONMENTAL SCIENCE AND ENGINEERING   L T P C
(Common to 3rd Sem – Civil, CSE, IT, EEE and EIE   **3 0 0 3**
5th Sem – Mechanical, 7th Sem - ECE)

AIM

The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVE

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   14

Definition, scope and importance of environment – need for public awareness – concept 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 (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) –Introduction to biodiversity definition: genetic, species and ecosystem diversity –biogeographical classification of India – value of 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 loss, poaching of wildlife, man-wildlife conflicts –endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds. Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II   ENVIRONMENTAL POLLUTION   8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III   NATURAL RESOURCES   10

Forest resources: Use and over-exploitation, deforestation, case studies – timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over – utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in

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conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

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 of people; its problems and concerns, case studies – role of nongovernmental organization – environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation – consumerism and waste products – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – central and state pollution control boards- Public awareness.

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   6

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

                                                                                            TOTAL: 45

TEXT BOOKS:
1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2008.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:
1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, BS Publications, 2004.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental Law", Prentice Hall of India (P) Ltd., New Delhi, 2007.
4. Rajagopalan R, "Environmental Studies from Crisis to Cure", Oxford University Press, 2005.

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BCE302   APPLIED GEOLOGY   L T P C
                                                                    3 0 0 3

OBJECTIVE

At the end of this course the student shall be able to understand about geological formations, classification and morphology of rocks, and the importance of the study of geology for civil engineers with regard to founding structures like dams, bridges, buildings, etc. The student shall also be able to appreciate the importance of geological formation in causing earthquakes and land slides.

UNIT I   GENERAL GEOLOGY   9
Geology in Civil Engineering – Branches of geology – Earth Structures and composition – Elementary knowledge on continental drift and plate technologies. Earth processes – Weathering – Work of rivers, wind and sea and their engineering importance – Earthquake belts in India. Groundwater – Mode of occurrence – prospecting – importance in civil engineering.

UNIT II   MINERALOGY   9
Elementary knowledge on symmetry elements of important crystallographic systems – physical properties of minerals – study of the following rock forming minerals – Quartz family. Feldspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet – properties, behaviour and engineering significance of clay minerals – Fundamentals of process of formation of ore minerals – Coal and petroleum – Their origin and occurrence in India.

UNIT III   PETROLOGY   9
Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Description occurrence, engineering properties and distribution of following rocks. Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, shale conglo, Conglomerate and breccia. Metamorphic rocks. Quartzite, Marble, Slate, Phyllite, Gniess and Schist.

UNIT IV   STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD   9
Attitude of beds – Outcrops – Introduction to Geological maps – study of structures – Folds, faults and joints – Their bearing on engineering construction. Seismic and Electrical methods for Civil Engineering investigations.

UNIT V   GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING   9
Remote sensing techniques – Study of air photos and satellite images – Interpretation for Civil Engineering projects – Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road cuttings, Land slides – Causes and preventions. Sea erosion and coastal protection.

                                                                    TOTAL: 45

TEXT BOOKS
1. Parbin Singh, "Engineering and General Geology", Katson Publication House, 1987.
2. Krynine and Judd, "Engineering Geology and Geotechniques", McGraw-Hill Book Company, 1990

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

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BCE303   MECHANICS OF SOLIDS   L T P C
                                                                   3 1 0 4

OBJECTIVE

The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behaviour of members subjected to various type of forces. The subject can be mastered best by solving numerous problems.

UNIT I   STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS   12

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of Proportionality, Modulus of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – biaxial state of stress – stress at a point – stress on inclined plane – principal stresses and principal planes – Mohr's circle of stresses.

UNIT II   ANALYSIS OF PLANE TRUSS, THIN CYLINDERS / SHELLS   12

Stability and equilibrium of plane frames – types of trusses – analysis of forces in truss members' method of joints, method of sections, method of tension coefficients – thin cylinders and shells – under internal pressure – deformation of thin cylinders and shells.

UNIT III   TRANSVERSE LOADING ON BEAMS   12

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Theory of simple bending – analysis of stresses – load carrying capacity of beams – proportioning of sections

UNIT IV   DEFLECTION OF BEAMS AND SHEAR STRESSES   12

Deflection of beams – double integration method – Macaulay's method – slope and deflection using moment area method, Conjugate Beam method – variation of shear stress – shear stress distribution in rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections – shear flow – shear centre.

UNIT V   TORSION AND SPRINGS   12

Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs – deflection of springs.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS
1. Egor P Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi, 2003.
2. Bansal R.K. Strength of materials, Laxmi Publications, New Delhi – 2007.

REFERENCES
1. Subramanian R., Strength of materials, Oxford university press, New Delhi – 2005.
2. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, Tata McGraw-Hill publishing co., New Delhi – 2007.
3. Srinath L.S, Advanced Mechanics of Solids, Tata McGraw-Hill Publishing Co., New Delhi, 2003.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE304   MECHANICS OF FLUIDS   L T P C
                                                                                       3 1 0 4

OBJECTIVE

The student is introduced to the definition and properties of fluid. Principles of fluid statics, kinematics and dynamics are dealt with subsequently. The applications of similitude and model study are covered subsequently. After undergoing this course, the student would have learnt fluid properties and application to real situations of fluid flow.

UNIT I   DEFINITIONS AND FLUID PROPERTIES   7

Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum concept of system and control volume

UNIT II   FLUID STATICS & KINEMATICS   14

Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium Fluid Kinematics Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets – Velocity measurement (Pitot tube, current meter, Hot wire and hot film anemometer, float technique, Laser Doppler velocimetry)

UNIT III   FLUID DYNAMICS   13

Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle

UNIT IV   BOUNDARY LAYER AND FLOW THROUGH PIPES   13

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 – Pipes in series and in parallel – Pipe network

UNIT V   SIMILITUDE AND MODEL STUDY   13

Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS
1. Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995.
2. Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics", New Chand Bros., Roorkee
3. Rajput, R.K., "A text book of Fluid Mechanics" , S.Chand and Co.,New Delhi - 2007
4. Fox, Robert, W. and Macdonald, Alan.T, "Introduction to Fluid Mechanics", John Wiley & Sons, 1995
5. Modi.P.N., & Seth.S.M., Hydraulics & fluid Mechanics, Standard book house, New Delhi - 2005.

REFERENCES
1. Streeter, Victor, L. and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 1998.
2. E. John Finnemore and Joseph B. Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition, 2001.
3. Pernard Messay, "Mechanics of Fluids" 7th Edition, Nelson Thornes Ltd. U. K. 1998.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE305   CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICE   L T P C
4 0 0 4

OBJECTIVE

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. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

UNIT I   CONCRETE TECHNOLOGY   12

Cements – Grade of cements - manufacture of cement – concrete chemicals and Applications – Mix design concept – mix design as per BIS & ACI methods – manufacturing of concrete – Batching – mixing – transporting – placing – compaction of concrete – curing and finishing. Testing of fresh and hardened concrete – quality of concrete - Non – destructive testing.

UNIT II   CONSTRUCTION PRACTICES   13

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry – concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick –– weather and water proof – roof finishes – acoustic and fire protection.

UNIT III   SUB STRUCTURE CONSTRUCTION   13

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points - Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV   SUPER STRUCTURE CONSTRUCTION   12

Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

UNIT V   CONSTRUCTION EQUIPMENT   10

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling.

Total: 60

TEXT BOOKS

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
3. Varghese , P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
4. Shetty, M.S, "Concrete Technology, Theory and Practice," S. Chand and Company Ltd, New Delhi, 2005.

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REFERENCES

1. Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.
2. Sharma S.C. "Construction Equipment and Management", Khanna Publishers New Delhi, 1988.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.
4. Dr. Mahesh Varma, "Construction Equipment and its Planning and Application", Metropolitan Book Company, New Delhi, 1983.
5. Gambhir, M.L, "Concrete Technology", Tata McGraw – Hill Publishing Company Ltd, New Delhi, 2004

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE306   SURVEYING - I   L T P C
                                                                        3 0 0 3

OBJECTIVE
> At the end of the course the students will posses knowledge about Chain surveying, Compass surveying, Plane table surveying, Levelling, Theodolite surveying and Engineering surveys.

UNIT I   INTRODUCTION AND CHAIN SURVEYING   8
Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II   COMPASS SURVEYING AND PLANE TABLE SURVEYING   7
Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT III   LEVELLING AND APPLICATIONS   12
Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV   THEODOLITE SURVEYING   8
Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.

UNIT V   ENGINEERING SURVEYS   10
Reconnaissance, preliminary and location surveys for engineering projects - Lay out – Setting out works - Route Surveys for highways, railways and waterways - 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 - Setting out by offsets and angles - Vertical curves - Sight distances – Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts - Adits.

TOTAL: 45

TEXT BOOKS
1. Bannister A. and Raymond S., "Surveying", ELBS, 6th Edition, 1992.
2. Kanetkar T.P., "Surveying and Levelling", Vols. I and II, United Book Corporation, Pune, 1994.
3. Punmia B.C. "Surveying", Vols. I, II and III, Laxmi Publications, 1989.

REFERENCES
1. Clark D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, 6th Edition, 1971.
2. James M.Anderson and Edward M.Mikhail, "Introduction to Surveying", McGraw-Hill Book Company, 1985.
3. Heribert Kahmen and Wolfgang Faig, "Surveying", Walter de Gruyter, 1995.

BCE331   SURVEY PRACTICAL – I   **L T P C**
                                                                        0 0 4 2

OBJECTIVE

At the end of the course the student will posses knowledge about Survey field techniques
1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection – Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level
12. Fly levelling using tilting level
13. Check levelling
14. LS and CS
15. Contouring
16. Study of Theodolite

TOTAL: 60

SURVEY PRACTICAL I & SURVEY PRACTICAL II

LIST OF EQUIPMENTS
(For a batch of 30 students)

Sl.No	Description of Equipments	Quantity
1.	Total Station	3 Nos
2.	Theodolites	Atleast 1 for every 10 students
3.	Dumpy level	
4.	Plane table	
5.	Pocket Stereoscope	1
6.	Ranging rods	1 for a set of 5 students
7.	Levelling staff	
8.	Cross staff	
9.	Chains	
10.	Tapes	
11.	Arrows	

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BCE332   COMPUTER AIDED BUILDING DRAWING   L T P C
                                                                                                   0 0 4 2

OBJECTIVE

At the end of this course the student should be able to draft on computer building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the following:

1. Buildings with load bearing walls (Flat and pitched roof)   –
   Including details of doors and windows   15
2. RCC framed structures   -   15
3. Industrial buildings – North light roof structures – Trusses   -   15
4. Perspective view of one and two storey buildings   -   15

TOTAL: 60

TEXT BOOKS
1. Varma B.P., "Civil Engg. Drawing & House Planning" ,Khanna publishers, Delhi.
2. Balagopal & T.S. Prabhu., "Building drawing & detailing", Spades Publishers, Calicut.

REFERENCES
1. Shah.M.G., "Building drawing", Tata McGraw-Hill,1992.
2. Kumaraswamy N., Kameswara Rao A., "Building planning & Drawing",Charotar Publishing.
3. Shah, Kale and Patki, "Building Drawing with integrated approach to built environment",Tata McGraw-Hill.

Examination Guideline

30% of the end semester examination paper shall deal with planning, while the rest 70% shall be based on the drafting skill.

LIST OF EQUIPMENTS
(For a batch of 30 students)

Sl.No	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Licensed version of any reputed Analysis, Design & Drafting software	1 copy for a set of 3 students

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Curriculum & Syllabus for B.E. (CIVIL)   **Regulations-2011**

BEG331   COMMUNICATION SKILLS AND TECHNICAL SEMINAR – I   L T P C
(Common to all branches)   0 0 3 2
(To be conducted as a Practical Paper by the Depts of English for 3 hrs per week)

OBJECTIVES:
- To improve the learners' oral fluency in English
- To help the learners acquire the readiness to speak in English
- To develop the sub-skills required for paper presentations and group discussions
- To help the learners improve their vocabulary related to specific fields of technology
- To facilitate the development of the learners' proficiency in meaningful interaction
- To provide them linguistic support for managing vital sub-functions of communication

COURSE CONTENT:

A) Phonetic practice (7 hrs)
- English phonemes with special emphasis on the diphthongs
- Stress patterns for words that end with specific suffixes.
  (*'ion' , 'ic' 'ical' 'ious','ate' , 'ise/-ize', 'fy', 'logy', 'ity'*)

B) Speech practice (8 hrs)
- Speaking on the themes by developing the hints provided.
  The themes are:
  1. Cloning
  2. Artificial satellites
  3. Renewable sources
  4. Telecommunication
  5. Cyber Revolution
  6. Space research
  7. Polythene pollution
  8. Fossil fuels
  9. Climate change
  10. Ecological threats
  11. Water resources
  12. Nuclear technology
  13. Scientific farming
  14. Thermal power plants
  15. Natural calamities
  16. Robotics
  17. Artificial intelligence
  18. Role of Fibre Optics
  19. Exploration of Mars
  20. Gas turbines

C) Group Quiz on technical aspects related to the themes (4hrs)

D) Language Functions (8 hrs)
  1. comparing and contrast
  2. reporting the conversation of others
  3. talking about future plans and intentions
  4. giving reasons
  5. expressing preferences
  6. quantifying
  7. expressing certainty and uncertainty
  8. expressing opinions and impressions
  9. making suggestions

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10.   expressing assumptions
11.   evaluating options
12.   hypothesing/deducing
13.   defending a point of view

E) Seminar presentation on the themes allotted (18 hrs)
PROCEDURE:
A) Phonetic practice
All the speech sounds should be taught .The learners should be given drills in the pronunciation of at least 30 words for each sound. While practicing stress patterns, they should be encouraged to identify as many words as possible for each suffix endings.

B) Speech practice
Every student should be allowed to choose one theme to specialize in. (However not more than 4 students in a section can choose the same theme).The teacher has to prepare at least 4 hints development tasks on each theme and should provide chance to each learner to speak on those hints related to his/ her theme (5 minutes).The hints may be supplied to the students in advance. When a student speaks, the class should be encouraged to ask questions as well as note down the words related to the different fields.

C) Group Quiz on technical phrases related to the themes.
The class should be divided into groups that specialize on a particular theme. Each group should conduct a quiz (question & answer session) which will be answered by the other groups.

D) Language Functions
The teacher should build micro activities to develop the use of language required to handle these sub-functions of communication. In the process, the learners should get used to the linguistic elements needed for these functions.

E) Seminar presentation on the themes allotted
Each student should collect materials from books, journals and newspapers for his/her theme and prepare a short seminar paper. The presentation should be for 10 minutes. It should be followed 'open house' during which others should come forward to question, clarify, supplement or evaluate.

RECORD LAY OUT:
Every student has to maintain a record in which he/she has to incorporate the following details.
  • First page containing learner details and the topic of specialization.
  • Twenty words for each phoneme
  • Twenty words with stress marks for each suffix ending
  • Vocabulary list (technical words and compound words) related to the 20 themes identified for this semester.
  • Three news paper items, two journal items and three internet sources related to the special theme selected by the student.(To be pasted on the pages)
  • The Quiz questions of the group with expected answers.
  • The seminar paper presented by the learner with details about the open house.
  • Notes of observation. (Details about any three seminar paper presentations by others)
  • The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practicals.

                                                                                                    P = 45 Total = 45

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Curriculum & Syllabus for B.E. (CIVIL)   **Regulations-2011**

BMA404   NUMERICAL METHODS   (Common to EEE & Civil)   L T P C
3 1 0 4

OBJECTIVES
At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:
i.   The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
ii. When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
iii. The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
iv. Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I   SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS   9+3
Solution of equation - Fixed point iteration: $x=g(x)$ method – Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon methods – Iterative method - Gauss-Seidel method - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II   INTERPOLATION AND APPROXIMATION   9+3
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III   NUMERICAL DIFFERENTIATION AND INTEGRATION   9+3
Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.

UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS
9+3
Single step methods: Taylor series method – Euler methods for First order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V   BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL
DIFFERENTIAL EQUATIONS   9+3
Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS
1. Veerarjan,T and Ramachandran.T, "Numerical Methods with Programming in C",2nd Edition, Tata Mcgraw-Hill Pub.Co.Ltd, First Reprint 2007.
2. SankaraRao K, "Numerical Methods for Scientisits and Engineers", 3rd Edition, Prentice Hall of India Private Limited, New Delhi, 2007.

REFERENCES
1. P. Kandasamy, K. Thilagavathy And K. Gunavathy, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Gerald C.F. and Wheate.P.O, "Applied Numerical Analysis",Pearson Education Asia, New Delhi.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE401   APPLIED STRENGTH OF MATERIALS   L T P C
3 1 0 4

OBJECTIVES

This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition. This knowledge is very essential for an engineer to enable him in designing all types of structures and machines.

UNIT I   ENERGY PRINCIPLES   12

Strain energy and strain energy density – strain energy in traction, shear in flexure and torsion – castigliano's theorems – principle of virtual work – application of energy theorems for computing deflections in beams and trusses – Maxwell's reciprocal theorems

UNIT II   INDETERMINATE BEAMS   12

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) – theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams – slope & deflections in continuous beams (qualitative study only)

UNIT III   COLUMNS   12

Eccentrically loaded short columns – middle third rule – core section – columns of unsymmetrical sections – (angle channel sections) – Euler's theory of long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns - thick cylinders – compound cylinders.

UNIT IV   STATE OF STRESS IN THREE DIMENSIONS   12

Spherical and deviatory components of stress tensor - determination of principal stresses and principal planes – volumetric strain – dilatation and distortion – theories of failure – principal stress dilatation – principal strain – shear stress – strain energy and distortion energy theories – application in analysis of stress, load carrying capacity and design of members – residual stresses

UNIT V   ADVANCED TOPICS IN BENDING OF BEAMS   12

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – curved beams – Winkler Bach formula – stress concentration – fatigue and fracture

Lectures: 45 Tutorials: 15 Total: 60

TEXT BOOKS
1. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2003.
2. Rajput R.K., "Strength of Materials", S.Chand & Company Ltd., New Delhi, 2006.

REFERENCES
1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing company Ltd, 2007.
3. Srinath, L.S., "Advanced Mechanics and Solids", Tata-McGraw Hill publishing Company Limited, 2005.
4. Punmia B.C., "Theory of Structures (SMTS)",Vol 1 & II, Laxmi Publishing Private Limited, New Delhi, 2004.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE402   SOIL MECHANICS   **L T P C**
                                                                                   3 0 0 3

OBJECTIVE

After undergoing this course, the student gains adequate knowledge on engineering properties of soil.

UNIT I   INTRODUCTION   10

Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

UNIT II   SOIL WATER AND WATER FLOW   8

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.

UNIT III   STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT   10

Stress distribution in soil media – Boussinesq formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation – laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on final and time rate of consolidation

UNIT IV   SHEAR STRENGTH   9

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.

UNIT V   SLOPE STABILITY   8

Slope failure mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C-ϕ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures.

                                                                                   Total: 45

TEXT BOOKS
1. Punmia.B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 1995.
2. Gopal Ranjan and Rao A.S.R., "Basic and applied soil mechanics", New Age International Publishers, New Delhi, 2000.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995.
4. Khan I.H., "A text book of Geotechnical Engineering", Prentice Hall of India, New Delhi, 1999.

REFERENCES
1. Coduto, D.P., "Geotechnical Engineering Principles and Practices", Prentice Hall of India Private Limited, New Delhi, 2002.
2. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geo techniques", 6th Edition, Prentice-Hall, New Jersey, 2002.
3. Das, B.M, "Principles of Geo technical Engineering", 5th edition, Thomas Books/ cole, 2002.

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4. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2000.

BCE403   APPLIED HYDRAULIC ENGINEERING   L T P C
3 1 0 4
OBJECTIVE

Student is introduced to open channel flow characteristics including hydraulic jump and surges. Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught. Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel and design hydraulic machines.

UNIT I   OPEN CHANNEL FLOW   12
Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.

UNIT II   UNIFORM FLOW   11
Uniform flow – Velocity measurement – Manning's and Chezy's formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels

UNIT III   VARIED FLOW   12
Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Graphical integration, direct step and standard step method – Flow through transitions - Hydraulic jump – Types – Energy dissipation – Surges.

UNIT IV   PUMPS   12
Centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done – rotary pumps.

UNIT V   TURBINES   13
Turbines - draft tube and cavitations – Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction

Lectures: 45 Tutorials: 15 Total: 60
TEXT BOOKS
1. Subramanya K., "Flow in Open channels", Tata McGraw-Hill Publishing Company, 1994.
2. Modi, P.N and Seth S.M., "Hydraulic and Fluid Mechanics", Standard Book House, 2000.
3. Bansal R.K, "Fluid mechanics & Hydraulic machines", Laxmi Publishing Pvt Ltd, New Delhi, 2007.

REFERENCES
1. Jain A.K., "Fluid Mechanics (including Hydraulic Machines)", Khanna Publishers, 8th Edition, 1995.
2. Ranga Raju, K.G., "Flow through Open Channels", Tata McGraw-Hill, 1985.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE404   SURVEYING – II   **L T P C**
                                                                                      3 0 0 3

OBJECTIVE

At the end of the course the student will posses knowledge about Tachometric surveying, Control surveying, Survey adjustments, Astronomical surveying and Photogrametry.

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 - Anallactic 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 - Trignometric levelling - Single and reciprocal observations - Modern trends – Bench marking

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 - use of Nautical almanac - Star constellations - calculations for azimuth of a line.

UNIT V   HYDROGRAPHIC AND ADVANCE SURVEYING   **12**

Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge - Photogrammetry - Introduction – Basic concepts of Terrestial and aerial Photographs - Stereoscopy – Definition of Parallax. Electromagnetic distance measurement – Basic principles - Instruments – Trilateration. Basic concepts of Cartography and Cadastral surveying.

TOTAL: 45

TEXT BOOKS
1. Bannister A. and Raymond S., "Surveying", ELBS, 6th Edition, 1992.
2. Punmia B.C., "Surveying", Vols. I, II and III, Laxmi Publications, 1989.
3. Kanetkar T.P., "Surveying and Levelling", Vols. I & II, United Book Corporation, Pune, 1994.

REFERENCES
1. Clark D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971.
2. James M.Anderson and Edward M.Mikhail, "Introduction to Surveying", McGraw-Hill Book Company, 1985.
3. Wolf P.R., "Elements of Photogrammetry", McGraw-Hill Book Company, 2nd Edition, 1986.
4. Robinson A.H., Sale R.D. Morrison J.L. and Muehrche P.C., "Elements of Cartography", John Wiley and Sons, New York, 5th Edition, 1984.
5. Heribert Kahmen and Wolfgang Faig, "Surveying", Walter de Gruyter, 1995.

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BCE405   HIGHWAY ENGINEERING   L T P C
                                                                                          3 0 0 3

OBJECTIVE

The objective of the course is to educate the students on the various components of Highway Engineering. It exposes the students to highway planning, engineering surveys for highway alignment, Design of Geometric Elements of Highways and Urban roads, Rigid and Flexible pavements design. The students further learn the desirable properties of highway materials and various practices adopted for construction. This course enables the students to develop skill on evaluation of the pavements and to decide appropriate types of maintenance.

UNIT I   HIGHWAY PLANNING AND ALIGNMENT   9

History of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of Ongoing Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, Highway Research Board, 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, Kerbs, Shoulders and Footpaths [IRC Standards], Cross sections of different Class of Roads - Principles of Highway Financing.

UNIT II   GEOMETRIC DESIGN OF HIGHWAYS   9

Design of Horizontal Alignment – Horizontal Curves Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves 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   FLEXIBLE AND RIGID 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 [IRC Method and Recommendations - Problems] - Design Practice for Rigid Pavements – IRC Recommendations - concepts only.

UNIT IV   HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE   9

Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test - Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test - 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, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only].

                                                                                          TOTAL: 45

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TEXT BOOKS

1. Khanna K and Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, "Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi, 2000.

REFERENCES

1. C.S. Papacostas, P.D. Prevedouros ,"Transportation Engineering & Planning", Prentice Hall of India Pvt. Ltd., 2006.
2. IRC Standards (IRC 37 - 2001 & IRC 58 -1998).
3. Bureau of Indian Standards (BIS) Publications on Highway Materials Specifications for Road and Bridges, NORTH (India).

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BCE431   STRENGTH OF MATERIALS LABORATORY   L T P C
                                                                                                       0 0 3 2

OBJECTIVE

The experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains. Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.

LIST OF EXPERIMENTS

1. Test involving axial compression to obtain the stress – strain curve
2. Test involving axial tension to obtain the stress – strain curve and the strength
3. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness
4. Test involving flexure to obtain the load deflection curve and hence the stiffness
5. Tests on springs
6. Hardness tests
7. Shear test
8. Test for impact resistance
9. Tests on Cement

The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

Total: 45

LIST OF EQUIPMENTS (For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	UTM of minimum 400 KN capacity	1
2.	Torsion testing machine for steel rods	1
3.	Izod impact testing machine	1
4.	Hardness testing machine Rockwell Vicker's } (any 2) Brinnel	1 each
5.	Beam deflection test apparatus	1
6.	Extensometer	1
7.	Compressometer	1
8.	Dial gauges	Few
9.	Le Chatelier's apparatus	2
10.	Vicat's apparatus	2
11.	Mortar cube moulds	10

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BCE432   **HYDRAULIC ENGINEERING LABORATORY**   **L T P C**
                                                                              0 0 3 2

OBJECTIVE
   Student should be able to verify the principles studied in theory by conducting the experiments.

LIST OF EXPERIMENTS
1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes
7. Study of minor losses in pipes
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine
10. Study on performance characteristics of Kaplan turbine
11. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
12. Study on performance characteristics of reciprocating pump.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS

1. **Bernoulli's theorem – Verification Apparatus**   - 1 No.

2. Calculation of Metacentric height water tank   - 1 No.
       Ship model with accessories   - 1 No.

3. Measurement of velocity
       Pitot tube assembly   - 1 No**.**

4. Flow measurement
       Open channel flow
       (i) Channel with provision for fixing notches
       (Rectangular, triangular & trapezoidal forms)   - 1 Unit
       (ii) Flume assembly with provisions for conducting
       experiments on Hydraulic jumps, generation of
       surges etc.   - 1 Unit

5. Flow measurement in pipes
       (i) Venturimeter, U tube manometer fixtures like
              Valves, collecting tank   - 1 Unit
       (ii) Orifice meter, with all necessary fittings in
              Pipe lines of different diameters   - 1 Unit
       (iii) Calibration of flow through orifice tank with
              Provisions for fixing orifices of different shapes,
              collecting tank   - 1 Unit
       (iv) Calibration of flow through mouth piece
           Tank with provisions for fixing mouth pieces
           Viz external mouth pieces & internal mouth piece
              Borda's mouth piece   - 1 Unit

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6. Losses in Pipes

       Major loss – Friction loss
       Pipe lengths (min. 3m) of different diameters with
       Valves and pressure rapping & collecting tank   - 1 Unit
       Minor Losses
       Pipe line assembly with provisions for having
       Sudden contractions in diameter, expansions
       Bends, elbow fitting, etc.   - 1 Unit

7. Pumps

       (i) Centrifugal pump assembly with accessories
           (Single stage)   - 1 Unit
       (ii) Centrifugal pump assembly with accessories
           (Multi stage)   - 1 Unit
       (iii) Reciprocating pump assembly with accessories   - 1 Unit
       (iv) Deep well pump assembly set with accessories   - 1 Unit

8. Turbine

       (i) Impulse turbine assembly with fittings
           & accessories   - 1 Unit
       (ii) Francis turbine assembly with fittings
           & accessories   - 1 Unit
       (iii) Kaplan turbine assembly with fittings
           & accessories   - 1 Unit

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BCE433   **SURVEY PRACTICAL – II**   **L T P C**
                                                                    0 0 4 2

OBJECTIVE

At the end of the course the student will posses knowledge about Survey field techniques.

1. Study of theodolite
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Theodolite survey traverse
4. Heights and distances - Triangulation - Single plane method.
5. Tacheometry - Tangential system - Stadia system - Subtense system.
6. Setting out works - Foundation marking - Simple curve (right/left-handed) – Transition curve.
7. Field observation and Calculation of azimuth
8. Field work using Total Station.

TOTAL: 60 PERIODS

BEG431   COMMUNICATION SKILLS AND TECHNICAL SEMINAR – II   L T P C
                        (Common to all branches)   **0 0 3 2**
                 (To be conducted as a Practical Paper by the Depts of English for 3 hrs per week)

OBJECTIVES:
   1. To improve the learners' oral fluency in English
   2. To help the learners acquire the readiness to speak in English
   3. To develop the sub-skills required for paper presentations and group discussions
   4. To help the learners improve their vocabulary related to specific fields of technology
   5. To facilitate the development of the learners' proficiency in meaningful interaction
   6. To provide them linguistic support for managing vital sub-functions of communication.

COURSE CONTENT:

A) Phonetic practice (7 hrs)
All the English phonemes with special emphasis on the following
   1. /ae/ and /ei/
   2. /e/ and /i/
   3. First syllable and second syllable stress
   4. Three different ways of pronouncing 'ed' past tense endings eg. *'played', 'walked', 'wanted'*
   5. Correct pronunciation of commonly used words (A list of 1000 words will be suggested by the university)
   6. Silent letters

B) Speech practice (8 hrs)
Speaking on the themes by developing the hints provided.
The themes are:
1. Indian space missions
2. Converting agricultural wastes for useful purposes
3. Developments in transportation
4. Technology and agriculture
5. Impact of global warming
6. Desalination of water
7. Technology for national security
8. Industrial development and ecological issues
9. Applications of nano technology
10. Hazards of e-waste

C) Preparation of power point frames on the given topic (2 hrs)
   (Only pictures, graphs, equations should be given through power point and not the text of the presentation as such)

D) Language Functions (14 hrs)
Reporting the conversation of others
Using the third conditional
Expressing agreement and disagreement
Numerical expressions
Describing manner and frequency
Evaluating different standpoints
Developing an argument

Describing daily routines, events, and weather

D) Seminar presentation on the themes allotted using power point frames (14 hrs)

PROCEDURE:

A) Phonetic practice

The learners should be given drills in the pronunciation of at least 30 words for each sound. While practising stress patterns, they should be encouraged to identify as many words as possible for each pattern.

B) Speech practice

Every student should be allowed to choose one theme to specialize in. (However not more than 7 students in a section can choose the same theme).The teacher has to prepare at least 4 hints development tasks on each theme and should provide chance to each learner to speak on those hints related to his/ her theme (5 minutes).The hints may be supplied to the students in advance. When a student speaks, the class should be encouraged to ask questions as well as note down the words related to the different fields.

C) Language Functions

The teacher should build micro activities to develop the use of language required to handle these sub-functions of communication. In the process, the learners should get used to the linguistic elements needed for these functions.

D) Seminar presentation on the themes allotted

Each student should collect materials from books, journals and newspapers for his/her theme and prepare a short seminar paper. The presentation should be for 10 minutes using power point frames. It should be followed by an 'open house' during which others should come forward to question, clarify, supplement or evaluate.

RECORD LAY OUT:

Every student has to maintain a record in which he/she has to incorporate the following details.

- First page containing learner details and the topic of specialization.
- Twenty words for each phoneme /ae/, /ei/, /i/ and /e/
- Fifty words with first syllable stress and fifty for second syllable stress (The learner will be required to pronounce some of these words during the practical exam)
- Vocabulary list (technical words and compound words) related to the 10 themes identified for this semester.
- Three newspaper items, two journal items and three internet sources related to the special theme selected by the student.(To be pasted on the pages)
- The seminar paper presented by the learner with a soft copy of the power point frames.
- Notes of observation. (Details about any two seminar paper presentations by others)
- The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practicals.

P = 45 Total = 45

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BCE501   **IRRIGATION ENGINEERING**   **L T P C**
                                                                     3 0 0 3

OBJECTIVE

- The student shall understand the need and mode of irrigation. The student shall also know the irrigation management practices of the past, present and future. The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part. Finally, the student shall be in a position to conceive and plan any type of irrigation project.

UNIT I   INTRODUCTION   8
Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.

UNIT II   IRRIGATION METHODS AND WATER MANAGEMENT   9
Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation – Optimum use of water – Need for optimisation of water use – Methods for improving canal irrigation management – Water losses – On farm development works

UNIT III   CANAL IRRIGATION   8
Alignment of canals – Classification of canals – Canal falls – Types – Design of vertical drop – Cross drainage works – Types – Canal Head works – Canal regulators – River Training works.

UNIT IV   WEIRS AND TANKS   10
Weirs and Barrage – Classification of weirs – Layout of a diversion head work – component parts – Failure of weirs founded on impervious foundation – Bligh's creep theory – Khosla's theory – Tanks – Isolated tanks and tanks in series – Tank weirs – Types of tank weirs – Tank sluices

UNIT V   DAMS   10
Dams – Types of dams – Problems in dam construction – Factors governing the selection of particular type of dam – Selection of dam site – Gravity dam – Typical cross section – Forces acting on gravity dam – Earth dam – Types of Earth dam – Causes of failure – Arch dam – Types – Forces acting on arch dam – Spillways – Types

TOTAL: 45 PERIODS

TEXT BOOKS
1. Asawa, G.L., "Irrigation Engineering", New Age International Publishers, 2000
2. Punima B.C. & Pande B.B.Lal, "Irrigation and Water Power Engineering", Laxmi Publishing, New Delhi, 2007
3. Santosh Kumar Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publications Private Limited, New Delhi, 2009

REFERENCES
1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India Private Limited, 2000
2. Basak.N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co, New Delhi, 1999
3. Sharma R.K, "Irrigation Engineering", S.Chand and Company, 2007.

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BCE502   **STRUCTURAL ANALYSIS – I**   **L T P C**
                                                                                                              3 1 0 4
OBJECTIVE
- The members of a structure are subjected to internal forces like axial forces, shear forces, bending and torsional moments while transferring the loads acting on it. Structural analysis deals with analysing these internal forces in the members of the structures.

UNIT I   DEFLECTION OF DETERMINATE STRUCTURES   12
Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram – Mohr's correction

UNIT II   MOVING LOADS AND INFLUENCE LINES   12
                 (Determinate & Indeterminate Structures with Redundancy Restricted To One)
Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads.
Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures – Begg's deformeter

UNIT III   ARCHES   12
Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

UNIT IV   SLOPE DEFLECTION METHOD   12
Continuous beams and rigid frames (with and without sway) – Symmetry and antisymmetry – Simplification for hinged end – Support displacements

UNIT V   MOMENT DISTRIBUTION METHOD   12
Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway – Naylor's simplification.

                                                L:45 T:15, TOTAL: 60 PERIODS

TEXT BOOKS
1. Vaidyanadhan. R and Perumal. P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Laxmi Publications, New Delhi, 2003.
2. Punmia B.C., Theory of Structures (SMTS), Vol.2, Laxmi Publishing Private Limited, New Delhi, 2004.
3. Bhavikatti. S.S, Structural Analysis – Vol. 1 & Vol. 2, Vikas Publishing Private Limited., New Delhi, 2008

REFERENCES
1. Analysis of Indeterminate Structures – C.K. Wang, Tata McGraw-Hill, 2003.
2. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 6th Edition, 2003.

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BCE503   DESIGN OF REINFORCED CONCRETE ELEMENTS   L T P C
                                                                                                                        3 0 0 3

OBJECTIVE
- This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method. The design of Basic elements such as slab, beam, column and footing which form a part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included. At the end of course the student shall be in a position to design the basic elements of reinforced concrete structures.

UNIT I   METHODS OF DESIGN OF CONCRETE STRUCTURES   9
Materials for Concrete – Stress-Strain curve for concrete and reinforcing steel – Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code – Design of flexural members and slabs by working stress method – Properties of un-cracked section

UNIT II   LIMIT STATE DESIGN FOR FLEXURE   9
Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects – Analysis and design of singly and doubly reinforced rectangular and flanged beams

UNIT III   LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR AND TORSION   9
Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.

UNIT IV   LIMIT STATE DESIGN OF COLUMNS   9
Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns.

UNIT V   LIMIT STATE DESIGN OF FOOTING AND DETAILING   9
Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only – Standard method of detailing RC beams, slabs and columns – Special requirements of detailing with reference to erection process.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Private Limited, New Delhi 2002.
2. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi,2003.

REFERENCES
1. Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Rourkee
2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Limited, New Delhi.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE504   **ENVIRONMENTAL ENGINEERING – I**   **L T P C**
                                                                                  3 0 0 3

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

UNIT I   PLANNING FOR WATER SUPPLY SYSTEM   9
Public water supply system -Planning -Objectives -Design period - Population forecasting -Water demand -Sources of water and their characteristics -Surface and Groundwater- Impounding Reservoir Well hydraulics -Development and selection of source - Water quality - Characterization -Water quality standards.

UNIT II   CONVEYANCE SYSTEM   9
Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials - Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

UNIT III   WATER TREATMENT   9
Objectives -Unit operations and processes -Principles, functions design and drawing of Flash mixers, fiocculators, sedimentation tanks and sand filters -Disinfection- Residue Management.

UNIT IV   ADVANCED WATER TREATMENT   9
Aerator- Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination -Membrane Systems -Construction and Operation & Maintenance aspects of Water Treatment Plants -Recent advances -Membrane Processes

UNIT V   WATER DISTRIBUTION AND SUPPLY TO BUILDINGS   9
Requirements of water distribution - Components - Service reservoirs - Functions and drawings - Network design - Economics - Computer applications - Analysis of distribution networks - Appurtenances - operation and maintenance - Leak detection – Methods - Principles of design of water supply in buildings - House service connection - Fixtures and fittings - Systems of plumbing and drawings of types of plumbing.

                                                                  TOTAL: 45 PERIODS
TEXT BOOKS
6. Garg. S.K, "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
7. Modi. P.N. "Water Supply Engineering", Vol.1 Standard Book House, New Delhi, 2005.
8. Punmia. B.C, Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Private Limited, New Delhi, 2005.

REFERENCES
1. "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.
2. Syed R.Qasim and Edward M.Motley Guang Zhu, "Water Works Engineering Planning Design and Operation", Prentice Hall of India Private Limited, New Delhi, 2006.

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BCE505   **FOUNDATION ENGINEERING**   **L T P C**
3 0 0 3

OBJECTIVE
- The student acquires the capacity to assess the soil condition at a given location in order to suggest suitable foundation and also gains the knowledge to design various foundations.

UNIT I   SITE INVESTIGATION AND SELECTION OF FOUNDATION   9
Scope and objectives – Methods of exploration-auguring and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Data interpretation (Strength Parameters and Liquefaction potential) – Selection of foundation based on soil condition.

UNIT II   SHALLOW FOUNDATION   9
Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement.

UNIT III   FOOTINGS AND RAFTS   9
Types of foundation – Contact pressure distribution below footings and raft - Isolated and combined footings – Types and proportioning - Mat foundation– Types – applications - uses and proportioning - floating foundation.

UNIT IV   PILES   9
Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley's) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity – Group capacity by different methods (Feld's rule, Converse Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test – Forces on pile caps – under reamed piles – Capacity under compression and uplift.

UNIT V   RETAINING WALLS   9
Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil – Coloumb's wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Private Limited, New Delhi, 1995.
2. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Limited, New Delhi, 1999.
3. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", Wiley Easter Limited, New Delhi, India, 2003.

REFERENCES
1. Das, B.M. "Principles of Foundation Engineering", 5th Edition, Thomson Books / COLE, 2003.
2. Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1994.
3. Venkatramaiah.C, "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995.

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BCE506   **CONCRETE TECHNOLOGY**   **L T P C**
                                                                        3 0 0 3

OBJECTIVE
- The student should have learnt about various ingredients, properties and tests on fresh and hardened concrete that is commonly used in civil engineering constructions. Further student should be able to understand the various types of special concrete and their applications.

UNIT I   INGREDIENTS OF CONCRETE   9
Cement – constituents – Hydration – Tests on cement – Types of cement – Aggregates – properties and uses – Classification of aggregates – Properties and test on aggregates – gradation – Quality of water – Admixtures – Accelerators – Retarders – Water proofers – workability agents – air entraining admixtures

UNIT II   PROPERTIES OF CONCRETE   9
Properties of fresh concrete – Workability – Segregation – Bleeding – Properties of hardened concrete – Strength – Stress - Strain characteristics – Modulus of Elasticity – Shrinkage – Creep – Thermal properties – Permeability – Test for Tension, Compression and Flexure – Non-Destructive Test

UNIT III   CONCRETE MIX DESIGN AND QUALITY CONTROL OF CONCRETE   9
Quality Control - Frequency of sampling – Statistical analysis of test results – standard deviation – Coefficient of variation – Characteristic strength –Acceptance and rejection Criteria – Importance of water cement ratio– Importance of cover to concrete – Nominal mixes – Design Mixes – factors influencing the design mix – Mix Design by ACI and IS method.

UNIT IV   DURABILITY AND CONCRETE UNDER SPECIAL CIRCUMSTANCES   9
Durability – Strength and durability relationship – Permeability – Chemical and sulphate attack – Underground Construction – Concreting in Marine Environment – Under water Construction – Hot weather and Cold weather concreting.

UNIT V   SPECIAL CONCRETES   9
High Strength – High Performance Concrete – reactive powder concrete – Light weight, heavy weight and mass concrete – Self Compacting Concrete – Self Curing Concrete – Polymer Concrete – Fibre Reinforced Concrete – Ready Mixed Concrete – Ferro cement – Shortcrete – Vacuum concrete.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Shetty M.S., "Concrete Technology", S.Chand and Company, New Delhi, 2008
2. Santhakumar. A.R, "Conrete Technology", Oxford University Press, 2007
3. M.L. Gambhir, "Concrete Technology", Tata Mc-Graw Hill Company, Noida, 2011

REFERENCES
1. Orchard D.F., "Concrete Technology", Vol. I & II ,1998
2. Neville A.M., "Properties of Concrete", Pearson Education, 2008

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Curriculum & Syllabus for B.E. (CIVIL)   **Regulations-2011**

BCE531   CONCRETE AND HIGHWAY ENGINEERING LABORATORY   L T P C
                                                                    0 0 3 2

OBJECTIVE
- To learn the principles and procedures of testing Concrete and Highway materials

I. TESTS ON FRESH CONCRETE
1. Slump cone test
2. Flow table
3. Compaction factor
4. Vee bee test.

II. TESTS ON HARDENED CONCRETE
1. Compressive strength - Cube & Cylinder
2. Flexure test
3. Modulus Of Elasticity

III. TESTS ON BITUMEN
1. Penetration
2. Softening Point
3. Ductility
4. Viscosity
5. Elastic Recovery
6. Storage Stability

IV. TESTS ON AGGREGATES
1. Soundness
2. Proportioning of Aggregates
3. Water Absorption

V. TESTS ON BITUMINOUS MIXES
1. Determination of Binder Content
2. Marshall Stability and Flow values
3. Specific Gravity
4. Density.

TOTAL: 45 PERIODS

EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS

SL.NO	DESCRIPTION OF EQUIPMENTS	QUANTITY
1.	Concrete cube moulds	6
2.	Concrete cylinder moulds	3
3.	Concrete Prism moulds	3
4.	Sieves	1 set
5.	Concrete Mixer	1
6.	Slump cone	3
7.	Flow table	1
8.	Vibrator	1
9.	Trovels and planers	2 set
10.	Vee Bee Consistometer	1
11.	Aggregate impact testing machine	1
12.	Blains Apparatus	1
13.	Compression Testing Machine 200T capacity	1
14.	Flexure Testing Machine	1
15.	Compressometer	1

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE532   SOIL MECHANICS LABORATORY   **L T P C**
                                                                 0 0 3 2

OBJECTIVE
- The student acquires the capacity to test the soil to assess its Engineering and Index properties.

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - Density relationship using standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Determination of shear strength parameters.
9. Direct shear test on cohesionless soil
10. Unconfined compression test on cohesive soil
11. Triaxial compression test (demonstration only)
12. One dimensional consolidation test (Demonstration only)
13. Field density test (Core cutter and sand replacement methods)

TOTAL: 45 PERIODS

LIST OF EQUIPMENT (For a batch of 30 students)

SL.NO.	DESCRIPTION OF EQUIPMENTS	QUANTITY
1.	Sieves	2 sets
2.	Hydrometer	2 sets
3.	Liquid and plastic limit apparatus	2 sets
4.	Shrinkage limit apparatus	3 sets
5.	Proctor compaction apparatus	1 set
6.	CBR Apparatus	1
7.	Direct shear apparatus	1
8.	Thermometer	2
9.	Field density measuring device	2
10.	Triaxial shear apparatus	1
11.	Three gang consolidation test device	1

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE533   IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING   L T P C
                                                                             1 0 3 2

OBJECTIVE
- To impart the basic knowledge on the components and special features of various irrigation and environmental structures.

IRRIGATION ENGINEERING

Design and drawing of
1. Tank Surplus Weir
2. Tank Sluice with a Tower Head
3. Canal Drop
4. Canal Regulators and river regulators.
5. Cross-Drainage Works (Syphon Aqueduct type II & III)

ENVIRONMENTAL ENGINEERING

Design and drawing of
1. Sedimentation tank
2. Clariflocculator
3. Slow sand filters
4. Rapid sand filters
5. Secondary settling tanks
6. Trickling filter
7. Softner
8. Activated sludge process
9. Sludge digestion tank
10. Septic tank with dispersion trench and soak pit.

TOTAL: 60 PERIODS

TEXT BOOKS
1. Modi, P.N., "Environmental Engineering I & II", Standard Book House, Delhi
2. Sathyanarayana Murthy, "Irrigation Design And Drawing" published by Mrs.L.Banumathi, Tuni East Godavari District A.P 1998
3. Sharma R.K. Irrigation Engineering and Hydraulic Structures Oxford and IBH Publishing Company, New Delhi 2002.

REFERENCES
1. Peary, H.S., ROWE, D.R., Tchobanoglous, G., "Environmental Engineering", McGraw-Hill Book Company, New Delhi, 1995.
2. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4th Edition, Tata McGraw-Hill, New Delhi, 2003.
3. Garg S.K., "Irrigation Environmental Engineering and design Structures-I", Khanna Publishers, New Delhi, 17th Reprint, 2003.
4. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
5. Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BGE501   **PROFESSIONAL ETHICS AND HUMAN VALUES**   **L T P C**
                                                                                                       3 0 0 3
OBJECTIVE
- To create awareness on Engineering Ethics and Human Values. Instill Moral and Social Values and Loyalty. To appreciate the rights of others

UNIT I   HUMAN VALUES   10
Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT II   ENGINEERING ETHICS   9
Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III   ENGINEERING AS SOCIAL EXPERIMENTATION   9
Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT IV   SAFETY, RESPONSIBILITIES AND RIGHTS   9
Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining – confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V   GLOBAL ISSUES   8
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers - consulting engineers - engineers as expert witnesses and advisors -Moral leadership-sample code of Ethics of ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India.

TOTAL: 45 PERIODS
TEXT BOOKS
1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES
1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE601   DESIGN OF REINFORCED CONCRETE AND BRICK   L T P C
**   MASONRY STRUCTURES   3 0 0 3**

OBJECTIVE
- This course covers the design of Reinforced Concrete Structures such as Retaining Wall, Water Tanks, Staircases, Flat slabs and Principles of design pertaining to Box culverts, Mat foundation and Bridges. The student has a comprehensive design knowledge related to structures, systems that are likely to be encountered in professional practice.

UNIT I   RETAINING WALLS   9
Retaining wall – Types – Design and detailing of cantilever and counter fort retaining walls

UNIT II   WATER TANKS   9
Design – Underground rectangular tanks – Domes – Overhead circular and rectangular tanks – Design of staging and foundations

UNIT III   SELECTED TOPICS   9
Staircase – Types – Design of staircases (ordinary and doglegged) – Design of flat slabs – Design of Reinforced concrete walls – Principles of design of mat foundation, box culvert and road bridges

UNIT IV   YIELD LINE THEORY   9
Application of virtual work method to square, rectangular, circular and triangular slabs

UNIT V   BRICK MASONRY   9
Introduction, Classification of walls, Lateral supports and stability, effective height of wall and columns, effective length of walls, design loads, load dispersion, permissible stresses, design of axially and eccentrically loaded brick walls

TOTAL: 45 PERIODS

TEXT BOOKS
1. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Limited, New Delhi 2009.
2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 2006.
3. Varghese, P.C., "Advanced Reinforced Concrete Structures", Prentice Hall of India Private Limited, New Delhi, 2007.

REFERENCES
1. Mallick, D.K. and Gupta A.P., "Reinforced Concrete", Oxford and IBH Publishing Company, 2007
2. Krishna Raju, N., "Design of RC Structures", CBS Publishers and Distributors, Delhi, 2006
3. Ram Chandra.N. and Virendra Gehlot, "Limit State Design", Standard Book House, 2004.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE602   **STRUCTURAL ANALYSIS – II**   **L T P C**
                                                                                  3 1 0 4

OBJECTIVE
- To know the advanced method of analysis like Matrix method, Plastic Analysis and Space Structures.

UNIT I   FLEXIBILITY MATRIX METHOD   12
Equilibrium and compatibility – Determinate Vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT II   STIFFNESS MATRIX METHOD   12
Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames

UNIT III   FINITE ELEMENT METHOD   12
Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain - Triangular elements

UNIT IV   PLASTIC ANALYSIS OF STRUCTURES   12
Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems

UNIT V   SPACE AND CABLE STRUCTURES   12
Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables – suspension bridges with two and three hinged stiffening girders

L:45 T:15, TOTAL: 60 PERIODS

TEXT BOOKS
1. Bhavikatti, S.S, "Structural Analysis – Vol. 1 Vol. 2", Vikas Publishing House Private Limited, New Delhi, 2008
2. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003.

REFERENCES
1. Vaidyanathan.R and Perumal.P, "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2003
2. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press, London and New York, 2003.
3. Coates R.C, Coutie M.G. and Kong F.K., "Structural Analysis", ELBS and Nelson, 1990
4. G.S. Pandit & S.P. Gupta, "Structural Analysis – A Matrix Approach", Tata McGraw Hill 2004.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE603   **DESIGN OF STEEL STRUCTURES**   **L T P C**
                                                                 3 1 0 4

OBJECTIVE
- This course covers the design of structural steel members subjected to compressive, tensile and bending loads as per current codal provisions (IS 800 - 2007) including connections. Design of structural systems such as roof trusses, gantry girders is included.

UNIT I   INTRODUCTION   12
Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using rivets, welding, bolting – Design of bolted, riveted and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts

UNIT II   TENSION MEMBERS   10
Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III   COMPRESSION MEMBERS   14
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base

UNIT IV   BEAMS   12
Types of simple beam connections – Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders riveted and welded – Intermediate and bearing stiffeners – Web splices

UNIT V   ROOF TRUSSES AND INDUSTRIAL STRUCTURES   12
Roof trusses – Roof and side coverings – Design loads – design of purlin and elements of truss– end bearing – Design of gantry girder

                                           L: 45 T:15, TOTAL: 60 PERIODS
TEXT BOOKS
1. Dayaratnam.P, "Design of Steel Structures", Second Edition, S. Chand & Company, 2003.
2. Ramachandra.S and Virendra Gehlot, "Design of Steel Structures – Vol. I & II", Standard Publication, New Delhi, 2007
3. Bhavikatti.S.S. ,"Design of steel Structures", I.K. International Private Limited, 2009.
4. IS 800-2007 Indian Standard General Construction in Steel – code of practice (3rd Revision).

REFERENCES
1. "Teaching Resources for Structural Steel Design – Vol. I & II", INSDAG, Kolkatta.
2. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., "Design of Steel Structures", 3rd Edition, McGraw-Hill Publications, 1992
3. Negi L.S., Design of Steel Structures, Tata McGraw Hill Publishing Private Limited, New Delhi, 2007.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE604   **ENVIRONMENTAL ENGINEERING – II**   **L T P C**
                                                                                                                    3 0 0 3

OBJECTIVE
- To educate the student on the principles and design of Sewage Collection, it's Conveyance, treatment and disposal.

UNIT I   PLANNING FOR SEWERAGE SYSTEMS   9
Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.

UNIT II   SEWER DESIGN   9
Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage - Plumbing System for Buildings – One pipe and two pipe system.

UNIT III   PRIMARY TREATMENT OF SEWAGE   9
Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects.

UNIT IV   SECONDARY TREATMENT OF SEWAGE   9
Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

UNIT V   DISPOSAL OF SEWAGE AND SLUDGE   9
Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Soil dispersion system - Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2003.
2. Punmia, B.C., Jain, A.K., and Jain.A., Environmental Engineering, Vol. II, Lakshmi Publications, Newsletter, 2005.

REFERENCES
1. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997.
2. Wastewater Engineering – Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2003.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE631   ENVIRONMENTAL ENGINEERING LABORATORY   L T P C
0 0 3 2

OBJECTIVE
- This subject includes the list of experiments to be conducted for characterisation of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterisation of water and wastewater.
2. Determination of
    i) pH and turbidity
    ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of lime dozing
9. Determination of Optimum Coagulant Dosage
10. Determination of available Chlorine in Bleaching powder
11. Determination of dissolved oxygen
12. Determination of suspended, volatile and fixed solids
13. B.O.D. test
14. C.O.D. test
15. Introduction to Bacteriological Analysis (Demonstration only)

TOTAL: 45 PERIODS

REFERENCES
1. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998
2. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi
3. Modi, P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi-6

LIST OF EQUIPMENTS (For a batch of 30 students)

1. pH meter   -   1 No.
2. Turbidity meter   -   1 No.
3. Conductivity meter   -   1 No.
4. Refrigerator   -   1 No.
5. BOD incubator   -   1 No.
6. Muffle furnace   -   1 No.
7. Hot air oven   -   1 No.
8. Magnetic stirrer with hot plates   -   5 Nos.
9. Desicator   -   1 No.
10. Jar test apparatus   -   1 No.
11. Water bath   -   1 No.
12. Furniture   -   1 lot
13. Glass waves / Cruicibles   -   1 lot
14. Chemical balance   -   1 No.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE632   COMPUTER AIDED DESIGN AND DRAFTING LABORATORY   L T P C
0 0 3 2

OBJECTIVE
- The student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

1. Design and detailing of Reinforced Cement Concrete cantilever and counter fort type retaining walls with reinforcement details
2. Design of solid slab and Reinforced Cement Concrete Tee beam bridges for Indian Road Congress loading and reinforcement details
3. Design and detailing of Intz type water tank, circular and rectangular water tanks
4. Design of plate girder bridge – Twin Girder deck type railway bridge – Truss Girder bridges – Detailed Drawings including connections

TOTAL: 45 PERIODS

TEXT BOOKS
1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers 2004.
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi Publications Private Limited, 2003.

REFERENCES
1. Krishnamurthy, D., "Structural Design & Drawing – Vol. II", CBS Publishers & Distributors, Delhi 1992.
2. Krishnamurthy, D., "Structural Design & Drawing – Vol. III Steel Structures", CBS Publishers & Distributors, New Delhi 1992.

LIST OF EQUIPMENTS

1. Models of Structures   -   1 each.
2. Computers Pentium IV   -   30 Nos.
3. Auto CAD Software
        - Multi user License   -   1 No.

BCE633   **SURVEY CAMP**   **L T P C**
                                                                                       0 0 0 2

Ten days survey camp using Theodolite, level, chains, cross staff, levelling staff, tapes and total station. The camp must involve work on a large area of not less than 400 hectares. The camp record shall include all original field observations, calculations and plots.

i)   Triangulation
ii)   Trilateration
iii) Contouring
iv)   Fly and Check levelling
v)   LS and CS
vi)   Sun / Star observation to determine azimuth
vii) Use of GTS to determine latitude and longitude
viii) Surveying using Total Station

EVALUATION PROCEDURE

1.	*Internal Marks* (decided by the staff in-charge appointed by the Institution)	40 marks
2.	*Evaluation of Survey Camp Report* (Evaluated by the external examiner appointed by the COE with the approval of HOI)	20 marks
3.	*Viva voce Examination* (evaluated by the internal examiner appointed by the HOD with the approval of HOI and external examiner appointed by the COE with the approval of HOI – with equal Weightage)	40 marks
	TOTAL	**100 MARKS**

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE701   STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING   L T P C
                                                                                      3 0 0 3

OBJECTIVE:
- The main objective of this course is to introduce the student about phenomena of earthquakes, the process, measurements and the factors that affect the design of structures in seismic areas. This objective is achieved through imparting rudiments of theory of vibrations necessary to understand and analyse the dynamic forces caused by earthquakes and structures. Further, the student is also taught the codal provisions as well as the Aseismic design methodology.

UNIT I   THEORY OF VIBRATIONS   9

Concept of inertia and damping – Types of Damping – Difference between static forces and dynamic excitation – Degrees of freedom – SDOF idealisation – Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse – Duhamel integral

UNIT II   MULTIPLE DEGREE OF FREEDOM SYSTEM   9

Two degree of freedom system – Normal modes of vibration – Natural frequencies - Mode shapes - Introduction to MDOF systems – Decoupling of equations of motion – Concept of mode superposition (No derivations).

UNIT III   ELEMENTS OF SEISMOLOGY   9

Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound – Epicentre – Hypocentre – Primary, shear and Raleigh waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales – Spectral Acceleration - Information on some disastrous earthquakes

UNIT IV   RESPONSE OF STRUCTURES TO EARTHQUAKE   9

Response and design spectra – Design earthquake – concept of peak acceleration – Site specific response spectrum – Effect of soil properties and damping – Liquefaction of soils – Importance of ductility – Methods of introducing ductility into RC structures.

UNIT V   DESIGN METHODOLOGY   9

IS 1893, IS 13920 and IS 4326 – Codal provisions – Design as per the codes – Base isolation techniques – Vibration control measures – Important points in mitigating effects of earthquake on structures.

                                                                    TOTAL: 45 PERIODS

TEXT BOOKS
1. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", 2nd Edition, Pearson Education, 2003.
2. Pankaj Agarwal & shrikhande, "Earth quake resistant Design of Structures", PHI Learning, 2009.
3. Paz, M., "Structural Dynamics – Theory & Computation", CSB Publishers & Distributors, Shahdara, Delhi, 1985

REFERENCES
1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw–Hill Book Company, NewYork, 1964
2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 2009
3. NPEEE Publications.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE702   PRESTRESSED CONCRETE STRUCTURES   L T P C
                                                                         3 0 0 3
OBJECTIVE
- The student shall have knowledge of methods of prestressing, advantages of prestressing concrete, the losses involved and the design methods for prestressed concrete elements under codal provisions.

UNIT I   INTRODUCTION – THEORY AND BEHAVIOUR   9

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 – Partial prestressing – Applications.

UNIT II   DEFLECTION AND LOSSES   9

Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Losses in pretensioned and post tensioned members – Estimation of crack width

UNIT III   DESIGN OF PRESTRESSED CONCRETE BEAMS   12

Pre tensioned and post tensioned simply supported rectangle, I, T sections – Stress method – Design for flexure, bond and shear – IS Code provisions. End block: Introduction – Transmission length – End zone reinforcement – Anchorage zone stresses – Guyon and Magnel method – Calculation of bearing stress and bursting tensile forces – Reinforcement in Anchorage zone.

UNIT III   CIRCULAR PRESTRESSING   7

Design of prestressed concrete tanks – fixed & hinged base – Pipes

UNIT IV   COMPOSITE CONSTRUCTION   8

Analysis for stresses – Differential shrinkage –Deflections of composite members – Flexural strength of composite members

TOTAL: 45 PERIODS

TEXT BOOKS
1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 1998
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Company Private Limited, 1997.
3. Rajagopalan, N, "Prestressed Concrete", Alpha Science, 2002

REFERENCES
1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
3. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete - A design guide, McGraw Hill, New Delhi 1992.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE703   ESTIMATION AND QUANTITY SURVEYING   L T P C
3 0 0 3

OBJECTIVE
- To know the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works. This subject covers the rate analysis, valuation of properties and preparation of reports for estimation of various items. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student should also be able to prepare value estimates.

UNIT I   ESTIMATE OF BUILDINGS   11
Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT II   ESTIMATE OF OTHER STRUCTURES   10
Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.

UNIT III   SPECIFICATION AND TENDERS   8
Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements.

UNIT IV   VALUATION   8
Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease

UNIT V   REPORT PREPARATION   8
Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Private Limited, 2003
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand and Company Limited, 2004

REFERENCES
1. PWD Data Book.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE704   RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING   L T P C
                                                                                                3 0 0 3

OBJECTIVE
- This course imparts the knowledge of planning, design, construction and maintenance of railway tracks. The student develops skills on airport planning and design with the prime focus on runway and taxiway geometrics. Students become conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders. The students acquire knowledge on site reconnaissance for location and planning of harbours.

UNIT I   RAILWAY PLANNING AND DESIGN   10
Role of Indian Railways in National Development – Railways for Urban Transportation – LRT & MRTS - Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipments) - Permanent Way, its Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks -Sleepers – Functions, Materials, Density – Functions, Materials, Ballastless Tracks - Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves.

UNIT II   RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION   8
Points and Crossings - Design of Turnouts, Working Principle - Signalling, Interlocking and Track Circuiting - Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage - Track Modernisation– Automated maintenance and upgrading, Re-laying of Track, Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings.

UNIT III   AIRPORT PLANNING AND DESIGN   10
Role of Air Transport, Components of Airports - Airport Planning – Air traffic potential, Site Selection, Design of Components, Cost Estimates, Evaluation and Institutional arrangements Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage - Taxiway Design – Geometric Design Elements, Minimum Separation Distances, Design Speed, Airport Drainage - Airport Zoning - Clear Zone, Approach Zone, Buffer Zone, Turning Zone, Clearance over Highways and Railways

UNIT IV   AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL   7
Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts - Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities - Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings - Air Traffic Control – Basic Actions, Air Traffic Control Network - Helipads, Hangars, Service Equipments.

UNIT V   HARBOUR ENGINEERING   10
Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports - Requirements and Classification of Harbours - Site Selection and Selection Investigation – Speed of water, Dredging, Range of Tides, Waves and Tidal Currents, Littoral Transport with Erosion and Deposition, Soundings, Anchoring Grounds, Geological Characteristics, Winds & Storms, Position and Size of Shoals - Shore Considerations-Proximity to Towns/Cities, Utilities, Construction Materials, Coast Lines - Dry and Wet Docks, Planning and Layouts - Entrance, Position of Light Houses, Navigating - Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids - Coastal Structures-Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders - Coastal Shipping, Inland Water Transport and Container Transportation.

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TOTAL: 45 PERIODS

TEXT BOOKS

1. Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1998.
2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.
3. S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.

REFERENCES

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.
3. Oza.H.P. and Oza.G.H., "A course in Docks & Harbour Engineering", Charotar Publishing Company, 1976.
4. J.S. Mundrey, "A course in Railway Track Engineering", Tata McGraw Hill, 2000.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BMG601   **PRINCIPLES OF MANAGEMENT**   **L T P C**
                                                                                3 0 0 3

OBJECTIVES
- To get the skills needed to successfully manage an organization.
- To understand concepts of strategic and tactical organizational planning.
- Implement employee motivational approaches and conflict management skills.
- To describe common performance appraisal processes.
- To understand group and team management, management development, and employee training.
- Describe concepts of controlling and control systems.

UNIT I   FOUNDATIONS   9
Historical developments – approaches to management – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization, Meaning, features merits and demerits.

UNIT II   MANAGERS AND ENVIRONMENT   9
Social responsibility–Planning – Objectives – Setting Objectives – Process of Managing through Objectives – Strategies- Policies and Planning Premises- Forecasting – Decision-making.

UNIT III   FUNCTIONAL AREA OF ORGANISATION   9
Formal and informal organization – Organization Chart – Structure and Process – Departmentation by different strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness.

UNIT IV   MOTIVATION AND DIRECTIONS   9
Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication.

UNIT V   CONTROLLING STRATEGIES   9
System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology– Computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management.

                                                                    TOTAL: 45 PERIODS

TEXT BOOKS
1. Hellriegel, Slocum & Jackson, "Management – A Competency Based Approach", Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and mark V Cannice, "Management – A global & Entrepreneurial Perspective", Tata Mcgraw Hill, 12th edition, 2007.

REFERENCES
1. Stephen P. Robbins and Mary Coulter, "Management", Prentice Hall of India", 8th edition, 2012.
2. Charles W.L Hill, Steven L McShane, "Principles of Management", McGraw Hill Education, Special Indian Edition, 2007.
3. Vijayaraghavan G.K & Sivakumar M. "Principles of Management", Lakshmi Publications, 1st Edition, 2011.
4. Ramachandran. S. "Principles of Management" Air Walk Publications, 1st Edition, 2007.

BCE731   **CIVIL SOFTWARE APPLICATION LABORATORY**   **L T P C**
                                                                    0 0 4 2

OBJECTIVE
- To develop the ability to design steel and concrete structural components and transfer the design into drawings as per Indian Standard Codes using commercially available software

DEVELOPMENT AND IMPLEMENTATION OF PROGRAM USING SOFTWARE

1. Analysis & Design of 2D & 3D Truss
2. Analysis & Design of 2D & 3D Frames
3. Design and detailing of trusses & frames (2D & 3D)
4. Structural design of Steel Gable Frames
5. Analysis and Design of simple two storey buildings

TOTAL: 60 PERIODS

REFERENCES / MANUALS / SOFTWARE
6. STRAP / STAAD Pro / SAP 2000.
7. Krishnaraju, N., "Structural Design & Drawing", (Concrete & Steel – Volume II and III) CBS Publishers, 2004.
8. Punmia B.C., Jain, Ashok Kumar and Jain, Arun Kumar., "Comprehensive Design of Steel Structures", Laxmi Publications Private Limited, 2003.
9. Krishnamurthy, D., "Structural Design and Drawing", Vol. II & III, CBS, Publishers & Distributors, Delhi, 1992.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE732   **DESIGN PROJECT**   **L T P C**
                                                                          0 0 4 2

OBJECTIVE

- This course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, references, specifications if any and complete set of drawings which follow the design. In building design, the results of Manual design should be compared with design results obtained by using soft wares like STAAD PRO, STRAP etc.

                                                                          TOTAL: 60 PERIODS

EVALUATION PROCEDURE

1.	*Internal Marks* (decided by the staff in-charge appointed by the Institution)	40 marks
2.	*Evaluation of Project Report* (Evaluated by the external examiner appointed by the COE with the approval of HOI)	20 marks
3.	*Viva voce Examination* (evaluated by the internal examiner appointed by the HOD with the approval of HOI and external examiner appointed by the COE with the approval of HOI – with equal Weightage)	40 marks
	TOTAL	**100 MARKS**

BCE733   **COMPREHENSION**   **L T P C**
                                                                          0 0 3 1

OBJECTIVE
- The objective of this course is to make the student comprehend through a series of lectures, the knowledge pool he/she has gone through seven semesters. This should form a basis on which the student shall be able to perform better in competitive examinations and interviews.

TOTAL: 45 PERIODS

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE801   **CONSTRUCTION PLANNING AND SCHEDULING**   **L T P C**
3 0 0 3

OBJECTIVE
- The student is expected to learn how to plan construction projects, schedule the activities using network diagrams, determine the cost of the project, control the cost of the project by creating cash flows and budgeting and how to use the project information as an information and decision making tool

UNIT I   CONSTRUCTION PLANNING   8
Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems.

UNIT II   SCHEDULING PROCEDURES AND TECHNIQUES   12
Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software.

UNIT III   COST CONTROL MONITORING AND ACCOUNTING   9
The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

UNIT IV   QUALITY CONTROL AND SAFETY DURING CONSTRUCTION   8
Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT V   ORGANIZATION AND USE OF PROJECT INFORMATION   8
Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.
2. Srinath,L.S., "Pert and CPM Priniples and Applications ", Affiliated East West Press, 2001

REFERENCES
1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
2. Moder.J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Company, 3rd Edition, 1983.

BCE831   **PROJECT WORK**   **L T P C**
                                                                         0 0 12 8

OBJECTIVE
- The project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college where the student is registered. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.

This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability.

TOTAL: 180 PERIODS

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BCE001   **HYDROLOGY**   **L T P C**
                                                                                                       3 0 0 3

OBJECTIVE
- To understand all the components of the hydrological cycle. The mechanics of rainfall, its spatial and temporal measurement and their applications will be understood. Simple statistical analysis and application of probability distribution of rainfall and run off shall also be understood.

UNIT I   PRECIPITATION   9
Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

UNIT II   ABSTRACTION FROM PRECIPITATION   9
Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT III   HYDROGRAPHS   9
Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

UNIT IV   FLOODS AND FLOOD ROUTING   9
Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

UNIT V   GROUND WATER HYDROLOGY   9
Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Company, Limited, 2000
2. Raghunath, H.M., "Hydrology", Wiley Eastern Limited, 2000.
3. Jayaramy Reddy.P., "Hydrology", Tata McGraw-Hill Publications Private Limited, New Delhi, 2003.
4. Santosh Kumar Garg, "Hydrology and Water Resources Engineering", Khanna Publications Private Limited, New Delhi, 2009.

REFERENCES
1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Limited, 2000
2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Limited, 2000.

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**BCE002   REMOTE SENSING TECHNIQUES AND GEOGRAPHIC
                            INFORMATION SYSTEM   L T P C
                                                                                                       3 0 0 3**

OBJECTIVE
- To introduce the student 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.

UNIT I   EMR AND ITS INTERACTION WITH ATMOSPHERE   9
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT II   PLATFORMS AND SENSORS   9
Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.

UNIT III   IMAGE INTERPRETATION AND ANALYSIS   9
Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT IV   GEOGRAPHIC INFORMATION SYSTEM   9
Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT V   DATA ENTRY, STORAGE AND ANALYSIS   9
Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman, "Remote Sensing and Image Interpretation", 5th Edition, John Willey and Sons (Asia) Private Limited, New Delhi. PP: 763., 2004
2. Anji Reddy, M., "Remote Sensing and Geographical Information System", 2nd Edition, BS Publications, Hyderabad, 2001.

REFERENCES
1. Lo. C.P.and A.K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India Private Limited, New Delhi, Pp:492., 2002.
2. Peter A.Burrough, Rachael A.McDonnell, "Principles of GIS", Oxford University Press, 2000.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE003   **PAVEMENT ENGINEERING**   **L T P C**
                                                                         3 0 0 3

OBJECTIVE
- To know the various IRC guidelines for designing flexible and rigid pavements and to assess quality and serviceability conditions of roads.

UNIT I   TYPE OF PAVEMENT AND STRESS DISTRIBUTION   9
Introduction - Pavement as layered structure - Pavement types - flexible and rigid - Stress and deflections in pavements under repeated loading

UNIT II   DESIGN OF FLEXIBLE PAVEMENTS   9
Flexible pavement design - Empirical– Semi empirical and theoretical Methods –Design procedure as per latest IRC guidelines - Design and specification of rural road

UNIT III   DESIGN OF RIGID PAVEMENTS   9
Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Joints in rigid pavements - Concrete roads and their scope in India.

UNIT IV   PERFORMANCE EVALUATION AND MAINTENANCE   9
Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V   STABILISATION OF PAVEMENTS   9
Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control – Stabilisation for rural roads in India - use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 1989.
2. Wright, P.H., "Highway Engineers", John Wiley & Sons, Inc., New York, 1996
3. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES
1. Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 1975.
2. Guidelines for the Design of Flexible Pavements, IRC: 37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC: 58-1998, the Indian Roads Congress, New Delhi.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE004   **HOUSING PLANNING AND MANAGEMENT**   **L T P C**
3 0 0 3

OBJECTIVE
- The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. The course focuses on cost effective construction materials and methods. Emphasis has also been given on the principles of sustainable housing policies and programmes.

UNIT I   INTRODUCTION TO HOUSING   9
Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II   HOUSING PROGRAMMES   9
Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations

UNIT III   PLANNING AND DESIGN OF HOUSING PROJECTS   9
Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV   CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS   9
New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V   HOUSING FINANCE AND PROJECT APPRAISAL   9
Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Private Limited, New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES
1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.
3. National Housing Policy, 1994, Government of India.

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BCE005   **GROUND WATER ENGINEERING**   **L T P C**
                                                                              3 0 0 3

OBJECTIVE
- To understand the distribution of ground water, evaluation of aquifer parameters, solving ground water equations. Ground water quality and development of ground water methods are dealt.

UNIT I   FUNDAMENTALS OF GROUND WATER   9
Introduction – Characteristic of Ground water – Distribution of water - ground water column – Permeability - Darcy's Law - Types of aquifers - Hydro geological Cycle – water level fluctuations.

UNIT II   HYDRAULICS OF FLOW   9
Storage coefficient - Specific field - Heterogeneity and Anisotropy -Transmissivity - Governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumptions - Velocity potential - Flow nets

UNIT III   ESTIMATION OF PARAMETERS   9
Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method - Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells.

UNIT IV   GROUND WATER DEVELOPMENT   9
Infiltration gallery - Conjunctive use - Artificial recharge Rainwater harvesting - Safe yield - Yield test – Geophysical methods – Selection of pumps.

UNIT V   WATER QUALITY   9
Ground water chemistry - Origin, movement and quality - Water quality standards - Saltwater intrusion – Environmental concern

TOTAL: 45 PERIODS

TEXT BOOKS
1. Raghunath H.M., "Ground Water Hydrology", Wiley Eastern Limited, 2000.
2. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, 2000.

REFERENCE
1. C Walton, "Ground Water Resource Evaluation", McGraw-Hill Publications 1998.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE006   MANAGEMENT OF IRRIGATION SYSTEMS   L T P C

3 0 0 3

OBJECTIVE
- To know concept of irrigation water management practices of the past, present and future.

UNIT I   IRRIGATION SYSTEM REQUIREMENTS   9
Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II   IRRIGATION SCHEDULING   8
Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNIT III   MANAGEMENT   9
Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV   OPERATION   9
Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V   INVOLVEMENT OF STAKE HOLDERS   10
Farmer's participation in System operation – Water users associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL: 45 PERIODS

TEXT BOOKS
1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Private Limited, New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES
1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE007   **COASTAL ZONE MANAGEMENT**   **L T P C**
                                                                        3 0 0 3

OBJECTIVE
- The student shall be able to understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.

UNIT I   COASTAL ZONE   9
Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II   WAVE DYNAMICS   10
Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III   WAVE FORECASTING AND TIDES   9
Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches – Surges and Tsunamis.

UNIT IV   COASTAL PROCESSES   8
Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V   HARBOURS   9
Structures near coast – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers – Effect of Mangalore forest.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Richard Sylvester, "Coastal Engineering, Volume I and II", Elseiner Scientific Publishing Company, 1999
2. Quinn, A.D., "Design & Construction of Ports and Marine Structures", McGraw-Hill Book Company, 1999

REFERENCES
3. Ed. A.T. Ippen, "Coastline Hydrodynamics", McGraw-Hill Inc., New York, 1993
4. Dwivedi, S.N., Natarajan, R and Ramachandran, S., "Coastal Zone Management in Tamilnadu".

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE008   **WATER RESOURCES ENGINEERING**   **L T P C**
                                                                        3 0 0 3

OBJECTIVE
- To know the different phases in Water Resources viz planning, collection of relevant data on water resources and also on National Water Policy. Reservoir planning, management and economic analysis aspects are covered in detail.

UNIT I   GENERAL   9
Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Economics of water resources planning, physical and socio economic data – National Water Policy – Collection of meteorological and hydrological data for water resources development.

UNIT II   NETWORK DESIGN   9
Hydrologic measurements – Analysis of hydrologic data – Hydrologic station network – Station network design – Statistical techniques in network design.

UNIT III   WATER RESOURCE NEEDS   9
Consumptive and non-consumptive water use - Estimation of water requirements for irrigation, for drinking and navigation - Water characteristics and quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget and development plan.

UNIT IV   RESERVOIR PLANNING AND MANAGEMENT   9
Reservoir - Single and multipurpose – Multi objective - Fixation of Storage capacity - Strategies for reservoir operation - Sedimentation of reservoirs - Design flood-levees and flood walls - Channel improvement.

UNIT V   ECONOMIC ANALYSIS   9
Estimation of cost and Evaluation of Benefits - Discount rate - Discounting factors - Discounting techniques – Computer Applications**.**

TOTAL: 45 PERIODS

TEXT BOOKS
1. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2000.
2. Douglas J.L. and Lee R.R., "Economics of Water Resources Planning", Tata McGraw-Hill Inc. 2000.
3. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers 1998

REFERENCES
1. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1997.
2. Goodman Alvin S., "Principles of Water Resources Planning", Prentice-Hall, 1984.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE009   **GROUND IMPROVEMENT TECHNIQUES**   **L T P C**
                                                                                                                   3 0 0 3

OBJECTIVE
- This course provides the knowledge on basic deficiencies of various soil deposits and implementing techniques of improvement.

UNIT I   INTRODUCTION   9
Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II   DRAINAGE AND DEWATERING   9
Drainage techniques - Well points - Vacuum and electro osmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III   INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS   9
Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV   EARTH REINFORCEMENT   9
Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works

UNIT V   GROUT TECHNIQUES   9
Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994.
2. Purushothama Raj, P. "Ground Improvement Techniques", Tata McGraw-Hill Publishing Company, New Delhi, 1995

REFERENCES
1. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.
2. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
3. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002
4. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996
5. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE010   **CONTRACT LAWS AND REGULATIONS**   **L T P C**
                                                                                    3 0 0 3

OBJECTIVE
- To know about the contract laws, tenders and legal requirements of construction.

UNIT I   CONSTRUCTION CONTRACTS   9
Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

UNIT II   TENDERS   10
Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Transparency in Tenders Act.

UNIT III   ARBITRATION   8
Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

UNIT IV   LEGAL REQUIREMENTS   9
Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

UNIT V   LABOUR REGULATIONS   9
Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration– Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamil Nadu Factory Act – Child Labour Act - Other Labour Laws

                                                                    TOTAL: 45 PERIODS
TEXT BOOKS
1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M.Tripathi Private Limited, Bombay, 1982
2. Tamilnadu PWD Code, 1986

REFERENCES
1. Jimmie Hinze, Construction Contracts, Second Edition, McGraw Hill, 2001
2. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, 6th Edition, McGraw Hill, 2000.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE011   **ENVIRONMENTAL IMPACT ASSESSMENT**   **L T P C**
                                                                          3 0 0 3

OBJECTIVE
- This subject deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same. The student is expected to know about the various impacts of development projects on environment and the mitigating measures.

UNIT I   INTRODUCTION   8
Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA

UNIT II   METHODOLOGIES   9
Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III   PREDICTION AND ASSESSMENT   9
Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA

UNIT IV   ENVIRONMENTAL MANAGEMENT PLAN   9
Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

UNIT V   CASE STUDIES   10
EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects

TOTAL: 45 PERIODS

TEXT BOOKS
1. Canter, R.L., "Environmental Impact Assessment", McGraw-Hill Inc., New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCES
1. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook", McGraw-Hill Book Company, 1990.
2. "Environmental Assessment Source book", Vol. I, II & III, The World Bank, Washington, D.C., 1991.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE012   INTRODUCTION TO SOIL DYNAMICS AND   L T P C
                MACHINE FOUNDATIONS   3 0 0 3

OBJECTIVE
- This course deals with dynamic properties of soil and various design parameters required for the design of machine foundation as well as design of foundation for various reciprocating machines.

UNIT I   INTRODUCTION   9
Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

UNIT II   WAVES AND WAVE PROPAGATION   9
Wave propagation in an elastic homogeneous isotropic medium- Raleigh, shear and compression waves-waves in elastic half space

UNIT III   DYNAMIC PROPERTIES OF SOILS   9
Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions

UNIT IV   DESIGN PROCEDURES   9
Design criteria - dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

UNIT V   VIBRATION ISOLATION   9
Vibration isolation technique - mechanical isolation - foundation isolation - isolation by location - isolation by barriers - active passive isolation tests.

                                                            TOTAL: 45 PERIODS
TEXT BOOKS
1. S.Prakesh & V.K Puri, Foundation for machines, McGraw-Hill 1993
2. Srinivasulu, P & Vaidyanathan, Hand book of Machine Foundations, McGraw-Hill, 1996

REFERENCES
1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Private Limited, 1999
2. Kramar S.L, "Geotechnical Earthquake Engineering", Prentice Hall International series, Pearson Education (Singapore) Private Limited, 1996.
3. Kameswara Rao, "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi, 2003
4. Kameswara Rao, "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998
5. IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill, 1996.
6. Moore P.J., "Analysis and Design of Foundation for Vibration", Oxford and IBH, 1995.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE013   **INDUSTRIAL WASTE MANAGEMENT**   **L T P C**
                                                                                   3 0 0 3

OBJECTIVE
- This course deals with the pollution from major industries and methods of controlling the same. To know about the polluting potential of major industries in the country and the methods of controlling the same.

UNIT I   INTRODUCTION   8
Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II   CLEANER PRODUCTION   8
Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III   POLLUTION FROM MAJOR INDUSTRIES   9
Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Pulp & Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV   TREATMENT TECHNOLOGIES   11
Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved in organics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

UNIT V   HAZARDOUS WASTE MANAGEMENT   9
Hazardous wastes - Physico chemical treatment – solidification – incineration – Secure land fills

                                                                          TOTAL: 45 PERIODS

TEXT BOOKS
1. M.N.Rao & A.K.Dutta, "Wastewater Treatment", Oxford - IBH Publication, 1995.
2. W.W.Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.

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

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE014   **FINITE ELEMENT TECHNIQUES**   **L T P C**
                                                                                 3 0 0 3

OBJECTIVE
- This course provides the basic knowledge of finite element method and shall be able to analyse linear elastic structures, which he has studied about in core courses, using finite element method.

UNIT I   INTRODUCTION – VARIATIONAL FORMULATION   9
General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT II   FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS   10
One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT III   FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS   10
Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

UNIT IV   ISOPARAMETRIC ELEMENTS AND FORMULATION   8
Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V   APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS   8
Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow
                                                                    TOTAL: 45 PERIODS

TEXT BOOK
1. Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", 3rd Edition, Prentice Hall, India, 2003.

REFERENCES
1. J.N.Reddy, "An Introduction to Finite Element Method", McGraw-Hill, Intl. Student Edition, 1985.
2. Zienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1, 4th Edition, McGraw-Hill, Book Co 1998.
3. S.S.Rao, "The Finite Element Method in Engineering", Pergaman Press, 2003.

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Curriculum & Syllabus for B.E. (CIVIL)   **Regulations-2011**

BCE015   **ECOLOGICAL ENGINEERING**   **L T P C**
                                                                              3 0 0 3

OBJECTIVE
  - This subject deals with the scope and applications of ecological effects for wastewater treatment and reuse. To know the various effects of industrialization on ecology and ecological based waste purification methods.

UNIT I   PRINCIPLES AND CONCEPTS   9
Scope and applications of Ecological Engineering – Development and evolution of ecosystems – principles and concepts pertaining to species, populations and community

UNIT II   ECOSYSTEM FUNCTIONS   10
Energy flow and nutrient cycling – Food chain and food webs – biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorous, sulphur and carbon dioxide – Habitat ecology - Terrestrial, fresh water, estuarine and marine habitats.

UNIT III   ECOLOGICAL ENGINEERING METHODS   9
Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems.

UNIT IV   ECOLOGICAL EFFECTS OF INDUSTRIALISATION   9
Ecological effects of exploration, production, extraction, processing, manufacture & transport.

UNIT V   CASE STUDIES   8
Case studies of integrated ecological engineering systems

                                                           TOTAL: 45 PERIODS

TEXT BOOKS
  1. Odum, E.P., "Fundamental of Ecology", W.B.Sauders, 1990.
  2. Kormondy, E.J., "Concepts of Ecology", Prentice Hall, New Delhi, 1996

REFERENCES
  1. Mitch, J.W. and Jorgensen, S.E., Ecological Engineering – An Introduction to Ecotechnology, John Wiley and Sons, 1996.
  2. Colinvaux, P., Ecology, John Wiley and Sons, 1996.
  3. Etnier, C & Guterstam, B., "Ecological Engineering for Wastewater Treatment", 2nd Edition, Lewis Publications, London, 1996.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE016   **BRIDGE STRUCTURES**   **L T P C**
                                                                                   3 0 0 3

OBJECTIVE
- This course shall be able to choose appropriate bridge structures and design it for given site conditions.

UNIT I   INTRODUCTION   9
Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

UNIT II   STEEL BRIDGES   9
Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT III   REINFORCED CONCRETE SLAB BRIDGES   9
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

UNIT IV   REINFORCED CONCRETE GIRDER BRIDGES   9
Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation

UNIT V   PRESTRESSED CONCRETE BRIDGES   9
Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

                                                                         TOTAL: 45 PERIODS

TEXT BOOKS
1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Company, New Delhi, 1990.
2. Rajagopalan,N "Bridge Superstructure", Alpha Science International, 2006

REFERENCES
1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1996.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE017   **ARCHITECTURE AND TOWN PLANNING**   **LT P C**
                                                                        3 0 0 3

OBJECTIVE
- To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.

UNIT I   ARCHITECTURAL DESIGN   8
Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

UNIT II   SITE PLANNING   9
Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

UNIT III   BUILDING TYPES   12
Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design

UNIT IV   CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN   8
Man and environment interaction - Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V   TOWN PLANNING   8
Planning – Definition, concepts and processes - Urban planning standards and zoning regulations - Urban renewal – Conservation – Principles of Landscape design

TOTAL: 45 PERIODS

TEXT BOOKS
1. Francis D.K. Ching, "Architecture: Form, Space and Order", VNR, New Yark, 1999.
2. Givoni B., "Man Climate and Architecture", Applied Science, Barking ESSEX, 1982
3. Edward D.Mills, "Planning and Architects Handbook", Butterworth London, 1995.

REFERENCES
1. Gallian B.Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Private Limited, New Delhi, 1995.
2. Margaret Robert, "An Introduction to Town Planning Techniques", Hutchinso London, 1990.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE018   MUNICIPAL SOLID WASTE MANAGEMENT   L T P C
3 0 0 3

OBJECTIVE
- This course covers the various sources and characterisation of municipal solid wastes and the on-site/off-site processing of the same and the disposal methods. The student is expected to know about the various effects and disposal options for the municipal solid waste.

UNIT I   SOURCES AND TYPES OF MUNICIPAL SOLID WASTES   9
Sources and types of solid wastes – Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – Public health effects. Principle of solid waste management – social & economic aspects Public awareness; Role of NGOs; Legislation.

UNIT II   ON-SITE STORAGE AND PROCESSING   9
On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT III   COLLECTION AND TRANSFER   9
Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT IV   OFF-SITE PROCESSING   9
Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V   DISPOSAL   9
Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment – monitoring ambient air quality – public health.

TOTAL: 45 PERIODS

TEXT BOOKS
1. George Tchobanoglous et.al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management", Springer, 1994.

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

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BCE019   **STORAGE STRUCTURES**   **L T P C**
                                                                          3 0 0 3

OBJECTIVE
- The main objective of this course is to impart the principles involved in designing structures which have to store different types of materials. The student at the end of the course shall be able to design concrete and steel material retaining structures.

UNIT I   STEEL WATER TANKS   12
Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

UNIT II   CONCRETE WATER TANKS   12
Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III   STEEL BUNKERS AND SILOS   7
Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV   CONCRETE BUNKERS AND SILOS   7
Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction

UNIT V   PRESTRESSED CONCRETE WATER TANKS   7
Principles of circular prestressing – Design of prestressed concrete circular water tanks

                                                                          TOTAL: 45 PERIODS
TEXT BOOKS
1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

REFERENCES
1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
3. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete - A design guide, McGraw Hill, New Delhi 1992

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE020   **DESIGN OF PLATE AND SHELL STRUCTURES**   **L T P C**
                                                                                                                    3 0 0 3

OBJECTIVE
  - At the end of this course the student shall understand the rudimentary principles involved in the analysis and design of plates and shells.

UNIT I   THIN PLATES WITH SMALL DEFLECTION   9
Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions

UNIT II   RECTANGULAR PLATES   9
Simply supported rectangular plates – Navier's solution and Levy's method.

UNIT III   THIN SHELLS   9
Classification of shells-structural actions – membrane theory

UNIT IV   ANALYSIS OF SHELLS   9
Analysis of spherical dome – cylindrical shells – folded plates

UNIT V   DESIGN OF SHELLS   9
Design of spherical dome – cylindrical shells – folded plates

TOTAL: 45 PERIODS

TEXT BOOKS
  1. Bairagi N K, A text book of Plate Analysis, Khanna Publishers, New Delhi, 1996.
  2. G.S. Ramaswamy, Design and Construction of Shell Structures, CBS Plublishers, New Delhi, 1996
  3. S. Timoshenko & S. Woinowsky – Krieger, "Theory of Plates and Shells", McGraw Hill Book Company

REFERENCES
  1. Szilard R, Theory and analysis of plates, Prentice Hall Inc, 1995
  2. Chatterjee B. K., Theory and Design of Concrete Shells, Oxford & IBH, New Delhi, 1998
  3. Billington D. P., Thin Shell Concrete Structures, McGraw-Hill, 1995.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE021   **TALL BUILDINGS**   **L T P C**
                                                                             3 0 0 3

OBJECTIVE

- This course deals with problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). To know the rudimentary principles of designing tall buildings as per the existing codes.

UNIT I   INTRODUCTION   9
The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads- Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading – Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II   THE VERTICAL STRUCTURE PLANE   10
Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT III   COMMON HIGH RISE STRUCTURES   10
The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV   APPROXIMATE STRUCTURAL ANALYSIS & DESIGN OF BUILDINGS   9
Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT V   OTHER HIGH-RISE BUILDING STRUCTURE   7
Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Wolfgang Schueller, "High - rise building Structures", John Wiley and Sons, New York 1976.
2. Bryan Stafford Smith and Alex Coull, "Tall Building Structures", Analysis and Design, John Wiley and Sons, Inc., 1991.

REFERENCES
1. Coull, A. and Smith, Stafford, B, "Tall Buildings", Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, "Structural Concepts and Systems for Architects and Engineers", John Wiley, 1994.
3. Taranath.B.S., "Structural Analysis and Design of Tall Buildings", Mc Graw Hill,1998

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BCE022   PREFABRICATED STRUCTURES   L T P C
                                                            3 0 0 3

OBJECTIVE
- This course shall be able to appreciate modular construction, industrialised construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.

UNIT I   INTRODUCTION   9
Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

UNIT II   PREFABRICATED COMPONENTS   9
Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

UNIT III   DESIGN PRINCIPLES   9
Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV   JOINT IN STRUCTURAL MEMBERS   9
Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT V   DESIGN FOR ABNORMAL LOADS   9
Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

TOTAL: 45 PERIODS

TEXT BOOKS
1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

REFERENCES
1. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978

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BCE023   **EXPERIMENTAL STRESS ANALYSIS**   **L T P C**
                                                                      3 0 0 3

OBJECTIVE
- To introduce the student to the basic concepts and principles of various strain measuring instruments and model analysis.

UNIT I   STRAIN MEASUREMENT METHODS   9
Strain gauges – basic characteristics – mechanical, optical, acoustic, electrical inductance and capacitance, pneumatic types – description and working principles – factors producing strain sensitivity – Gauge construction – temperature compensation – Gauge sensitivities and gauge factors – Strain rosettes –Calculation of principal strains and principal stresses.

UNIT II   MEASURING INSTRUMENTS   9
Linear Variable Differential Transducer – Cathode Ray Oscilloscope – XY Plotter – Digital Data Acquisition System – Hydraulic Jacks – Pressure Jacks – load cells – Proving Rings – Vibration meter – Wind Tunnel – Calibration of Testing Instruments.

UNIT III   PHOTO ELASTICITY   9
Two dimensional photo elasticity – Stress optic law – Polariscope – isoclinic and isochromatic fringes – compensators – Separation techniques – Model materials – Calibration of photo elastic materials.

UNIT IV   MODEL ANALYSIS   9
Model analysis – Direct and Indirect models – laws of structural similitude – choice of scales – Model materials – Limitations of model studies –Buckingham pi theorem –Design of direct and indirect models – Begg's Deformeter and its applications.

UNIT V   ADVANCED TECHNIQUES   9
Fundamentals of photo elastic coatings – Morie fringe and Brittle coating technique – crack detection techniques – Introduction to stress freezing technique. – Introduction to nondestructive testings – Holography

                                                            TOTAL: 45 PERIODS

TEXT BOOKS
1. Dally and Railey, "Experimental stress analysis", 2003.
2. Richard G Budynas, "Advanced Strength and Applied Stress Analysis", Tata McGraw Hill Publishing Company Limited, New Delhi, 2011

REFERENCES
1. Sadhu Singh, "Experimental stress analysis", Khanna Publishers, New Delhi, 2005.
2. Dove and Adam, "Experimental stress analysis and Motion measurements",1989

BCE024   COMPUTER AIDED DESIGN OF STRUCTURES   L T P C
3 0 0 3

OBJECTIVE
- The main objective of this programme is to train the student in the use of computers and creating a computer code as well as using commercially available software for the design of Civil Engineering structures.

UNIT I   INTRODUCTION   9
Fundamentals of CAD - Hardware and software requirements - Design process - Applications and benefits.

UNIT II   COMPUTER GRAPHICS   9
Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards – Drafting packages

UNIT III   STRUCTURAL ANALYSIS   9
Fundamentals of finite element analysis - Principles of structural analysis - Analysis packages and applications.

UNIT IV   DESIGN AND OPTIMISATION   9
Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V   EXPERT SYSTEMS   9
Introduction to artificial intelligence - Knowledge based expert systems - Rules and decision tables – Inference mechanisms - Simple applications.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Limited, New Delhi, 1993.
2. Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House, New Delhi, 1993

REFERENCES
1. Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford, 1990.
2. Rao S.S., "Optimisation Theory and Applications", Wiley Eastern Limited, New Delhi, 1977.
3. Richard Forsyth (Ed), "Expert System Principles and Case Studies", Chapman and Hall, London, 1989.

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BCE025   **INDUSTRIAL STRUCTURES**   **L T P C**
                                                                                          3 0 0 3

OBJECTIVE
- This course deals with some of the special aspects with respect to Civil Engineering structures in industries. At the end of this course the student shall be able to design some of the structures.

UNIT I   PLANNING   9
Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II   FUNCTIONAL REQUIREMENTS   9
Lighting – Ventilation – Acoustics – Fire safety – Guidelines from factories act.

UNIIT III   DESIGN OF STEEL STRUCTURES   9
Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV   DESIGN OF R.C. STRUCTURES   9
Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V   PREFABRICATION   9
Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TOTAL: 45 PERIODS

TEXT BOOKS
1. Purushothaman.P, "Reinforced Concrete Structural Elements", McGraw-Hill Inc., US (September 1984)
2. Dayaratnam, P., "Design of Steel Structures", Second edition, S. Chand & Company, 2003.
3. Ramachandra, S. and Virendra Gehlot, "Design of Steel Structures – Vol. I & II", Standard Publication, New Delhi, 2007.

REFERENCES
1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.

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BCE026   SMART STRUCTURES AND SMART MATERIALS   L T P C
                                                                                                     3 0 0 3

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

UNIT I   INTRODUCTION   9
Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II   MEASURING TECHNIQUES   9
Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III   SENSORS   9
Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT IV   ACTUATORS   9
Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electro rheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

UNIT V   SIGNAL PROCESSING AND CONTROL SYSTEMS   9
Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

                                                                                        TOTAL: 45 PERIODS
TEXT BOOKS
1.   Brain Culshaw, "Smart Structure and Materials" Artech House Borton, London-1996.

REFERENCES
3. L. S. Srinath, "Experimental Stress Analysis" Tata McGraw-Hill, 1998.
4. J. W. Dally & W. F. Riley, "Experimental Stress Analysis", Tata McGraw-Hill, 1998.

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BCE027   **AIR POLLUTION MANAGEMENT**   **L T P C**
                                                                             3 0 0 3

OBJECTIVE
- This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.

UNIT I   SOURCES AND EFFECTS OF AIR POLLUTANTS   9
Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Ambient Air Quality Standards – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II   DISPERSION OF POLLUTANTS   9
Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III   AIR POLLUTION CONTROL   12
Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries (Cement, Smelter, Pulp & Paper and Thermal Power Plant).

UNIT IV   AIR QUALITY MANAGEMENT   8
Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

UNIT V   NOISE POLLUTION   7
Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention

TOTAL: 45 PERIODS

TEXT BOOKS
1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Limited, New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.

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

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BCE028   EARTHQUAKE GEOTECHNICAL ENGINEERING   L T P C
                                                                                3 0 0 3

OBJECTIVE
- The main objective of this course is to introduce to the student the phenomena of earthquakes, the process, measurements and the factors that affect the design of structures in seismic areas.

UNIT I   ELEMENTS OF EARTHQUAKE SEISMOLOGY AND DYNAMICS   9
Mechanism of Earthquakes – Causes of earthquake – Earthquake Fault sources – Elastic Rebound theory – Seismic wave in Earthquake shaking – Definition of earthquake terms – Locating an earthquake – Quantification of earthquakes.

UNIT II   GROUND MOTION CHARACTERISTICS   9
Strong Motion Records – Characteristics of ground motion – Factors influencing ground motion – Estimation of frequency content parameters – Seismic site investigations – Evaluation of Dynamic soil properties.

UNIT III   GROUND RESPONSE ANALYSIS AND GROUND MOTION   9
Wave propagation Analysis – Site Amplification – Need for Ground Response Analysis – Shear Beam analysis – Methods of analyses – One Dimensional Analysis – Equivalent linear Analysis - Site effects – Design Ground Motion – Developing Design Ground Motion – Codal provisions

UNIT IV   SEISMIC STABILITY ANALYSIS   9
Earthquake – Resistant Design of foundation of buildings – Design considerations – Geotechnical – Architectural – Structures – Capacity Design – Seismic analysis. Dynamic Analysis – Earth pressure due to ground shaking - Liquefaction–Susceptibility – evaluation – Cyclic stress approach – Liquefaction Resistance – Laboratory and Field Tests – Interpretation– Lateral Deformation – Codal recommendation

UNIT V   EARTHQUAKE HAZARD MITIGATION   9
Seismic risk vulnerability and hazard – Percept of risk – Risk mapping – Hazard assessment – Maintenance and modifications to improve hazard resistance – Different type of foundation and its impact on safety – Ground Improvement Techniques.

                                                                    TOTAL: 45 PERIODS

TEXT BOOKS
1. KameswaraRao, N.S.V., "Dynamics soil tests and applications", Wheeler Publishing – New Delhi, 2000.
2. Krammer S.L., "Geotechnical Earthquake Engineering", Prentice Hall, International series Pearson Education (Singapore) Pvt. Ltd., 2004.
3. Kameswara Rao, "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998.

REFERENCES
1. McGuire, R.K., "Seismic Hazard and Risk Analysis", Earthquake Engineering Research Institute, MNo – 10, ISBN 0-943198-01-1, 2004.
2. Mahanti, N.C., Samal, S.K., Datta, P., Nag N.K., "Disaster Management", Narosa Publishing House, New Delhi, India ISBN : 81-7319-727X-2006

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BCE029   REPAIR AND REHABILITATION OF STRUCTURES   L T P C
3 0 0 3

OBJECTIVE
- To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I   MAINTENANCE AND REPAIR STRATEGIES   9
Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration

UNIT II   SERVICEABILITY AND DURABILITY OF CONCRETE   11
Quality assurance for concrete construction concrete properties- strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking

UNIT III   MATERIALS FOR REPAIR   9
Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT IV   TECHNIQUES FOR REPAIR AND DEMOLITION   8
Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures - case studies.

UNIT V   REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES   8
Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, Repair of Concrete Structures, Blakie and Sons, UK, 1987

REFERENCES
1. M.S.Shetty, Concrete Technology - Theory and Practice, S.Chand and Company, New Delhi, 1992.
2. Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing , "RHDC-NBO" Anna University, July 1992.
3. Raikar, R.N., Learning from failures - Deficiencies in Design, Construction and Service - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. N.Palaniappan, Estate Management, Anna Institute of Management, Chennai, 1992.
5. Lakshmipathy, M. etal. Lecture notes of Workshop on "Repairs and Rehabilitation of Structures", 29 - 30th October 1999.

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Curriculum & Syllabus for B.E. (CIVIL)   Regulations-2011

BMG701   **TOTAL QUALITY MANAGEMENT**   **L T P C**
                                                          3 0 0 3

OBJECTIVES
- To introduce the principles of business and social excellence,
- To generate knowledge and skills of students to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector.

UNIT I   INTRODUCTION   9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – Contributions of Deming, Juran and Crosby – Cost of Quality, Analysis Techniques for Quality Costs -Barriers to TQM.

UNIT II   TQM PRINCIPLES   9
Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, - Business Excellence Model-Rajiv Gandhi National Quality Award

UNIT III   TQM TOOLS & TECHNIQUES I   9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking– Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV   TQM TOOLS & TECHNIQUES II   9
Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V   QUALITY SYSTEMS   9
Need for ISO 9000 -   ISO 9000-2000 Quality System –Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

                                                          TOTAL: 45 PERIODS
TEXT BOOKS
1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint (2010).
2. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.

REFERENCES
1. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Limited, Oxford, 3rd Edition, 2003.
2. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Private Limited, 2006.
3. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Private Limited, 2006.
4. Ramachandran, S. "Total Quality Management", Air Walk Publications, 2nd Edition, 2008.

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BGE003   **INTELLECTUAL PROPERTY RIGHTS (IPR)**   **L T P C**
                                                                                  3 0 0 3
OBJECTIVES
- To create awareness on Intellectual Property Rights (IPR).
- To understand patents and copyrights.
- To know about application procedures of IPR

UNIT I   TYPES OF PROPERTY   9
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property (ii). Immovable Property and (iii). Intellectual Property.

UNIT II   PATENTS AND APPLICATION PROCEDURES   9
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark Registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT III   INTERNATIONAL PARTICES   9
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV   LEGISLATIONS AND POLICY   9
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V   CASE STUDIES   9
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications –Protection against unfair competition.

TOTAL: 45 PERIODS

TEXT BOOK
1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Private Limited, 1998.

REFERENCES
1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1974.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. www.ipmatters.net/features/000707_gibbs.html.

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Curriculum & Syllabus for B.E. (CIVIL)   **Regulations-2011**

BGE801   ENGINEERING ECONOMICS AND COST ANALYSIS   L T P C
3 0 0 3

OBJECTIVE
- To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

UNIT I   INTRODUCTION TO ECONOMICS   9
Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V ratio, Elementary economic Analysis – Material selection for product Design selection for a product, Process planning.

UNIT II   VALUE ENGINEERING   9
Make or buy decision, Value engineering – Function, aims, and Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate.

UNIT III   CASH FLOW   9
Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method.

UNIT IV   REPLACEMENT AND MAINTENANCE ANALYSIS   9
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT V   DEPRECIATION   9
Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Inflation adjusted decisions – procedure to adjust inflation, comparison of alternatives and determination of economic life of asset.

TOTAL: 45 PERIODS
TEXT BOOKS
1. PanneerSelvam, R, "Engineering Economics", Prentice Hall of India Limited, New Delhi, 2001.
2. Suma Damodaran, "Managerial Economics", Oxford University Press, 2006.

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REFERENCES

1. Chan S.Park, "Contemporary Engineering Economics", Prentice Hall of India, 2002.
2. Donald.G. Newman, Jerome.P.Lavelle, "Engineering Economics and analysis", Engg. Press, Texas, 2002
3. Degarmo, E.P., Sullivan,W.G and Canada.J.R, "Engineering Economy", Macmillan, New York, 1984
3. Grant.E.L.,Ireson.W.G., and Leavenworth, R.S, "Principles of Engineering Economy", Ronald Press, New York,1976.
4. Smith, G.W., "Engineering Economy", Lowa State Press, Iowa, 1973.
5. Truett & Truett, "Managerial economics-Analysis, problems & cases", Wiley India 8th Edition, 2004.
6. Luke M Froeb / Brian T Mccann, "Managerial Economics – A problem solving approach", Thomson learning 2007.