Faculty of Engineering & Technology

B.Tech(Civil Engineering)

Scheme of Examination & Detailed Syllabi

(w.e.f. 2015-2016)

University Campus
NH-12, Chaksu Bypass, Tonk Road, Jaipur-303901

Phone : 0141-3020500/555,Fax : 0141-3020538

Plot No.-IP-2 & 3, Phase-IV, Sitapura Industrial Area, Jaipur-202022

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** Approved by AC vide resolution no. …… dated ……..*

Course Structure (Civil Engineering)

FIRST SEMESTER (COMMON TO ALL BRANCH)

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3		-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3		-	30	70	100	3
BT 105	English & Communication Skills	3		-	30	70	100	3
BT 106	Engineering Chemistry	3		-	30	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Work shop	-	-	2	30	20	50	1
	TOTAL	18	2	10	330	520	850	25

SECOND SEMESTER(COMMON TO ALL BRANCH)								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to Computer Programming *	3	-	-	30	70	100	3
BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication skill Lab*	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**850**	**25**

THIRD SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BTCE 301	Numerical Analysis and Statistical Techniques	3	-	-	30	70	100	3
BTCE 302	Strength of material and mechanics of solids	3	1	-	30	70	100	4
BTCE 303	Civil Engineering Building Materials	3	-	-	30	70	100	3
BTCE 304	Engineering Geology	3	-	-	30	70	100	3
BTCE 305	Soil Mechanics	3	-	-	30	70	100	3
BTCE 306	Fluid Mechanics	3	1	-	30	70	100	4
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 307	Building Drawing Lab	-	-	2	30	20	50	1
BTCE 308	Fluid Mechanics Lab	-	-	2	30	20	50	1
BTCE 309	Engineering Geology Lab	-	-	2	30	20	50	1
BTCE 310	Building Material Testing Lab	-	-	2	30	20	50	1
BTCE 311	GD&soft skill	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**850**	**25**

FOURTH SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BTCE 401	Advanced civil engineering Construction Technology	3		-	30	70	100	3
BTCE 402	Structural Analysis	3	1	-	30	70	100	4
BTCE 403	Hydraulics & Hydraulic Machines	3		-	30	70	100	3
BTCE 404	Modern Concrete Technology	3		-	30	70	100	3
BTCE 405	Surveying-I	3	1	-	30	70	100	4
BTCE 406	Geo-Technical Engineering	3		-	30	70	100	3

PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 407	Concrete Lab	-	-	2	30	20	50	1
BTCE 408	Hydraulic Lab	-	-	2	30	20	50	1
BTCE 409	Surveying Lab	-	-	2	30	20	50	1
BTCE 410	Geo-Technical Engineering Lab	-	-	2	30	20	50	1
BTCE 411	Project Cum Seminar	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**850**	**25**
4 -6 weeks training will be held after fourth semester,viva will be conducted in fifth sem.								

FIFTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BTCE 501	Transportation Engineering I	3		-	30	70	100	3
BTCE 502	Water Resources Engineering*	3		-	30	70	100	3
BTCE 503	Steel Structure-I	3		-	30	70	100	3
BTCE 504	Theory Of Structures	3	1	-	30	70	100	4
BTCE 505	Surveying II	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose any one)								
BTCE 506A	**Foundation Engineering**	**3**	-	-	**30**	70	100	**3**
BTCE 506B	Object Oriented Programming in C++	3	-	-	**30**	70	100	3
BTCE 506C	Ground Improvement Techniques	3	-	-	**30**	70	100	3
BTCE 506D	Advanced Construction Materials	3	-	-	**30**	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 507	Road Material Testing Lab	-	-	2	30	20	50	1
BTCE 508	Design Steel Structure Lab	-	-	2	30	20	50	1
BTCE 509	Foundation Engineering Lab	-	-	2	30	20	50	1
BTCE 510	Surveying Lab	-	-	2	30	20	50	1
BTCE 511	Technical Seminar I	-	-	2	30	20	50	1
BTCE512	Training viva voce	-	-	0	30	20	50	2
	TOTAL	**18**		**10**	**360**	**540**	**900**	**27**

SIXTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 601	Transportation Engineering II	3	1	-	30	70	100	4
BTCE 602	Concrete Structures-I	3	1	-	30	70	100	4
BTCE 603	Steel Structures II	3	1	-	30	70	100	4
BTCE 604	Water supply Engineering	3	-	-	30	70	100	3
BTCE 605	Building Technology & Planning	3	-	-	30	70	100	3
GENERAL ELECTIVE –I(Choose any one)								
BTCE 606A	Repair and rehabilitation of structures	3	-	-	30	70	100	3
BTCE 606B	Advanced Geotechnical Engineering	3	-	-	30	70	100	3
BTCE 606C	Water Engineering	3	-	-	30	70	100	3
BTCE 606D	Planning and Design of Green Buildings	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 607	Concrete Design Lab	-	-	2	30	20	50	1
BTCE 608	Transportation Lab	-	-	2	30	20	50	1
BTCE 609	Building Technology Lab	-	-	2	30	20	50	1
BTCE 610	Water Supply Engineering Lab	-	-	2	30	20	50	1
BTCE611	Technical Seminar II	-	-	2	30	20	50	1
BTCE612	Surveying Camp	-	-	0	30	20	50	2
	TOTAL	**18**	**3**	**10**	**360**	**540**	**900**	**28**
4 -6 weeks training will be held after sixth semester,viva will be conducted in seventh sem.								

SEVENTH SEMESTER**								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 701	Major project/ Industrial Training	-	-	-	540	360	900	28

EIGHT SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 801	Estimation & Construction Management	3	1	-	30	80	100	4
BTCE 802	Advanced Structural Analysis	3	-	-	30	80	100	3
BTCE 803	Sanitation Engineering	3	-	-	30	80	100	3
BTCE 804	Concrete Structures -II	3	1	-	30	80	100	4
ELECTIVE(any one)								
BTCE 805A	Hydraulic Structures	3	-	-	30	80	100	3
BTCE 805B	Water Resource System Planning	3	-	-	30	80	100	3
BTCE 805C	Project Planning & Construction Management	3	-	-	30	80	100	3
BTCE 805D	construction management	3	-	-	30	80	100	3
BTCE 805E	Advance Transportation Engineering	3	-	-	30	80	100	3
ELECTIVE(any one)								
BTCE 806A	Earth Quake Resistant Design & Construction	3	-	-	30	80	100	3
BTCE 806B	Rural Water Supply & Sanitation	3	-	-	30	80	100	3
BTCE 806C	Prestressed concrete	3	-	-	30	80	100	3
BTCE 806D	Non Destructive Testing Techniques	3	-	-	30	80	100	3
BTCE 806E	Applications of Remote Sensing and GIS in Civil Engineering	3	-	-	30	80	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 807	Advanced Structural Engineering Lab	-	-	2	30	20	50	1
BTCE 808	Computer Aided Building Design Lab	-	-	2	30	20	50	1
BTCE 809	Sanitary Engg. Lab	-	-	2	30	20	50	1
BTCE 810	Design of Concrete structures Lab-I	-	-	2	30	20	50	1
BTCE811	Estimation & Construction Management Lab**	-	-	2	30	20	50	1
BTCE 812	Project	-	-	0	30	20	50	2
	TOTAL	18	2	10	360	600	900	27

The student will submit a synopsis at the beginning of the semester for approval from the depatmental committee in a specified format ,thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to the project should be delivered one after starting of semester .The progress will be monitored through seminars and progress reports.

Note;--
1. The total number of the credits of (Civil Engineering)Programme are = 210.
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn minimum of 200 credits .
For lateral entry students in Third Semester ::--
1.The total number of credits of the B. Tech (Civil Engineering)Programme = 160
2.Each student shall be required to appear for examination for all courses third semester onwards .However, for the award of the degree a student shall be required to earn the minimum of 150 credits .

BACHELOR OF TECHNOLOGY
COMMON TO ALL BRANCHES
FIRST SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 101	Engineering Physics-I	3	1	-	30	70	100	4
BT 102	Introduction to Computers Fundamental and IT*	3	-	-	30	70	100	3
BT 103	Applied Mathematics-I	3	1	-	30	70	100	4
BT 104	Introduction to Electrical & Electronic Engineering	3	-	-	30	70	100	3
BT 105	English & Communication Skills	3	-	-	30	70	100	3
BT 106	Engineering Chemistry	3	-	-	30	70	100	3

PRACTICALS/VIVA-VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BT 107	Electrical & Electronics Lab-I	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab-I	-	-	2	30	20	50	1
BT 109	IT Fundamental Lab*	-	-	2	30	20	50	1
BT 110	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 111	Engineering Workshop	-	-	2	30	20	50	1
TOTAL		18	**2**	**10**	**330**	**520**	**850**	**25**

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BT101: ENGINEERING PHYSICS I

UNIT I

Atomic Structure and Solid State: Atomic energy levels and electronic configuration, Intermolecular forces and binding, phases of matter, crystal structure simple cubic , body centered cubic and face centered cubic structures, energy bands in solids , band structure of metals, semiconductors and insulators.

UNIT II

Semiconductor Physics:Extrinsic and intrinsic semiconductors, Fermi levels of undoped and doped semiconductors, p-n junction, depletion region, forward and reverse biased p-n junction, volt-Ampere characteristics of a diode , effect of temperature on diode characteristics, Zener diode , tunnel diode, photodiode and LEDs , their structure and characteristics.

UNIT III

Theory of Relativity : Absolute and relative frames of reference, Galilean transformations, importance of Michelson-Morley experiment, postulates of special theory of relativity, Lorentz transformations, time dilation and length contraction, velocity addition , mass-energy relationship, elementary ideas about general theory of relativity.

UNIT IV

Elementary Quantum Mechanics: Wave particle duality, deBroglie waves, experimental evidence of wave nature of matter, Schrodinger wave equation in One dimension, eigen values and eigen functions, physical interpretation of wave function, Heisenberg uncertainty principle, tunneling phenomenon.

UNIT V

Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator,viscous & solid friction damping,Qualityfactor,Resonance standing waves,elastic waves,

Recommended reference books:

1.Conceptual Physics, P. Hewitt, Pearson, India

2. Physics for Scientists and Engineers, R. Serway

3. Fundamental University Physics, Alonso & Finn.

4. Physics Vol I and II, Resnick and Halliday

BT102 - INTRODUCTION TO COMPUTER FUNDAMENTAL AND IT

UNIT I

Computer System: Basics of computer systems, history, types and Generation of computer, capability and limitations of computer systems. Hardware organization: Anatomy of a digital computer, CPU.Internal architecture of CPU.Memory Units: Memory Hierarchy, Primary Memory, Secondary Memory, cache memory. Storage Devices, Input and Output Devices.

UNIT II

Operating Systems: DOS Internal, External commands, Windows (2000 and NT) , Overview of architecture of Windows, tools and system utilities including registry , partitioning of hard disk , Overview of Linux architecture , File system , file and permissions , concept of user and group , installation of rpm and deb based packages.

UNIT III

Number system & Conversions: decimal, binary, octal and hexadecimal number systems and their inter conversions, 1's and 2's complement representation, negative numbers and their representation, BCD, EBCDIC , ASCII and Unicode. Binary Arithmetic operations: addition, subtraction, multiplication, division.

UNIT IV

Networking Basics - Uses of a Network and Common types of Networks, Network topologies and protocols, Network media and hardware, Overview of Database Management System.

UNIT V

Data Processing: Introduction to MS office, MS-Power Point and MS-Excel, Introduction to Electronic Spreadsheets, Applications of Electronic Spreadsheets, Types of Spreadsheets, Features of MS-Excel, Starting MS-Excel, Contents of the MS-Excel window, Cell Referencing, Ranges and Functions, Formatting Worksheets and Creating Charts, Data Forms and Printing

Introduction to MS-PowerPoint : Introduction to MS-PowerPoint, What is a Presentations?, Slides, Working with Slides, Slides Show and Printing Presentation

Recommended reference books:

1. Peter Norton, Introduction to computers, Sixth Edition Tata McGraw Hill (2007).
2. Pradeep K. Sinha, PritiSinha, Computer Fundamentals, BPB Publications.
3. Andrews Jean, A+Guide to Managing & Maintaining Your PC, Cengage Publication 6/e
4. Anita Goel, Com
5. Computer Fundamentals, Pearson Education.

BT103- APPLIED MATHEMATICS I

UNIT I

Functions of variables:Geometric representation, limit, continuity and differentiability of functions of several variables , partial and full derivatives, derivatives of composite functions, Euler's theorem on homogeneous functions, harmonic functions, directional derivatives, Taylor's formula, maxima and minima of functions, Lagrange's multipliers.

UNIT II

Asymptotes and curvature: Rolle's Theorem, Cauchy's mean value theorem, Taylor and Maclaurin theorems, concavity and convexity of a curve, points of inflexion, asymptotes and curvature.

UNIT III

Analytical functions: Limit, continuity and differentiability of analytic functions, Cauchy-Reimann equations, complex functions, line integrals, Cauchy's integral theorem, Cauchy's integral formula, power series, zeroes and singularity, residue theorem.

UNIT IV

Integral calculus: Definite integral as limit of sum, properties of definite integrals, mean value theorem, fundamental theorem, evaluation of definite integrals, reduction formula.

UNIT V

Differential equations: Order and degree of a differential equation, general and particular solutions, solution of differential equations by separation of variables method, integrating factor method, homogeneous differential equations of first order and their solutions, solution of linear differential equation $dy/dx+f(x)y=Q(x)$ and their application in electrical, nuclear and mechanical systems.

Recommended reference books:

1. Kreszig, Advanced Engineering Mathematics, Wiley Eastern Ltd
2. Grewal B. S., Higher Engineering mathematics, Khanna Publishers
3. Sastri S S., Engineering Mathematics, Vol. 1 & 2, PHI
4. Gangadharan A, Engineering Mathematics Vol 1 & 2, PHI
5. Dass H.K., Advanced Engineering Mathematics, S. Chand, Delhi

BT104 - INTRODUCTION TO ELECTRICAL AND ELECTRONIC ENGINEERING

UNIT I

Basic Electrical Quantities: Electromotive force, Electric Power ,Charge, current, voltage, Energy,Electric potential and field, magnetic flux,resistance, capacitance and inductance. Ohm's law, Voltage and current sources.

UNIT II

Network analysis: Circuit principles, Kirchoff's Laws, Node Voltage and Mesh Current Analysis;Delta-Star and Star-Delta Transformation, Source Conversion. Classification of Network Elements, Superposition Theorem, Thevenin's Theorem.Norton Theorem.,MaximumPower Transfer Theorems.

UNIT III

AC circuits: Alternating Quanitities,Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3-Phase AC System.Power in a circuit, reactive power, power factor, impedance in ac circuit, series and parallel resonance, Q factor, Introduction to 3-Phase AC System.

UNIT IV

Transformers: Faraday's Law of Electromagnetic Induction Basic principle of operation of transformer, construction, working, voltage and current relations, Phasor Diagram of Ideal Transformer.open circuit and short circuit test, transformer losses and efficiency, ferrite core transformers.**Electrical DC Machine:** Principle of DC Machines, Types, Different Parts ofDC Machines

UNIT V

Power Supplies: Half wave, full wave and bridge rectifiers, ripple factor and reduction by use of inductor,capacitor, L and pie section filters, voltage regulation using Zener diode.

Recommended reference books:

1. Millman and Halkias; Integrated Electronics, Tata-McGraw Hill , New Delhi

2. E. Hughes; Electrical and Electronic Technology, Pearson Limited.

3. R.P. Punagin, Basic Electronics, Tata McGraw Hill.

4. J.Millman and C. Halkias: Electronic Devices and Circuits, Tata McGraw Hill Publishing Company Ltd., 2000.

5 .Donald A. Neamen, Semiconductor Physics and Devices, McGraw Hill, 1997.

6. Vicent Del Toro, Electrical Engineering Fundamentals, Prentice Hall India.

BT105- ENGLISH AND COMMUNICATION SKILLS

UNIT I

Grammar and Vocabulary: Basic sentence pattern, use of tense, modals, active and passive voice, Direct and Indirect Speech, One word substitution, Synonyms and Antonyms and Common Erros in English.

UNIT II

Phonetics: IPA symbols, Correct pronunciation of commonly used words, sounds (vowel and consonants)

UNIT III

Literature : Poetry : where the mind is without fear – Rabindra Nath Tagore, Mending wall – Robert Frost, Night of Scorpion – Nissim Ezekiel

Essays: of studies: Francis Bascon, what is science? George Orwell.

UNIT IV

Writing skills : Paragraph writing, Letter writing, covering letter and C.V., Writing E-mails.

UNIT V

Fundamentals of Communication : (A) Communication : definition and meaning of communication, functions of communication, process of communication.

(B) Types of communication: Verbal and Non verbal communication, Formal and informal communication.

(C) Barriers to communication, qualities of good communication, the art of listening.

Recommended reference books:

1. English for competitive examinations, Prof. R. P. Bhatnagar, Macmillan Publications.
2. "Current English Grammar and usage with composition" by R. P. Sinha, Oxford University Press (New Delhi).
3. Effective Technical Communication by M. Ashraf Rizvi Tata Mcgraw-Hill Companies, New Delhi.
4. Communication skills by Sanjay Kumar & Pushp Lata. Oxford University Press (New Delhi)

BT106- ENGINEERING CHEMISTRY

UNIT I

Water: The sources of water, common Impurities, soft and hard water, Hardness of water, degrees of hardness and its effects, determination of hardness by various techniques, Municipal Water supply, requisites of drinking water, purification of water by sedimentation, filtration, reverse osmosis (RO), sterilization, chlorination. Water for boilers, corrosion, sludge and scale formation, caustic embitterment, treatment by preheating, lime-soda process, permutit de-ionizer ordemineralization.

UNIT II

Electrochemistry: Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion.

Analysis: Volumetric Analysis, Types of titrations, Theory of indicators.

Spectral Analysis: Electromagnetic radiation, Lambert-Beer's Law, UV-VIS, IR, NMR instrumentation & applications.

Thermal Methods of Analysis: principle, working and applications of Thermogravimetry, Differential thermal analysis and Differential scanning calorimetry.

UNIT III

Fuels: The need of fuel, origin and classification of fuels, Solid fuels, coal and its constituents, calorific value and its determination, coke: carbonization process, various types of coke ovens.

Liquid Fuels: advantages, petroleum and its refining, synthetic petrol, reforming of gasoline, knocking, octane number and anti knocking agents, cracking. Gaseous Fuels advantages, composition and calorific value of coal gas and oil gas and its determination.

Lubricants: Need of Classification, types of lubricants, their properties and uses, lubricants, viscosity and viscosity index and flash points, cloud and pour point, emulsification

UNIT IV

Phase Rule: Statement, definition of terms involved, application to one component system (water-sulphur system), two component systems (Ag-Pbsystems).

Polymers: Plastics, preparation, properties and uses of polyethylene, bakelite, terylene and nylon, Rubber; natural rubber, synthetic rubber such as butyl and neoprene rubbers, vulcanization process and its advantages.

Corrosion: its significance, theories of corrosion, Galvanic cell and concentration cell, pitting and stress corrosion, protection techniques.

UNIT V

Explosives: Introduction, classification of explosives, preparation of commercially important explosives, blasting fuses, uses and abuses of explosives.

Cement: properties, Portland cement and its manufacture, chemistry of setting and hardening of cement, RCC structures.

Refractories: definition, classification, properties of silica and fireclay refractories, **Glass:** preparation, properties and uses.

Recommended reference books:

1. Morrison R.T & Boyn R. N ; Organic Chemistry; Prentice Hall of India 1999
2. Lee J. D. ; Inorganic Chemistry ;Blackwell Science
3. Gopalan R., Venkappayya D., Nagarajan S. "Engineering Chemistry" Vikas Publishing House Pvt Ltd 2000.
4. Jain & Jain " Engineering Chemistry" Dhanpat Rai publishing company
5. Dara S. S. , " A Text Book of Engineering Chemistry" S. Chand and Company Ltd, 2008
6. Keeler J and Wolhess P, Why Chemical Reaction Happen Oxford Press.

BT107- ELECTRICAL AND ELECTRONICS LAB-I

List of Experiments

1. Identification, Study & Testing of various electronic components:

   (a) Resistances-Various types, Colour coding (b) Capacitors-Various types, Coding, (c) Inductors (d) Diodes (e) Transistors (f) SCRs (g) ICs (h) Photo diode (i) Photo transistor (j) LED (k) LDR (l) Potentiometers.

2. Study of symbols for various Electrical & Electronic Components, Devices, Circuit functions etc.
3. Study of Analog & digital multi-meters.
4. Study of Function/ Signal generators.
5. Study of Regulated d. c. power supplies (constant voltage and constant current operations).
6. Study of analog CRO, measurement of time period, amplitude and frequency.
7. Perform half wave rectifier experiment and effect of filters on output.
8. Perform bridge rectifier experiment and measure the effect of filter output.
9. Application of diode as clipper and clamper.
10. Soldering & desoldering practice.

BT108- ENGINEERING PHYSICS LAB-I

List of Experiments

1. To study the charging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph
2. To study the discharging of a condenser to plot a graph of voltage (V) across it against time (T) and to determine the time constant from this graph.
3. To determine the specific resistance of a material and difference between two small resistances using "Carey Foster's Bridge ".
4. To determine band gap of a semiconductor- diode.
5. To study the Zener diode as a constant voltage regular.
6. To verify Malus Law (Cosine square law) for plane polarized light with the help of a Photo voltaic cell.
7. To determine the transmission coefficient by using Lummer Brodhum Photometer.
8. To determine minimum deviation angle for different light using prism and spectrometer.
9. To determine the profile of He -Ne Laser beam.
10. To study the variation of thermo e.m.f. of iron copper thermo couple with temperature.
11. To determine the wavelength of sodium light using Michelson Interferometer.
12. To determine the curie temperature of Monel metal
13. The determination of viscosity.

BT109 – IT FUNDAMENTAL LAB

LIST OF EXPERIMENTS

1. Dismantling a PC Part -1.
2. Dismantling a PC Part -2.
3. Internal and External commands of DOS.
4. System utilities of windows.
5. Understanding and Working knowledge of Linux/Unix OS.
6. Understanding of File system of Linux.
7. Creating user and group.
8. Understanding and Working knowledge of MS Office, Power Point and Excel: Editing and Reviewing, Drawing, Tables, Graphs, Templates.

BT110- ENGINEERING CHEMISTRY LAB

List of Experiments

1. To determine the strength of a given unknown copper sulphate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
2. To determine the strength of a given unknown FAS solution with titrate potassium dichromate solution using N-phenyl anthranilic acid (internal indicator).
3. To determine the strength of a given unknown potassium dichromate solution (Iodometrically) with titrate Hypo (sodium thio sulphate) solution.
4. Determine the percentage of available chlorine in a given sample of bleaching powder.
5. Determine the amount of free chlorine in a given water sample.
6. To determine the viscosity and viscosity index of a given sample of lubricating oil using Redwood viscometer No.1
7. To determine the flash and fire point of a given sample of lubricating oil using Pensky Marten's apparatus.
8. Determine the cloud and pour point of a given sample of lubricating oil.
9. Determination of hardness of water by complexometric method (using EDTA).
10. Determine the pH of an acid (strength of an acid) pH – metrically.
11. Determine the strength of a given unknown HCl solution by titrating it against NaOH solution (Conductometric analysis).
12. To estimation the amount of sodium hydroxide and sodium carbonate in the given alkali mixture solution (or in water sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.

BT111- ENGINEERING WORKSHOP

FITTING AND SHEET METAL SHOP

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.
3. Tin smithy for making mechanical joint and soldering of joint

WELDING SHOP

4. To prepare Lap Joint with the help of Arc welding
5. To prepare Butt Joint with the help of arc Welding
6. Gas welding practice by students on mild steel flat

MACHINE SHOP PRACTICE

7. Job on lathe M/C with centering and one step turning
8. Job on lathe M/C with grooving and chamfering operations

ELECTRICAL ENGINEERING
BACHELOR OF TECHNOLOGY
COMMON TO ALL BRANCHES

SECOND SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BT 201	Engineering Physics-II	3	1	-	30	70	100	4
BT 202	Introduction to Computer Programming *	3	-	-	30	70	100	3
BT 203	Engineering Mechanics*	3	1	-	30	70	100	4
BT 204	Digital Electronics	3	-	-	30	70	100	3
BT 205	Applied Mathematics-II	3	-	-	30	70	100	3
BT 206	Environmental Sciences	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BT 207	Electrical & Electronic Lab-II	-	-	2	30	20	50	1
BT 208	Engineering Physics-II	-	-	2	30	20	50	1
BT 209	Computer Programming Lab*	-	-	2	30	20	50	1
BT 210	Engineering Drawing	-	-	2	30	20	50	1
BT 211	Communication Skill Lab*	-	-	2	30	20	50	1
TOTAL		**18**	**2**	**10**	**330**	**520**	**850**	**25**

BT201- ENGINEERING PHYSICS II

UNIT I

Electric and Magnetic Fields :Coulomb's law, Gauss's law, electrostatic potential and field due to discrete and continuous charge distributions, dipole and quadrupole moments, dielectric polarization, electrostatic energy, conductors and capacitors, Biot-Savart law, Ampere's law, magnetic induction due to current carrying conductors, force on a charged particle in electric and magnetic field, Faraday's law of electromagnetic induction.

UNIT II

Thermodynamics: Work- Thermodynamic definition of work, examples, displacement work, path dependence of displacement work, thermal equilibrium, Zeroth law , definition of temperature, heat/work interaction systems , First law and its consequences, isothermal and adiabatic processes, reversible, irreversible and quasi-static processes. Second law and entropy. Carnot engine and cycle. Absolute temperature scale.

UNIT III

Optical phenomena : Principle of superposition, coherent and incoherent sources, temporal and spatial coherence, interference phenomena(Newton's ring and Michelson interferometer), diffraction of waves, diffraction from single and diffraction grating, polarization : types of polarization , Malus law, quarter and half wave plates, optical activity, specific rotation.

UNIT IV

Lasers and Holography : Spontaneous and stimulated emission (Einstein A and B coefficients), population inversion, basic principles of operation of He-Ne, Ruby and semiconductor lasers.

Optical Fibers : Types of optical fibers and their characteristics, characteristics of step, graded , mono mode and multi mode fibers, numerical aperture and its measurement, fiber optical communication. Principles and applications of holography

UNIT V

Magnetic Materials: Magnetization- origin of magnetic moment, classification of magnetic materials- die, Para and ferromagnetism, hysteresis curve, soft and hard magnetic materials. Superconductivity: General properties of

superconductors, Meissonier effect, penetration depth, type I and Type II superconductors, flux quantization, magnetic levitation, high temperature superconductors, superconducting materials, Cooper pairs and postulates of BCS theory.

Recommended reference books:

1. Fundamental University Physics, Alonso & Finn.
2. Berkley Physics Course Vol 1 & Vol. 3
3. Thermodynamics and Statistical Physics by F. Reif.
4. Thermodynamics and Statistical Physics, S. Lokanathan and D.P. Khandelwal.
5. Optics by Ajoy Ghatak
6. Conceptual Physics, Paul Hewitt
7. Introduction to Electrodynamics, D.J.Griffiths
8. Modern Physics, A. Beiser
9. Physics for Scientists and Engineers, R. Serway

BT202- INTRODUCTION TO COMPUTER PROGRAMMING

UNIT I

Concept of algorithms, Flow Charts, Overview of the compiler (preferably GCC) , Assembler, linker and loader , Structure of a simple Hello World Program in C ,Overview of compilation and execution process in an IDE (preferably Code Block)

UNIT II

Programming using C: Preprocessor Directive, C primitive input output using get char and put char , simple I/O Function calls from library , data type in C including enumeration , arithmetic, relational and logical operations, conditional executing using if, else, switch and break .Concept of loops , for, while and do-while , Storage Classes: Auto, Register, Static and Extern

UNIT III

Arrays and Strings: Declaring an array, Initializing arrays, accessing the array elements, working with multidimensional arrays, declaring and initializing string variables, arithmetic operations on characters.

Pointers: Declaring and initializing pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, pointers and strings.

UNIT IV

Functions: Defining functions, passing arguments to functions, returning values from functions, reference arguments, variables and storage classes, static functions, pointers and functions.

Structures: Declaring and initializing a structure, accessing the members of a structure, nested structures, array of structures, using structures in functions, pointers and structures.

UNIT V:

File Handling in C Using File Pointers, fopen( ), fclose( ), Input and Output using file pointers, Character Input and Output with Files , String Input / Output Functions , Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files , Positioning the File Pointer.

Recommended reference books:

1. Kernighan & Ritchie, “C Programming Language”, The (Ansi C version), PHI, 2/e
2. Yashwant Kanetkar “ Test your C Skills ” , BPB Publications
3. Programming in ANSI C, E. Balagurusamy; Mc Graw Hill, 6th Edition.
4. Herbert Schildt, “C: The Complete Reference”, OsbourneMcgraw Hill, 4th Edition, 2002.
5. Forouzan Behrouz A. “Computer Science: A Structured Programming Approach Using C, Cengage Learning 2/e
6. K.R Venugopal, “Mastering C ”, TMH
7. R.S. Salaria "Application Programming in C " Khanna Publishers4/e

BT203- ENGINEERING MECHANICS

UNIT I

Force System: Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varigon's theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems. Lami's theorem. Force body diagram.

UNIT II

Centroid & Moment of Inertia: Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar Moment of inertia, Lifting Machines: Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Wheel and differential axle, differential pulley Block,

UNIT III

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

UNIT IV

Kinematics of Particles and Rigid Bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular Acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion. Newton's laws, Equation of motion in rectangular Coordinate, radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

UNIT V

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Nonconservative Force, Conservation of energy. Impulse and Momentum: Linear and angular momentum, Linear and angular

impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a Particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular.

Recommended reference books:

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

BT204- DIGITAL ELECTRONICS

UNIT I

BASIC LOGIC GATES & BOOLEAN ALGEBRA: Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vice-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.

UNIT II

DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.

UNIT III

MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.

UNIT IV

COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.

UNIT V

SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous and synchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications, Registers: buffer register, shift register.

Recommended Reference Books:

1. M. Morris Mano: Digital Logic and Computer Design, PHI, India
2. Malvino and Leach: Digital Principles
3. Tocci R.J., Digital Systems- Principles & Applications, PHI 1997
4. loyd, Digital Fundamentals, PHI, 1997
5. Salivahanan A, Digital Circuit and Design, TMH

BT205- APPLIED MATHEMATICS II

UNIT I

Vector spaces, linear dependence of vectors, basis and linear transformations, scalar and vector fields, level surfaces, directional derivatives, gradient, divergence and curl of fields, Green, Gauss and Stokes theorems.

UNIT II

Matrix algebra, rank of a matrix, adjoint and inverse of a matrix, Solution of algebraic equations using matrix algebra , consistency conditions, eigenvalues and eigenvectors , Hermitian matrices.

UNIT III

Numerical solution of matrix equations using Gauss, Gauss-Seidel, LU decomposition and other iterative methods.

UNIT IV

Convergence of improper integrals, tests of convergence, elementary properties of beta and gamma functions, differentiation under integral sign, Leibnitz rule, integrals dependent on a parameter, trapezoidal and Simpson's integration rules, applications in engineering.

UNIT V

Numerical methods; round off and truncation errors, approximations, order of convergence, Newton's forward and backward interpolation formula, central difference interpolation, solutions of polynomial equations using bisection, Newton-Raphson and Regula-falsi methods.

Recommended reference books:

1. H. K. Dass: Advanced Engineering Mathematics; S. Chand, Delhi
2. P. C. Bishwal: Numerical Analysis; PHI, India

BT206- ENVIRONMENTAL SCIENCES

UNIT I

Ecosystem and Biodiversity: Components and types of ecosystem, Structure and functions of Ecosystem, Values, Type and levels of Biodiversity, Causes of extension, and Conservation methods of biodiversity.

UNIT II

Air Pollution: Definition, different types of Sources, effects on biotic and abiotic components and Control methods of air pollution.

UNIT III

Water pollution: Definition, different types of Sources, effects on biotic and abiotic components and treatment technologies of water pollution.

UNIT IV

Noise Pollution: Introduction of noise pollution, different Sources, effects on abiotic and biotic environment and Control measures.

UNIT V

Non Conventional energy sources: Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

Recommended reference books:

1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.
4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Down to Earth, Centre for Science and Environment (R)
6. Gleick, H.P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press.
7. Gilpin, Alan. Environmental Impact Assessment (EIA), cutting egde for the 21th century. Cambridge university Press.

BT207- ELECTRICAL AND ELECTRONICS LAB-II

List of Experiment:

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR.
2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3. To realize an SOP and POS expression.
4. To realize adder and Subtractor using universal gates.
5. To verify the truth table of Encoder and decoder.
6. To verify the truth table of multiplexer and demultiplexer.
7. To study and perform Various types of Flip-Flops.
8. To study and perform various types of counters.
9. To study and perform various types of shift registers.
10. To study and perform various types of Multivibrators.
11. To study and perform Schmitt Trigger.

BT208- ENGINEERING PHYSICS LAB-II

List of Experiments:

1. Conversion of a Galvanometer in to an ammeter and calibrate it.
2. Conversion of a Galvanometer in to voltmeter and calibrate it.
3. To determine the value of "g" by using compound pendulum.
4. To determine Plank's constant using LED.
5. To measure the Numerical Aperture (NA) of an optical fiber.
6. To determine the profile of He-Ne Laser beam.
7. To determine the wavelength of different lights using diffraction grating and spectrometer.
8. To determine the wavelength of sodium light by Newton's ring method.
9. To determine the specific rotation of glucose using Polarimeter.
10. To determine minimum deviation angle for different light using prism and spectrometer.
11. To study of detergent on surface tension of water by observing capillary rise
12. To determine the speed of sound in air at room temperature using a resonance tube by two resonance position.

BT209- COMPUTER PROGRAMMING LAB

LIST OF EXPERIMENTS

1. Write a program to calculate the area & perimeter of rectangle.
2. Write a program to calculate the area and circumference of a circle for a given radius.
3. Write a program to calculate simple interest for a given principal/amount.
4. Write a program to convert temperature given in ◦C to temperature in ◦F.
5. Write a program to find profit and loss (in percentage) of a given cost price and selling price.
6. Write a program to find out the maximum among the three given numbers.
7. Write a program to calculate the factorial of a given number.
8. Write a program to print the list of first 100 odd number.
9. Write a program to calculate the sum of the digits of a number and display it in reverse order.
10. Write a program to generate a Fibonacci series.
11. Write a program to generate the following series:

    1 2
    1 2 3
    1 2 3 4
    1 2 3 4 5

12. Write a program to generate the following series:

    0 1
    0 1 0
    0 1 0 1
    0 1 0 1 0

13. Write a program using a function to check whether the given number is prime or not.
14. Write a program to check whether the given string is a palindrome or not.

15 Write a program to find the length of a string, reverse the string and copy one string to another by using library function.

16 Write a program to swap two variables a & b using pointers.

17 Write a program to enter a line of text from keyboard and store it in the file. User should enter file name.

18 Write a recursive program for tower of Hanoi problem

19 Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices

- Addition of two matrices
- Subtraction of two matrices
- Finding upper and lower triangular matrices
- Transpose of a matrix
- Product of two matrices.

20 Write a program to copy one file to other, use command line arguments.

21 Write a program to perform the following operators an Strings without using String functions

- To find the Length of String.
- To concatenate two string.
- To find Reverse of a string.
- To Copy one sting to another string.

22 Write a Program to store records of an student in student file. The data must be stored using Binary File.Read the record stored in "Student.txt" file in Binary code.Edit the record stored in Binary File.Append a record in the Student file.

23 Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.

BT210- ENGINEERING DRAWING

Engineering Drawing

Sheet 1 Orthographic Projections (3 Problems)

Sheet 2 Riveted joints: Lap joints, butt joints, chain riveting, zig-zag riveting

Sheet 3 Screw fasteners, different threads, Nuts & bolts locking devices, set screws,

Sheet 4 Scale, plain scales, diagonal scales, scale of chords

Sheet 5 Conic Sections: Construction of ellipse, parabola and hyperbola

Sheet 6 Engineering Curves: Cycloid, Epicycloids, Hypo-cycloid, Involutes, Archemedian and logarithmic spirals

Sheet 7 Projection of points and lines, True inclinations and true length of straight lines, Traces of straight lines

Sheet 8 Projection of planes and solids: Projection of planes, Projection of polyhedra, Pyramids.

BT211- COMMUNICATION SKILLS LAB

1. Introducing yourself.
2. Role Plays.
3. Word Formation.
4. Listening and Speaking Skills.
5. Words often mis-spelt and Mis- Pronounced.
6. One word for many.
7. Synonyms and Antonyms.
8. Seminar Presentation.
9. Group Discussion.
10. Job Interview.

THIRD SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 301	Numerical Analysis and Statistical Techniques	3	-	-	30	70	100	3
BTCE 302	Strength of material and mechanics of solids	3	1	-	30	70	100	4
BTCE 303	Civil Engineering Building Materials	3	-	-	30	70	100	3
BTCE 304	Engineering Geology	3	-	-	30	70	100	3
BTCE 305	Soil Mechanics	3	-	-	30	70	100	3
BTCE 306	Fluid Mechanics	3	1	-	30	70	100	4
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 307	Building Drawing Lab	-	-	2	30	20	50	1
BTCE 308	Fluid Mechanics Lab	-	-	2	30	20	50	1
BTCE 309	Engineering Geology Lab	-	-	2	30	20	50	1
BTCE 310	Building Material Testing Lab	-	-	2	30	20	50	1
BTCE 311	GD&soft skill	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**850**	**25**

BTCE 301- NUMERICAL ANALYSIS AND STATISTICAL TECHNIQUES

UNIT I

Probability Theory: conditional probability, Baye's theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution, Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve .

UNIT II

Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients, ANOVA, Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student's T-distribution, F- distribution, Fisher's Z- distribution.

UNIT III

Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods. Finite differences: Forward differences, backward differences and Central differences

UNIT IV

Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences, Lagrange's interpolation formula for unequi-spaced values.

UNIT V:

Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential equations: Picard's method, Taylor's method, Euler's method, modified Euler's method, Runge-Kutta method of fourth order.

Recommended reference books:

1. R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", New Age.
2. N.M. Kapoor, "Fundamentals of Mathematical Statistics", Pitambar Publications
3. E. kresyzig," Advance Engineering Mathematics", Wiley publications
4. P. B. Patil and U. P. Verma, " Numerical Computational Methods", Narosa
5. Partial Differential Equations "Schaum's Outline Series", McGraw Hill.
6. Michael Greenberg, "Advance Engineering mathematics", Pearson.
7. Schaum's Outline on Fourier Analysis with Applications to Boundary Value Problem, TMH

BTCE 302- STRENGTH OF MATERIAL AND MECHANICS OF SOLIDS

UNIT I

Simple Stresses and Strains : Concepts of stress and strain in three dimensions and generalized form of Hooke's law; free body diagrams, Young's modulus ; Tension test of mild steel and other materials; yield stress , permissible and ultimate stress; stress in prismatic and non-prismatic structures; thermal stresses; shear stress and strain; modulus of rigidity and Poisson ratio

UNIT II

Compound Stress: Two dimensional stress and strain; Principal stress and strains, state of maximum shear stress; Mohr's circle and its applications; membrane stresses in thick and thin cylinders.

UNIT III

Columns: Short and long columns; crushing and buckling of columns; short columns subjected to axial and eccentric loads; Euler's theory and applications; effective length of columns; Rankine and Secant formula. strain energy for gradual, sudden and impact loads.

UNIT IV

Centroid and Moment of Inertia : First moment of area; centroid and moment of inertia of symmetrical and unsymmetrical sections; radius of gyration; moment of inertia theorems; Simple pin jointed trusses and their analysis; method of joints; method of sections.

UNIT V

Bending of Beams: Shear and compression; various cross-sectional shapes of beams; types of supports; support reactions; static stability of plane structures; bending moment; shear force diagrams for various types of loads and moments.

Recommended reference books:

1. Mechanics of materials ; by B.C. PUNMIA, lakshmi publications.
2. Strength of materials; by R.K. BANSAL, lakshmi publications.
3. Mechanics of solids ; by R.S. KHURMI, s. chand publications.
4. Elements of Strength of Materials; Timoshenko et al; Affiliated East-West , 1968

BTCE303- CIVIL ENGINEERING BUILDING MATERIALS

UNIT I

Stones: Source and types of stones, various standard test on building stones including compressive strength, water absorption, durability, impact value, tensile strength. Identification, Selection criteria and uses of common building stones. Dressing of stones

UNIT II

Clay Products : Manufacturing of Bricks. Types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test. Types of Tiles, Standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing. Fly Ash: Properties, classification, use of fly-ash in manufacturing of bricks & cement.

UNIT III

Cement & Lime: Raw materials, chemical composition and manufacturing process of cement. Basic compounds (Bouge's compounds) of cement and their role, types of cement. Setting and hardening of cement, physical properties of cement, various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength.

Lime: Classification as per IS, Manufacturing process, properties, standard tests of lime. Use of lime in construction. Gypsum, properties and use, Plaster of Perris.

UNIT IV

Mortar and Plaster: types of sand, bulking of sand, tests for sand, classification, mortar preparation methods**:** Functions and tests & their uses in various types pointing & plastering.

Timber & Steel: Definitions of related terms, classifications and properties, defects in wood, conversion of wood, seasoning, preservation, fire proofing, Plywoods, fiber boards,. Steel: properties, types mild steel and HYSD steel and their use, common tests on steel various types of paints and Varnishes; white wash and distempers and their application.

UNIT V

Environmental friendly Building material: Concept of embodied energy of materials, energy used in transportation and construction process. Natural material

like bamboo, rammed earth, stones, stabilized blocks; supplementary cementious materials like blast furnace slag, silica fume, rice husk ash,; building materials from agro and industrial wastes.

Miscellaneous: Properties, types and uses of glass, aluminum, Asbestos, G.I., plastics in construction.

Recommended reference books:

1. Building Materials: Products, Properties and Systems by Ghambir,Tata Mc Graw Hill, Delhi
2. Construction Materials: Their nature & Behaviour by J.M. Illston; E&FN Spon
3. Building Materials by S. Duggal; New Age International Publishers
4. Materials for Civil and Construction Engineers, by Michale, S .Mamlouk and Jhon P.Zaniewski, Pearson Noida
5. Building Construction, Vol 1,2,3,4, McKay W.B., Orient Longman U.K.

BTCE 304 -ENGINEERING GEOLOGY

UNIT I

General Geology : Subdivision of Geology; Importance of Geology in Civil Engg.; Internal Structure of the Earth; Physical properties of Minerals; Weathering and Work of Wind & River ; Geological Time Scale. Earthquakes and landslides : Classification, causes and effects of earthquakes and landslides, seismic curve, seismic problems of India, seismic zones of India,

UNIT II

Petrology : Origin, Classification, Texture & Structures of Igneous, Sedimentary and Metamorphic Rocks; Rock Mechanics: Engineering properties (density, unit weight, porosity), strength, index measurements for rock (SPT blow count, RQD, RMR, Point Load Index), relationships of index measurements with strength of soil and rock.

UNIT III

Structural Geology: Causes & Classification of Fold, Fault, Joints & Unconformities.

Geophysical Methods: Electrical resistivity & Seismic refraction method for civil engineering importance.

UNIT IV

Engineering Geology: Geological investigation for site selection of site for Dams, Tunnels, Reservoirs and Bridges. Site improvement for different engineering projects.

Geological Hazards: Major geological hazards Geological considerations in design of constructed facilities and infrastructure

UNIT V

Remote Sensing and GIS: Introduction of Remote Sensing and GIS, Topographic maps, geologic maps, aerial photographs, applications of Remote Sensing and GIS in Civil Engineering.

Recommended reference books:

1. Engineering Geology : Parbin Singh
2. Engineering Geology : G.K. Mukherjee
3. Mineralogy : Dana
4. Structural Geology : H.P. Billings
5. Remote Sensing and GIS: Pramod Kumar &Bharat nagar

BTCE305- SOIL MECHANICS

UNIT I

Definition of soil mechanics, various terminology scope of soil engineering, origin of soils, formation of soil, transportation of soils, major soil deposits in India, Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc., Inter-relationships of the above.

UNIT II

Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits: plastic limit, liquid limit and shrinkage limit void ratio and density index.

UNIT III

Identification and Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems

UNIT IV

Permeability of Soils: introduction, hydraulic head, validity of Darcy's law, Mineralogy of soils, effective stress law, seepage forces and quick sand phenomena, seepage through soils including Flow-Net diagrams, harmful effects of seepage and ways to minimize it, ecological impact of seepage.

UNIT V

Capillarity of soils:Capillary action, stress distribution in soils, compaction of soils, consolidation of soils, consolidation theory, stress history and settlement of soils

Recommended reference books:

1. Soil Mechanics and Foundation Engg., Purushothama Raj, Pearson Education
2. Geotechnical Engg, Venkataramaiah, New Age International Publishers
3. GeoTechnical Engineering [Principles and Practices],P.Donald,Coduto,PHI Publications
4. Soil mechanics in engineering practice by Karl Terzaghi, Ralph Brazelton Peck, Gholamreza Mesri, Wiley.
5. Geotechnical engineering: principles and practices of soil mechanics and foundation engineering, by V. N. S Murthy, Marcel Dekker
6. Soil mechanics by Lambe and Whitman Wiley edition
7. Basic And Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age international Ltd
8. Soil Engineering, Alam singh,CBS Publication
9. Geotechnical Engg, Gulati and Dutta, McGrawHill Education (I) Pvt. Ltd

BTCE 306 -FLUID MECHANICS

UNIT I

Fluids and their properties : Definition of Fluid, Continuum Hypothesis, Difference between Solids and Fluids, Liquids and gases; definition of density, specific gravity, pressure and vapour pressure, viscosity ;ideal and real fluids, Newton's Law of Viscosity, Newtonian and Non-Newtonian Fluids, Rheological Diagram, Variation of Viscosity with Temperature and Pressure, Surface Tension and Capillarity.

UNIT II

Fluid Statics : Introduction, Pascal's Law, Hydrostatic, Hydrostatic Pressure Variation for Compressible Fluid, Measurement of Pressure, Manometers, Static Forces on Surfaces: Plane Surfaces and Curved Surfaces. Buoyancy and Stability, Metacentre and metacentric heights, Stability of Fully Submerged Bodies, Stability of Floating Bodies.

UNIT III

Fluid Kinematics : Introduction to kinematics of Fluid Flow, Steady and Uniform Flow, Compressible and Incompressible Flow; One, Two and Three Dimensional Flow, Velocity and Acceleration of Fluid Particle, Stream line, Stream tube, path line and Stream line flow, Conservation of Mass: Continuity Equation, Stream Function and velocity potential, Vorticity and circulation , Rotational and Irrotational Flow, Free and Forced Vortex.

UNIT IV.

Dynamics of Fluid Flow : Equations of Motion , Euler's Equation, Energy Equation : Bernoulli's Equation, Applications of Bernoulli's Equation, orofices and Mouthpieces, Venturimeter and Orificemeter, Stagnation and Static Tube, Pitot Tube, Linear Momentum Equation.

UNIT V

Flow Through Closed Conduits : Energy and hydraulic gradient line, Losses in Pipe Flow: Major Loss - Darcy Weisbach Equation, Minor Losses,Pipes in Series and Parallel, flow through branched pipes, three reservoir problem, Power transmission through pipes, condition for maximum power transmission.

Recommended reference books:

1. Hydraulics and Fluid Mechanics by R.K. Bansal
2. Introduction to Fluid Mechanics and Fluid Machines by S.K. Som and G. Biswas.
3. Hydraulics and Fluid Mechanics by Modi and Seth.
4. Fluid mechanics by Dr. A.K. Jain

BTCE 307 BUILDING DRAWING LAB

List of Experiments

1. Study of Various joints /Bonds in Brick Masonry
2. Study of Various types of Stone Masonry
3. Study of Various types of Arches
4. Study of Various types of Stair cases
5. Drawing of 2 Bedroom House.
6. Drawing of a Multi-storey Apartment.

BTCE 308 FLUID MECHANICS LAB

List of Experiments

1. To determine viscosity of given fluid(Viscometer)
2. To verify Bernoullis theorem(Bernoullis Appratus)
3. To determine the metacentric height apparatus(metacentric apparatus)
4. To calibrate the orificmeter(orificmeter)
5. To determine Cc,Cv & Cd of the orifices & mouth piece.
6. To determine Cd of a V-notch (V-notch)
7. To determine the velocity of flow by pitot tube (pitot tube)

BTCE 309 CIVIL ENGINEERING GEOLOGY LAB

List of Experiments

1. Study of Physical properties of minerals.
2. Identification of minerals in hand specimens.
3. Study of Physical properties of rocks.
4. Identification of Rocks in hand specimens.
5. Study of Dip and strike.
6. Profile Drawing of specimens.
7. Identification of various structural features of minerals.
8. Drawing of various Petrological structures

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BTCE 310 BUILDING MATERIAL TESTING LAB

List of Experiments

1. To determine Tensile Strength of Mild Steel and HYSD bar
2. To determine the Compressive Strength of Cement Cubes
3. To determine the compressive strength of Concrete Cubes
4. To determine Compressive Strength of Bricks
5. To determine Compressive Strength of stone specimen.
6. Hardness Test – Rockwell Hardness
7. Impact Test – Izod and Charpy
8. Fatigue Test
9. Spring Test
10. Torsion Test

BTCE311 GD&soft skill

FOURTH SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BTCE 401	Advanced civil engineering Construction Technology	3		-	30	70	100	3
BTCE 402	Structural Analysis	3	1	-	30	70	100	4
BTCE 403	Hydraulics & Hydraulic Machines	3		-	30	70	100	3
BTCE 404	Modern Concrete Technology	3		-	30	70	100	3
BTCE 405	Surveying-I	3	1	-	30	70	100	4
BTCE 406	Geo-Technical Engineering	3		-	30	70	100	3

PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 407	Concrete Lab	-	-	2	30	20	50	1
BTCE 408	Hydraulic Lab	-	-	2	30	20	50	1
BTCE 409	Surveying Lab	-	-	2	30	20	50	1
BTCE 410	Geo-Technical Engineering Lab	-	-	2	30	20	50	1
BTCE 411	Project Cum Seminar	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**850**	**25**
4 -6 weeks training will be held after fourth semester,viva will be conducted in fifth sem.								

BTCE401 ADVANCED CIVIL ENGINEERING CONSTRUCTION TECHNOLOGY

UNIT I

Building Requirements & Construction System: Building components, their functions and requirements, types of construction, load bearing construction and framed structure construction. Lift slab construction. Prefabricated / precast construction; advantages & disadvantage of prefabrication.

Temporary structures: Types & methods of shoring, underpinning and Scaffolding Foundation & Site Preparation: Purpose, types of foundation, depth of foundation, Sequence of construction activity and co-ordination, site clearance, marking, foundation plan, Brick and Stone Masonry: Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry

UNIT II

Damp Proofing: Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti termite treatment.

Joints : Requirements, types and material used, construction details. Grouting of Joints of Precast reinforced Concrete Structures. Arches and Lintels : Terms used, types of arches and their construction detail, types of lintels and constructions. thin precast RCC lintels in Brick walls. Partition Wall : Types, purpose and use of partition wall.

Stairs : Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, lifts and lamps.

UNIT III

Fabrication and Erection Work : Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures, Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast reinforced Concrete Structures

Ground & Upper floors : Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits

Roof and Roof Covering : Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs specially king port, queen port, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs. Thin R.C. ribbed slab for floors & roofs. Precast R.C. plank flooring/roofing.

UNIT IV

Advance Construction Equipments Different types of construction equipments viz. Earth moving equipments & their outputs, Dewatering equipments, Pumping equipments, Grouting equipments, Pile Driving equipments, Compaction equipments, Concreting equipments

UNII V

Equipment Management in Construction Projects Forecasting equipment requirements, Output and capacity of equipments, Selection of equipments, Spare-parts management, Owning Costs investment costs, depreciation, major repair cost, Operation Cost & Its types. Investment Cost, Cost of Repairs, Overheads Cost accounting, Break-even point theory, Replacement of equipment. Maintenance management-types of maintenance, breakdown maintenance, preventive maintenance & its functions.

Recommended reference books:

1. Construction Equipments & Management by R.L. Purifoy, Tata Mc Graw Hill.
2. Construction Technology by Subir K. Sarkar & Subhajit Saraswati, Oxford University Press
3. Building Construction by Bindra & Arora; Dahnpat Rai & Sons.
4. Construction Equipments by Mahesh Verma, Metropolitan Book Co.
5. Construction Equipments and its Management by S.C.Sharma, Prentice Hall of India (PHI).

BTCE402 - STRUCTURAL ANALYSIS

UNIT I

Fixed & Continuous Beams :Fixed beams subjected to various types of loading in simple cases ,Continuous beams in simple cases,

UNIT II

Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections,(only for symmetrical bending)

UNIT III

Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method,

UNIT IV

Torsion : Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Springs: stiffness of springs, close coiled helical springs, springs in series and parallel, laminated plate springs.

UNIT V

Vibrations : Stress tensor and failure criterion. Elementary concepts of structural vibration, degree of freedom, free vibration of undamped single degree of freedom systems. Newton's law of motion, D'Almbert's principle, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping,

Recommended reference books:

1. C.S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
2. R.C. Hibbler, "Structural Analysis", Pearson Education
3. Schodek, "Structures", Pearson Education
4. Vaidyanathan and P Perumal, "Comprehensive Structural Analysis", Laxmi Publications
5. Sujit kumar Roy, "Fundamental of Structural Analysis", S. Chand Publication.
6. D.S. Prakash Rao, "Structural Analysis", University Press.
7. Strength of material & Theory of Structures by B.C.Punmia, Laxmi publication.
8. Mechanics of Structures by Jvnarkar, Charotar Publisher.
9. Hydraulics & Hydraulic Machines

BTCE 403 HYDRAULICS & HYDRAULIC MACHINES

UNIT I

Flow in open channels: Introduction, Prismatic & Non-Prismatic Channels, Flow Classification, Chezy`s & Manning`s Equations, Most efficient/economical section of rectangular & trapezoidal channels, specific energy, specific-energy curves, Rapidly varied flow in channels, hydraulic jump & its characteristics, use & equations, concept of gradually varied flow.

UNIT II

Dimensional Analysis& Similitude: Introduction, Dimensional Homogenity, Dimensions of various physical quantities, Methods of Dimensional Analysis,Rayleigh`s method & Buckingham ,Pi theorem, examples ,Modeling & Similitude, Types of similarities ,forces & standard dimensionless numbers with their importance, distorted models.

UNIT III

Laminar flow: Laminar flow between parallel plates ,Plane Poiseuille flow & Couette flow,Laminar flow through circular pipes,shear stresses

UNIT IV

Turbulent flow: Transition from laminar to turbulent flow ,Shear Stresses , Hydro-dynamically smooth & rough boundaries, equations for velocity distributions & resistance to flow in smooth & rough pipes.

UNIT V

Hydraulic Machines: Introduction, Definitions of turbines & pumps, general layout of Hydro Electric Power Plant, Types of turbines & basis of their selection ,Heads & efficiencies of turbines ,Specific speed of turbine, Draft tube & its function ,Centrifugal pump ,Main parts ,Heads on pump,Specific speed of a pump & efficiencies.

Recommended reference books:

1. Hydraulics & Fluid Mechanics including Hydraulic Machines by Dr P.N Modi & Dr. S.M Seth
2. Hydraulics & Fluid Mechanics by S. Ramamurtham.
3. Victor Streeter, “Fluid Mechanics”, International Edition, Tata McGraw Hill Publications
4. R.K.Bansal, “Fluid Mechanics”,
5. Hughes and Brighton, “Fluid Mechanics”, , Tata McGraw Hill

BTCE 404 MODERN CONCRETE TECHNOLOGY

UNIT I

Concrete : Grade of concrete, proportioning of ingredients, water/cement ratio and its role, concrete mix deign ,quality control for concrete. ,workability,strengths, permeability, creep, shrinkage, standard tests on fresh and hardened concrete as per IS code. ,Aggregate, Ready Mix Concrete.

UNIT II

Concrete Handling in Field:Mixing & batching methods, placing, transportation and Compaction methods, curing methods and compounds.

Admixture in concrete : Chemical and mineral admixtures, their types, use of water reducers, accelerator, retarders, water-proofing plasticizers and super plasticizers, use of fly ash and silica fume in concrete, their properties, effect and production of high strength concrete, properties of high strength concrete & application.

UNIT III

Form work: Requirements, Indian standard on form work, type & method to provide centering and shuttering for Columns, beams, slabs, walls and staircase

Site Preparation and temporary Structures: Sequence of construction activity and co-ordination, site clearance, marking, foundation plan, earthwork in dry and loose soil, different methods and their suitability, dewatering, construction of temporary shed, types of shoring, methods of underpinning and types of scaffolding.

Damp Proofing: Causes of dampness, effects of dampness methods and material for damp proofing DPC treatment in buildings, methods and materials for anti termite treatment.

UNIT IV

Joints : Requirements, types and material used, construction details. Arches and Lintels : Terms used, types of arches and their construction detail, types of lintels and constructions.

Stairs : Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, lifts and Escalators.

Construction System : Prefabricated/precast construction; advantages & disadvantage of prefabrication. Precast R.C. plank flooring/roofing, Thin R.C. ribbed slab for floors & roofs, thin precast RCC lintels in brickwalls, Modular co-ordination, Multi storied building frames.

UNIT V

Ground & Upper floors : Floor components and their junctions, selection of flooring and floor types, construction details of ground and upper floors, merits and demerits.

Roof and Roof Covering : Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs specially king post, queen post, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs.

Recommended reference books:

1. Concrete technology by Neville and Brooks, Person Publication
2. Concrete technology by M.S. Shetty,S.chand and company
3. Concrete material by Popovics , Standard Publishers
4. Chemistary of concrete by Peter C Hewlete,

BTCE 405 SURVEYING –I

UNIT I

Introduction: Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.

Measurement of Distances: Different types of chains, tapes and their uses, sources of error and precautions, corrections to tape measurements, field problems in distance measurement.

UNIT II

Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation, use and adjustment of surveyors and prismatic compass, Vernier and micro-optic theodolite, temporary and permanent adjustment of vernier theodolite, measurement of horizontal and vertical angle by different methods, application of theodolite in field problems.

UNIT III

Traversing: Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bow ditch rule, graphical method, axis method. Gales traverse table.

UNIT IV

Leveling: Definitions of various terms in leveling, different types of leveling, sources of errors in leveling curvature and refraction corrections, temporary and permanent adjustment of dumpy and tilting levels, Computation and adjustment of levels, Profile leveling; L-Section and cross-sections.

UNIT V

Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two point and three point problems.

Contouring: Characteristics of contours, contour interval, contour gradient, methods of locating contours, uses of contour maps.

Recommended reference books:

1. Plane Surveying by Alak De, S.Chand Publication.
2. Surveying" by Kanitkar, Pune Vidyarthi Griha Prakashan.
3. K.R. Arora, Surveying Vol. I and II Standard Book House, New Delhi
4. Surveying, Arthur Bannister, Pearson Education
5. Surveying, Mimi Das Saikia, Madan Mohan Das, PHI Publications
6. Fundamentals of Surveying, S.K. Roy, PHI Publications
7. Surveying and Leveling, T. P. Kanetkar and Kulkerni, Standard Publishers
8. C. Venkatramaiah, "Textbook of Surveying", 2nd Edition, University Press.

BT CE 406 GEO-TECHNICAL ENGINEERING

UNIT I

basics of Geo Tech engineering: Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics. Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory, Field pumping out tests, factors affecting permeability, permeability of stratified soil masses.

UNIT II

Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon, Seepage and Seepage Pressure, Laplace's equation for seepage, Flow net and its construction. Uplift pressure, piping, phriatic line and flow net through earth dam.

UNIT III

Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box, Tri axial and unconfined compression test apparatuses. Typical stress-stain curves for soils, typical failure envelopes for cohesion less soils and normally consolidated clay soils.

UNIT IV

Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, Soil stabilization, Mechanical Stabilization, Stabilization with cement, lime and bitumen.

UNIT V

Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghi's one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Normally, over and under consolidated soils.. Total and differential Settlement.

Recommended Reference Books:

1. R. B. Peck and Terzaghi, “Soil Mechanics in Engineering Practice”, John Wiley
2. V.N.S. Murthy, “Soil Mechanics and Foundation Engineering”, CBS
3. Shashi K. Gulati and Manoj Datta, “Geotechnical Engineering”, Tata Mc Graw Hill [2008].
4. Donald P. Coduto, “Geotechnical Engineering”, Prentice-Hall India.
5. J.E.Bowles, “Foundation Analysis and Design”, Mc-Graw Hill
6. N.P. Kurian, “Design of foundation Systems, Principles and Practices” Norsa Publisher
7. Braja M. Das, Principles of Foundation Engineering, Cengage Learning
8. P.C. Verghese, “Foundation Engineering” PHI Learning Pvt. Ltd.
9. Karuna Moy Ghosh, “Foundation Design in Practice” PHI Learning Pvt. Ltd.
10. Nihar Ranjan Patra, “Ground Improvement Techniques”, Vikas Publishing House Pvt. Ltd.

BTCE 407 CONCRETE LAB

List of Experiments

1. To determine standard (Normal) consistency of cement.

2. To determine Initial & Final setting time of cement.

3. To determine specific gravity of cement.

4. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.

5. To determine Soundness of cement by Le-chatelier apparatus.

6. To determine the fineness modulus of coarse aggregates and fine aggregates by sieve analysis.

7. To determine the workability of given concrete mix by slump test.

8. To determine the workability o given fresh concrete mix by compaction factor test.

9. To determine the workability of given concrete mix by Flow table test.

10. To design concrete mix in accordance with I S recommendations.

BTCE 408 HYDRAULIC LAB

List of Experiments

1. To Study Tilting Flume
2. To study the flow characteristics in open Channel
3. To Study the Characteristics of Hydraulic jump
4. To determine the various losses in pipe flow.(Pipe network)
5. To study the characteristics of Pelton wheel
6. To study the characteristics of Centrifugal Pump
7. To study the characteristics of Kaplan Turbine

BTCE 409 SURVEYING LAB

List of Experiments

1. To fix a survey station by ranging rod.
2. To plot a building block by cross-staff
3. To determine the bearing of line by Surveyor Compass
4. To determine the bearing of line by Prismatic Compass
5. To determine RL by dumpy level.
6. To determine RL by Autolevel
7. To study adjustments in theodolite.
8. Measurement of horizontal angle by theodolite
9. Measurement of vertical angle by theodolite
10. To determine the area of a figure using a planimeter.
11. Plane table survey for a given area.

BTCE 410 GEO-TECHNICAL ENGINEERING LAB

List of Experiments

1. Determination of water content by oven drying method
2. To determine water content in soil specimen. (Pycnometer)
3. To determine specific gravity of soil specimen (-do-)
4. To determine density of soil by core-cutter method.
5. Grain size distribution by sieving.
6. To determine liquid limit by casagrande`s apparatus
7. To determine Liquid limit by cone penetrometer.
8. To determine plastic limit
9. To determine shrinkage limit

BTCE411 Project Cum Seminar

FIFTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 501	Transportation Engineering I	3		-	30	70	100	3
BTCE 502	Water Resources Engineering*	3		-	30	70	100	3
BTCE 503	Steel Structure-I	3		-	30	70	100	3
BTCE 504	Theory Of Structures	3	1	-	30	70	100	4
BTCE 505	Surveying II	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose any one)								
BTCE 506A	**Foundation Engineering**	**3**	-	-	**30**	70	100	**3**
BTCE 506B	Object Oriented Programming in C++	3	-	-	**30**	70	100	3
BTCE 506C	Ground Improvement Techniques	3	-	-	**30**	70	100	3
BTCE 506D	Advanced Construction Materials	3	-	-	**30**	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 507	Road Material Testing Lab	-	-	2	30	20	50	1
BTCE 508	Design Steel Structure Lab	-	-	2	30	20	50	1
BTCE 509	Foundation Engineering Lab	-	-	2	30	20	50	1
BTCE 510	Surveying Lab	-	-	2	30	20	50	1
BTCE 511	Technical Seminar I	-	-	2	30	20	50	1
BTCE512	Training viva voce	-	-	0	30	20	50	2
	TOTAL	**18**		**10**	**360**	**540**	**900**	**27**

BTCE 501 TRANSPORTATION ENGINEERING-I

UNIT I

Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison.

Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.

UNIT II

Highway Materials and Construction: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash. Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, Bituminous roads and Concrete roads, Specific features of rural roads.

UNIT III

Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves.

UNIT IV

Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study, Importance and types of Traffic Signs, Signals, Road Markings and Road Intersections.

UNIT V

Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods, Design of Rigid Pavements by Westergard and modified methods. (As per guidelines of IRC)

Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of Hill roads, Road side Arboriculture and Landscaping, Recent Developments in Urban Roads and their role in economic developments.

Reference Books Recommended:

1. "Highway Engineering" by JustoKhanna - Nemchand Brothers.
2. Transportation Engineering by Kadiyali
3. Saxena, "Textbook of Highway and Traffic Engineering", CBS Publishers
4. I.S. specifications on concrete, aggregates and bituminous materials
5. David Croney, "Design and performance of road pavements", McGraw Hill
6. Wright Dixon, "Highway Engineering", Wiley India.
7. Dr. L. R. Kadiyali, "Traffic Engineering and Transport Planning",
8. KP. James H. Banks "Introduction to Transportation Engineering", McGraw Hill
9. R. Srinivasa Kumar, "Textbook of Highway Engineering", University Press.

BTCE 502 WATER RESOURCE ENGINEERING*

UNIT I

Irrigation Engineering & Water Requirement of Crops: Functions, advantages & disadvantages of Irrigation; Principal Indian Crops and Seasons; Present status of irrigation in India; Quality of irrigation water; Definitions of various terms, Irrigation efficiencies; Duty,Delta & Base period; Consumptive use of water, Phytometer Method & Field plot method of measuring Transpiration; Classification of soil water or soil moisture,Field capacity & Wilting point, available water and its depth, Frequency of irrigation; Irrigation efficiencies.Methods of application of water.

UNIT II

River Mechanics and Training: Different stages of a river; Behaviour of rivers affected by sediments; Meandering of rivers, Cutoff; Aggradation and Degradation in rivers; Objectives and Classification of River Training Works, Methods of river training; Bank protection works, Spurs and Groynes.

UNIT III

Hydrology: Definition, Hydrologic cycle,Application to Engineering problems; Measurement of rainfall,rain gauges,optimum number of rain gauges,estimation of missing rainfall data,Mean precipitation over an area; Infiltration and Infiltration indices,factors affecting infiltration;Runoff and its estimation by empirical methods; Hydrograph, Unit hydrograph and its derivation from a simple hydrograph, estimation of peak flow by empirical methods and unit hydrograph.

UNIT IV

Canal Irrigation: Types of canals, Methods of canal alignment; Alluvial channels, Critical tractive force, bed forms and regimes of flow; Kennedy's and Lacey's theories for design of alluvial channels; Cross sections of canals; Lined canals;advantages and disadvantages ,types of canal linings.

UNIT V

Water Logging: Causes,Preventive and Corrective measures, Saline and Alkaline lands. Well irrigation: Open wells and Tube wells, Types of tube wells,Duty of tube well water. Concept and methods of Water Harvesting and Conservation.

Reference Books Recommended:

1. Irrigation Engineering by S.K.Garg.
2. Irrigation Engineering by R.K.Sharma and T.K.Sharma.
3. Ralph A.Wurbs, Wisley P.James- Water Resources Engineering, PHI, New Delhi.
4. R.K.Sharma and T.K.Sharma- Irrigation Engineering. S.Chand and Company Ltd., New Delhi.
5. Satya Narayana Murty Challa-Water Resources Engineering [Principles and Practice] NewAge Intl.
6. Applied Hydrology - Ven T Chow, David R Maidment, Larry W Mays, McGraw-Hill, New Delhi
7. Bharat Singh, Fundamentals of Irrigation Engineering, Nem Chand and Brothers, roorkee

BTCE 503 STEEL STRUCTURE- I

UNIT I

Introduction: Types of steels and their permissible stresses.

Connections: Design of riveted, bolted and welded connections under axial and eccentric loadings.

UNIT II

Compression Member: Design of compression member; axially and eccentrically loaded compression members, built up columns, design of lacings and battens.

UNIT III

Beams: Design of beams; simple and compound sections, main and subsidiary beams and their connections, grillage foundation.

UNIT IV

Tension Members: Design of axially and eccentrically loaded tension members.

Column Bases: Design of column bases, Slab base, gusseted base.

UNIT V

Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor, design of simply supported beams, fixed beams, continuous beams and single span rectangular frames.

Reference Books Recommended:

1. Design of Steel Structures by Ramchandre, Standard Publishers
2. Design of Steel Structures by Vazrani Ratwani, Khanna Publishers.
3. Design of Steel Structures by P. Dayaratnam, S. Chand Publication.
4. N. Subramanian, “Design of steel structures”, Oxford University Press.
5. Krishnamurthy, “Elementary Structural Design”-Vol-III, CBS Publishers
6. Elias G. Abu-Saba, “Design of steel structures”, CBS Publication
7. John E. Lothers. “Design of steel structures”, Prentice-Hall

BTCE 504 THEORY OF STRUCTURES

UNIT I

Introduction to Indeterminate structures, Degrees of freedom , Static and Kinematic indeterminacy (i.e. for beams, frames & portals without sway etc.), analysis of Indeterminate Structures using Moment Area method.

UNIT II

Analysis of Statically Indeterminate Structures using Slope-deflection method and Moment-distribution methods.

UNIT III

Column Analogy method for indeterminate structures, Conjugate beam method for analysis of indeterminate structures.

UNIT IV

Introduction to Energy method: strain energy due to bending, castigieno's theorem, solution of determinate & indeterminate structures using energy methods (i.e. determination of deflection and forces in structures).

UNIT V

Approximate methods for lateral loads: Analysis of multistory frames by portal method & cantilever method.

Analysis of determinate space trusses by tension coefficient method.

Reference Books Recommended:

1. "Theory of Structures" by R.S Khurmi, S.Chand Publication.
2. "Mechanics of Structures" by Jvnarkar, Charotar Publisher.S
3. "Theory of Structures" by Ramamurtham, Dhanpatrai & Sons

BTCE 505 SURVEYING-II

UNIT 1:

Trigonometric Leveling: Methods of trigonometric leveling direct method and reciprocal method, axis Signal corrections, Determination of difference in elevations of points.

UNIT 2:

Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curves Methods of setting out circular and transition curves.

UNIT 3:

Triangulation: Merits and demerits of traversing, triangulation and trilateration, Grades of triangulation, Strength of figure, field procedure of triangulation, Reconnaissance and selection of triangulation stations, Intervisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line, Satellite station and base line extension.

UNIT 4:

Errors in Surveying: Classification of errors in surveying, the probability curve, its equation and properties, theory of least squares, weight, most probable valve, probable errors, standard errors. Normal equation correlates.

Adjustment of Triangulation Figures: Adjustment of levels, adjustment of triangulations figures, braced quadrilateral Triangle with central, station, approximate and method of least squares for figure adjustment, Trilateration.

UNIT 5:

Field Astronomy: Definitions of terminology used in Astronomy, Co- ordinate Systems, relationships between different Coordinate systems. Astronomical Triangle, Napier's Rule, different methods of determination of Azimuth.

Electronic distance measurement and use of Total station.

Survey camp: (including exercise on triangulation, topographic, or project survey) with duration of maximum 10 days.

Reference Books Recommended:

(1) "Advanced Surveying" by B.C.Punmia – Laxmi Publication.

(2) "Surveying" by Kanitkar, Pune Vidyarthi Griha Prakashan.

BTCE 506A FOUNDATION ENGINEERING*

UNIT1:

Shallow foundation: type of shallow foundation and loading on shallow foundation introduction and basic definitions of bearing capacity Methods of estimation of bearing capacity computation of bearing capacity factors, effect of water table on bearing capacity,terzaghi's analysis, Meyerhof's analysis, bearing capacity of stratified soils.

UNIT 2:

Limits of settlements for various structures, Determination of allowable bearing capacity as per Indian Standard Code Provisions (IS: 1904, 6403, 8009). Skempton's method, finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data.

UNIT 3:

Pile foundations: types of pile and their use, modes of failure, bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae, bearing Capacity factors Pile group bearing capacity and settlement, negative skin friction, behavior of piles under lateral loading. Pile resistance and deflection under lateral loads.

UNIT4:

Foundation on difficult Soils: Collapsible soil; identification,Collapse settlement: foundation design, sanitary land fills settlement of sanitary land fill.

Expansive soils: Behavior of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations.

UNIT 5:

Raft foundation: Common types of raft, combined footing, bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation.

Well foundations: design and construction, bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods.

Reference Books Recommended:

(1) "Soil Engineering" by Alam Singh, CBS publisher.

(2) "Soil Mechanics" by B. S. Punmia, Laxmi Publications.

(3) "Design and Construction of Foundation" by Bowley.

BTCE506 B OBJECT ORIENTED PROGRAMMING IN C++

UNIT I:

Evolution of Programming Paradigms; Structured versus Object-Oriented Development; Elements of Object Oriented Programming – encapsulation, data hiding, data abstraction, inheritance, polymorphism, message communication; Popular OOP Languages, Merits and Demerits of Object Oriented Methodology.

UNIT II:

Overview of C++; Class specification, class objects; Inline functions; Nesting of member functions, function overloading; Arrays within a class, arrays of objects, returning objects; Static data members, static member functions; Friend functions and friend classes; Constructors and Destructors – order of construction and destruction, parameterized constructors, constructor overloading, constructors with default arguments, copy constructor, dynamic initialization of objects

UNIT III:

Operator Overloading – rules for overloading, overloading unary & binary operators, overloading binary operators using friends; Type Conversions – basic to class type, class to basic type, class to class type; Inheritance – forms of inheritance, inheritance and member accessibility, constructors and destructors in derived classes, constructor invocation and data members initialization, virtual base classes, nested and inner classes.

UNIT IV:

Concept of dynamic binding; Pointers to objects; this pointer; Pointers to derived classes; Virtual functions, pure virtual functions; Object Slicing; Abstract classes, Smart pointers; Managing Console I/O Operations – C++ stream classes, unformatted I/O operations, formatted console I/O operations, managing output with manipulators; File handling – classes for file stream operations, file modes, file pointers and their manipulations, sequential and random access to a file, saving and retrieving of objects.

UNIT V:

Generic programming with templates - function templates, class templates; Exception handling model and constructs; Standard Template Library(STL) overview, container classes; Namespace; Runtime typecasting.

Recommended Reference Books :

1. E. Balagurusamy, Object Oriented programming, Tata McGraw Hill.
2. K R Venugopal, Rajkumar, T Ravishankar, Mastering C++, Tata McGraw Hill.
3. C. Thomas Wu, An Introduction to OOP with Java, McGraw Hill.
4. Timothy Wood, An Introduction to Object Oriented Programming, Addison Wesley.
5. John R. Hubbard, Programming with C++, McGraw Hill International.

BTCE506C- GROUND IMPROVEMENT TECHNIQUES

UNIT I

Introduction : Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

UNIT II

In-situ densification methods in granular soils & Cohesive soils: Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth. Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

UNIT III

Mechanical Stabilization: Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

Cement Stabilization:Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

Lime and Bituminous Stabilization : Type of admixtures, mechanism, factors affecting, design of mixtures,construction methods.

UNIT IV

Reinforced earth: Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT V

Geotextiles : Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.

Recommended Reference Books:

1. Hausmann M.R(1990) Engineering Principles of ground modification, McGraw-Hill International edition.
2. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd., New Delhi.
3. Robert M. Koerner, Designing with Geosynthatics, Prentice Hall New Jercy, USA.
4. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
5. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, New Delhi.

BTCE506 D ADVANCED CONSTRUCTION MATERIALS

UNIT I

Light weight materials, fibers in reinforced concrete, types of fibers, workability , mechanical and physical properties of fibre reinforced concrete, transparent concrete properties

UNIT II

Industrial waste materials in concrete , their influences on physical and mechanical properties, and durability of concrete

UNIT III

Concrete at high temperature, high strength concrete ,change in concrete with time, corrosion of concrete in various environments, corrosion of reinforcing steel, electro-chemical process, measures of protection, ferro-cement material and properties.

UNIT IV

Polymers in civil engineering, polymers, fibers and composites, fiber reinforced plastic in sandwich panels, modeling, architectural use and aesthetics of compsites.

UNIT V

Adhesives and sealents, structural electrometric bearings and resilent seating, moistrure barriers, polymers foams and polymer resin building physics, polymer concrete composites. Introduction to green concrete and properties.

BTCE 507 ROAD MATERIAL TESTING LAB

List of Experiments

1. Aggregate impact test.
2. Aggregate crushing value test.
3. Loss angels abrasion testing machine.
4. To determine elongation index for a given sample of aggregate.
5. To determine flakiness index for a given sample of aggregate.
6. To determine the percentage of free or surface moisture in coarse aggregate.
7. To determine fineness modulus of a given sample of coarse aggregate.
8. Case studies on BC (Bituminous Concrete) pavements.
9. Case studies on accidents due to defective pavements.

BTCE 508 DESIGN OF STEEL STRUCTURE LAB

List of Experiments:

1. Study of Deflection of a truss
2. Analysis of redundant frame
3. Study of Deflection of curved members
4. Study of Buckling of Columns & Struts
5. Study of Clark –Maxwell reciprocal theorem with simply supported beam
6. Study of Suspension Bridge
7. Study of Deflection of beam

BTCE 509 FOUNDATION ENGINEERING LAB

List of Experiment

1. Determination of water content by oven drying method.
2. Permeability by falling head method (study)
3. Permeability by constant head method (study)
4. Direct shear test.
5. Unconfined compression apparatus (proving ring type).
6. Determination of compaction properties (standard proctor test)
7. Use of Sand replacement equipment
8. To determine shear strength of soil specimen
9. Plate load test (study)
10. Study of jaipur metro railway piling
11. Study of various components of well foundation

BTCE 510 SURVEY LAB

List of Experiments

1. To measure the Horizontal and Vertical Angles by Thedolite.
2. To determine the height of an object by trigonometric leveling. (Single Plane Method).
3. To determine the height of an object by trigonometric leveling. (Two Plane Method).
4. To shift the RL of known points by double leveling.
5. To prepare the Contour map by indirect Contouring.
6. To prepare the map of a given area by plane tabling.
7. Survey camp

SIXTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 601	Transportation Engineering II	3	1	-	30	70	100	4
BTCE 602	Concrete Structures-I	3	1	-	30	70	100	4
BTCE 603	Steel Structures II	3	1	-	30	70	100	4
BTCE 604	Water supply Engineering	3	-	-	30	70	100	3
BTCE 605	Building Technology & Planning	3	-	-	30	70	100	3
GENERAL ELECTIVE –I(Choose any one)								
BTCE 606A	Repair and rehabilitation of structures	3	-	-	30	70	100	3
BTCE 606B	Advanced Geotechnical Engineering	3	-	-	30	70	100	3
BTCE 606C	Water Engineering	3	-	-	30	70	100	3
BTCE 606D	Planning and Design of Green Buildings	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 607	Concrete Design Lab	-	-	2	30	20	50	1
BTCE 608	Transportation Lab	-	-	2	30	20	50	1
BTCE 609	Building Technology Lab	-	-	2	30	20	50	1
BTCE 610	Water Supply Engineering Lab	-	-	2	30	20	50	1
BTCE611	Technical Seminar II	-	-	2	30	20	50	1
BTCE612	Surveying Camp	-	-	0	30	20	50	2
	TOTAL	**18**	**3**	**10**	**360**	**540**	**900**	**28**
4 -6 weeks training will be held after sixth semester,viva will be conducted in seventh sem.								

BTCE 601 Transportation Engineering-II

UNIT 1:

Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast and Rail Fastenings.

Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations.

UNIT 2:

Points and Crossings: Types of Turnouts, Points or Switches, layout Plans of different types of Crossings, Design calculations of turnouts.

Railway Systems Specific to Urban Movements: Surface railways (sub urban railway systems), Underground & Elevated Metro Systems , Light Rail System (MRTS), Recent Developments in Railway Networking.

UNIT 3:

Geometric Design: Gradient and Grade Compensation, Super elevation and cant, cant deficiency, Types of Curves, Transition curves, their designs, Widening of Gauges.

UNIT 4:

Airport Engineering:-Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning.

Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Geometric Design of Runways, Layout of Taxiways, Geometric Standards, Exit or Turnaround Taxiways, Apron and Hangers**.**

UNIT 5:

Airport Pavement Design: Factors Affecting Pavement Design, Design methods of Flexible Pavements, Design methods of Rigid Pavements.

Reference Books Recommended:

1. "A Textbook of Railway Engineering" by S. C. Saxena & S.P.Arora, CBS Publisher.
2. "Airport planning" by S.P.Arora.
3. "Airport Engineering" by S. C. Saxena.

BTCE 602 CONCRETE STRUCTURES- I

UNIT 1:

Design Philosophies: Working stress, ultimate strength and limit states of design. Introduction to working stress method. Analysis and Design of prismatic Sections in flexure using limit state methods: singly and doubly reinforced prismatic sections **.**

UNIT 2:

Shear and Bond: Behavior of beams in shear and bond, design for shear, anchorage, curtailment and splicing of reinforcement, detailing of reinforcement. Serviceability Conditions, design of one way slab

UNIT 3:

Design of two way slabs and flat slab by direct design method

UNIT 4:

Design of Columns: Short and long rectangular and circular columns, axial loaded columns.

Design of T beams

UNIT 5:

Design of Column Footings: Isolated and combined column footings**.**

Reference Books Recommended:

(1) "Reinforced Concrete Design" by A.K.Jain, Nemchand Brother.

(2) "Reinforced Concrete Structures" by I .C. Syal & A. K. Goel, S. Chand Publications.

(3) IS 456:2000 code, to be supplied in end term examination @each student

BTCE 603 STEEL STRUCTURES II

UNIT 1

Design of gantry girder: calculation of load moment and shear in horizontal and vertical direction, design of plastic section, combined biaxial capacity, buckling resistance, deflection & shear.

UNIT II

Design of plate girder: design of section, connections for flange plate to flange angles & flange angles to web, web and flange splicing. Vertical, Horizontal, Intermediate and Bearing stiffeners, Curtailment of plates.

UNIT III

Bridges: Standard loading for railway bridges, design of Deck type plate-girder bridges, design of bracings and frames. Design the member of through type roof truss bridge using ILD, design of stringers, cross girder, lateral, sway and portal bracings.

UNIT IV

Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

NOTE: Only four units are sufficient as the questions are long.

Reference Books Recommended:

(1) "Design of Steel Structures" by P. Dayaratnam, S. Chand Publication.

(2) "Design of Steel Structures" by S.K.Duggal, Tata McGraw hill.

(3) "Design of steel structure" by B.C. Punmia , Laxmi publication

(4) "Design of steel structure" by S.S. Bhavikatti , IK international publishing house

IS 800-2007 code must be supplied in end term examination @each student

BTCE 604 WATER SUPPLY ENGINEERING

UNIT I

General: Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview.

Water Demand: Design flow, design periods, design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components.

UNIT II

Source of water and collection works: Alternative sources i.e. rain, surface and ground water, Assessment of yield and development of the source.

Quality of water: The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards.

UNIT III

Transmission of water: Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station.

Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening,

UNIT IV

Advanced Treatment of Water: filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles.

UNIT V

Distribution of water: Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system.

Plumbing of Building for water supply: Service connections, fixture units, simultaneous flow, design of plumbing system.

Reference Books Recommended:

1. S.K. Garg, "Water Supply Engineering", Khanna Publishers.
2. Davis and Cornwell, "Introduction to Environmental Engineering", McGraw Hill
3. Peavy, Rowe and Tchobanoglous, "Environmental Engineering", McGraw Hill
4. Henry and Heinke, "Environmental Science and Engineering", Prentice Hall India
5. Venugopala Rao, "Principles of Environmental Science and Engineering", Prentice Hall India
6. Gilbert M. Masters, "Introduction to Environmental Engineering" Prentice Hall India.
7. Kiely, Gerardd "Environmental Engineering" Tata McGraw Hill
8. Hammer, Hammer "Water and Wastewater Technology" PHI Learning Pvt. Ltd

BTCE 605 BUILDING TECHNOLOGY & PLANNING

UNIT I

Introduction: Types of buildings, criteria for location and site selection, site plan and its detail.

Sun Consideration : Sun chart, sun shading devices, energy conservation in buildings, passive solar cooling and heating of buildings.

UNIT II

Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, comfort conditions.

Orientation: Meaning, factors affecting orientation, orientation criteria .

Building Bye Laws and NBC Regulations: Objective of bye-laws, Regulations, setbacks, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.

UNIT III

Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.

Vastu Shastra In Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.

UNIT IV

Functional design and Accommodation requirements

(A) Residential Buildings: Activities and their spatial requirements; Area planning, living area, sleeping area, service area.

(B) Non Residential Buildings: School buildings, rest house, primary health centres, post office, bank, college library, cinema theatres etc.

UNIT V

Services in Buildings

(A) Lighting and ventilation, doors and windows.

(B) Acoustics, sound insulation and noise control.

Reference Books Recommended:

1. Manual of Tropical Housing and Buildings by Koenigs Berger Orient and Longman.
2. 2- Building Drawing by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.
3. 3.SP.41 (S&T)- Handbook on functional Requirements of Buildings Part-I
4. National Building Code, BIS.
5. Architecture Drafting and Design by Donald E. Helper, & Paul I Wallach.
6. Time Saver Standards for Housing and Residential Development by DE Chiara, Tata Mc Graw Hill, Delhi.

BTCE 606A REPAIR AND REHABILITATION OF STRUCTURES

UNIT I

Deterioration of concrete in structures: physical processes of deterioration like abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures.

Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc.

UNIT II

N.D.T.: Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc.

Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT III

Materials for repair: polymers and resins, self curing compound, FRP, Ferro cement etc; properties, selection criterion, bonding aspect.

UNIT IV

Repair Techniques: grouting, jacketing, shotcrete, externally bonded plates and under water repair; materials, equipments, precautions process etc.

UNIT V

Investigation for structures: Distress, observation and preliminary test methods.

Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures

BTCE 606B ADVANCED GEOTECHNICAL ENGINEERING

UNIT-I

Soil Dynamics: One Dimensional wave propagation, One Dimensional Wave in layered body, impedance ratio, angle of refraction, critical angle of incidence, introduction of attenuation of stress waves, Definitions of Material Damping and Radiation Damping in soil.

Measurements of Wave Propagation Velocity, Shear Modulus, Thickness of soil layers etc; Field Tests like Low Strain Test, Seismic Reflection Test, Seismic Refraction Test for Horizontal Layering and inclined or irregular layering, Suspension Logging Test, Steady States Vibration [Raleigh wave] Test, Seismic Cross Hole Test, Seismic Down Hole Test, Seismic Cone Test, Details and interpretation of Standard Penetration Test and Cone Penetration Tests. Laboratory Tests: Cyclic Triaxial Shear Test, Introduction of Centrifuge and Shaking Table Test.

UNIT-II

Machine Foundation: Types of Machine Foundations, General Requirements, Design Data, Dynamic Loads induced in simple Crank Mechanism, Permissible Amplitudes and Bearing Pressure, General Theory of Transmissibility of force for Vibrating machines in brief

UNIT-III

Analysis and Design of Block Type Machine Foundations: Brief review of Empirical Methods based on considering Soil as a Semi infinite Elastic Solid and Soil as a spring, Barkans Method of Analysis for Block Foundations including Vertical sliding, rocking and yawing of vibrations. Introduction of codes related with Machine Foundations

UNIT-IV

Foundation on Expansive Soils: Identification of expensive soils by field inspection and Laboratory Tests, general mechanism and characterization of swelling, Types of Damages in Building on expensive clay. Design of foundation on expensive soils like under-reamed piles, Computation of collapse settlement, Retaining walls in expansive soils, Treatment of cracked buildings.

UNIT-V

Environmental Geo-technology: Contamination due to landfills, subsurface contamination due to lechate and its effects. One dimensional analysis of contaminant transport, contaminated sites, Containment of solid waste in landfills, Vertical barrier for containment, Geo-technical reuse of construction and industrial waste materials

Case study of Ash disposal from Thermal power plant, Ash pond and its design with/without geo-textiles, Environmental impact and control

Recommended Reference Books:

1. Foundation for Machine: Analysis and Design by S. Prakash and V. K. Puri, John Wily
2. Geotechnical Earthquake Engineering by Kramer, Pearson publications.
3. Gulati-Datta - Geo-Technical Engineering, Tata McGraw Hill Publishers
4. Waste containment systems, waste stabilization and landfills: design and evaluation, Hari D Sharma, and Sangeeta P.Lewis, John Willey and Sons.
5. V.N.S. Murthy -Advanced Foundation Engineering, CBS Publishers and Distributors.
6. Foundation analysis and Design, Bowles, McGraw Hill Education(I) Pvt. Ltd.
7. Fundamentals of Soil Dynamics by B.M. Das, Elsevier Publication
8. Foundation engineering, Varghese, PHI Learning Pvt. Ltd

BTCE 606C WATER ENGINEERING

UNIT I

Demand of water: Domestic, commercial and public requirements, Factors affecting demand fluctuations, Estimate of prospective population, fire demand requirements and other allowances.

Sources of water: Estimating the quantity of water from various sources, surface and underground sources, such as, impounded, perennial stream, shallow wells artesian wells, deep wells, infiltration galleries, intake works from different sources.

UNIT II

Water quality: Suspended solids, turbidity, colour, taste odour, temperature, Total dissolved solids, pH, acidity, alkalinity, hardness, nitrates, chlorides, fluorides, metals, organics, nutrients, and Pathogens.

In-stream standards: Potable water standards, waste water / effluent standards, standards for receiving wastes in natural streams / sewer / sea, Bio-monitoring of streams and lakes Groundwater quality, chemical/ biological remediation of ground water.

UNIT III

Water purification processes in natural system: Water pollutants and their sources, Physical processes: Dilution, sedimentation and re-suspension, filtration, gas transfer, heat transfer, Chemical processes, metabolic processes, role of micro-organisms in natural water systems. Stream water quality changes due to waste disposal, Streeter-Phelps D.O. model, and water quality management of rivers having multiple discharges, lakes and estuaries.

UNIT IV

Analysis and Design [as per CPHEEO manual etc] of Engineered systems for water purification: Water treatment process and design, economic construction in water works design, solids separation by aeration, settling operations, coagulation, softening, mixing and flocculation, sedimentation.

Analysis and design of other system for water purification: Filtration, disinfection, [Residual chlorine, chlorine demand and brake point chlorination] adsorption, membranes, Water plant waste management, Pump drive units and analysis of pumping systems.

UNIT V

Distribution system: Methods of distributing water, distribution reservoirs, stand pipes and water tanks, design of pumping mains, use of nomograms, appurtenances, distribution systems and their components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems.

Recommended Reference Books:

1. Henry and Heinke, "Environmental Science and Engineering", Prentice Hall India
2. Venugopala Rao, "Principles of Environmental Science and Engineering", Prentice Hall India
3. Gilbert M. Masters, "Introduction to Environmental Engineering" Prentice Hall India.
4. Kiely, Gerardd "Environmental Engineering" Tata McGraw Hill
5. Hammer, Hammer "Water and Wastewater Technology" PHI Learning Pvt. Ltd
6. Qasim, Motley, Zhu "Water works engineering" PHI Learning Pvt. Ltd.
7. C.D.Gupta, V.K.Gupta "Water Supply Handbook" Jain Brothers
8. S.K. Garg, "Water Supply Engineering", Khanna Publishers.
9. Davis and Cornwell, "Introduction to Environmental Engineering", McGraw Hill
10. Peavy, Rowe and Tchobanoglous, "Environmental Engineering", McGraw Hill

BTCE 606D PLANNING AND DESIGN OF GREEN BUILDINGS

UNIT I

Green building concept- History, Increased public focus on Sustainability and Energy Efficiency, Supportive Framework and general condition, Green Home Certifications, CO_2 Emission Trade, High Performance Building Characteristic, the LEED rating system, Rating system for Sustainable Building.

An integrated view of green building- Lifecycle engineering, Barriers to green building growth.

UNIT II

Green Building Requirements : Principles of Energy, Heat Flow, Fuel Types, Air Flow, Moisture Flow, Condensation and Dew Point, Relative Humidity, Concept of Earth air Tunnel System for moderating air temperature.

Design, construction, commissioning and monitoring for green building- Urban development and infrastructure, building shape and orientation, building envelope, building materials and furnishing, natural resources.

UNIT III

Planning of Green From Start- Traditional Design, Integrated Design, Site Selection , Site Development, House Design, Construction and Planning, Construction Waste, Remodeling

UNIT IV

Structural System- Types of Foundation, Foundation Selection, Materials required, Soil Gas, Tree Protection, Pest Control, Floors and Exterior walls, Roofs, Landscaping.

UNIT V

Sustainable building procedure requirement, Blower door test, Thermography, Indoor Comfort, Air Quality, Noise Protection, Day light Performance and Non-Glaring, Emulation, Monitoring and Energy Management, Conscious handling of resources- Energy benchmark as target values for design, regenerative energy resources, primary energy demand for indoor climate conditioning, Energy demand for Lifecycle of a building, Water requirement, Case study.

Recommended Reference Books:

1. Yudelson J, “The Green Building Revolution”, Island Press, New York.

2. Kibert C.J., “Sustainable Construction - Green Building Design and Delivery” John Wiley and Sons, New York
3. Edward B., “Guide to Sustainability: A Design Primer”, RIBA Publishing, U.K.
4. Sassi P., “Strategies for Sustainable Architecture”, Taylor and Francis, New York.
5. Wines J., “Green Architecture”, Taschen, New York.

BTCE 607 CONCRETE DESIGN LAB

List of Experiments:

1. To determine the various concrete grades
2. To determine the fineness modulus of fine aggregates by sieve analysis.
3. To determine the fineness modulus of coarse aggregates by sieve analysis
4. To determine the workability of given concrete mix by slump test.
5. To determine the workability of given fresh concrete mix by compaction factor test.
6. To determine the workability of given concrete mix by Flow table test.
7. To design concrete mix in accordance with I S recommendations.
8. To study the ready mix concrete.

BTCE 608 TRANSPORTATION LAB

List of Experiments

1. Angularity number test.
2. Standard tar viscometer test.
3. Specific gravity and water absorption test.
4. Marshell stability test.(only demo given by faculty/lab assistant)
5. Ductility test on bitumen.
6. Softening test of bitumen.
7. Case studies on bituminous Mixes.
8. Case studies on traffic sign and marking .
9. Case studies of "JAIPUR METRO".

BTCE 609 BUILDING TECHNOLOGY & PLANNING LAB

List of Experiments

1- To design and draw working drawing of a Residential building with following detail.

(a) Site plan

(b) Foundation plan

(c) Plan

(d) Two sectional elevations

(e) Front elevation

(f) Furniture plan

(g) Water supply and sanitary plan

(h) Electric fitting plan

2- To design and draw any type of building

BTCE 610 WATER SUPPLY ENGINEERING LAB

List of Experiments

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

BTCE611 Technical Seminar II

BTCE612 Surveying Camp

SEVENTH SEMESTER**								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 701	Major project/ Industrial Training	-	-	-	540	360	900	28

EIGHT SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 801	Estimation & Construction Management	3	1	-	30	80	100	4
BTCE 802	Advanced Structural Analysis	3	-	-	30	80	100	3
BTCE 803	Sanitation Engineering	3	-	-	30	80	100	3
BTCE 804	Concrete Structures -II	3	1	-	30	80	100	4
ELECTIVE(any one)								
BTCE 805A	Hydraulic Structures	3	-	-	30	80	100	3
BTCE 805B	Water Resource System Planning	3	-	-	30	80	100	3
BTCE 805C	Project Planning & Construction Management	3	-	-	30	80	100	3
BTCE 805D	construction management	3	-	-	30	80	100	3
BTCE 805E	Advance Transportation Engineering	3	-	-	30	80	100	3
ELECTIVE(any one)								
BTCE 806A	Earth Quake Resistant Design & Construction	3	-	-	30	80	100	3
BTCE 806B	Rural Water Supply & Sanitation	3	-	-	30	80	100	3
BTCE 806C	Prestressed concrete	3	-	-	30	80	100	3
BTCE 806D	Non Destructive Testing Techniques	3	-	-	30	80	100	3
BTCE 806E	Applications of Remote Sensing and GIS in Civil Engineering	3	-	-	30	80	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 807	Advanced Structural Engineering Lab	-	-	2	30	20	50	1
BTCE 808	Computer Aided Building Design Lab	-	-	2	30	20	50	1
BTCE 809	Sanitary Engg. Lab	-	-	2	30	20	50	1
BTCE 810	Design of Concrete structures Lab-I	-	-	2	30	20	50	1
BTCE811	Estimation & Construction Management Lab**	-	-	2	30	20	50	1
BTCE 812	Project	-	-	0	30	20	50	2
	TOTAL	18	2	10	360	600	900	27

BTCE 801 Estimation And Construction Management

UNIT I

Introduction: Purpose and importance of estimates, principles of estimating, Methods of taking out quantities of items of work, Mode of measurement, measurement sheet and abstract sheet; bill of quantities, Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

UNIT II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work, Current schedule of rates. (C.S.R.)

UNIT III

Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works and earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

UNIT IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.

UNIT V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Reference Books Recommended:

(1) "Estimating and Costing" by B. N. Dutta, UBS Publisher.

(2) "Estimating and Costing" by Rangwala, Charotar Publishing House.

BTCE 802 Advanced Structural Analysis

UNIT I

Influence line diagram & rolling load: ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure**.**

UNIT II

Arches: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels.

Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder.

UNIT III

Kani's Method: Analysis of beams and frames with & without sway by Kani's method.

UNIT IV

Unsymmetrical bending: Definition, location of NA, computation of stresses and deflection, shear center and its location.

Composite Sections: Flexural analysis of composite sections**.**

UNIT V

Matrix methods of structural analysis: Introduction to matrix methods; Stiffness (Deflection) and Flexibility (Force) matrices for bar, plate, and beam elements w.r.t. local axes and global axes, for entire structure w.r.t. global axes (Direct method and by assembly method).

Reference Books Recommended:

(1) "Theory of Structures" by B. C. Punmia, Laxmi Publications.

(2) "Mechanics of Structures, Vol. II" Junarkar, Charotar Publisher.

(3) "Fundamentals of Structural Analysis with Computer Analysis &Application by Sujit kumar Roy & Subrata Chakrabarty, S. Chand Publication.

BTCE 803 SANITATION ENGINEERING

UNIT I

General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview.

Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.

UNIT II

Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational method, shapes of sewer, Hydraulic design of sewers: diameter self cleansing velocity and slopes, construction and testing of sewer line, Sewer materials, joints and appurtenances, Sewage pumping and pumping stations, maintenance of sewerage system.

UNIT III

Sewage Treatment: Various units: their purpose, sequence and efficiencies, preliminary treatment, screening and grit removal units, oil and grease removal, primary treatment, secondary treatment, activated sludge process, trickling filter, sludge digestion and drying beds, stabilization pond, septic tank, soakage systems, recent trends in sewage treatment, advanced wastewater treatment :nutrient removal, solids removal**.**

UNIT IV

Wastewater Disposal and Reuse: Disposal of sewage by dilution, self-purification of streams,

sewage disposal by irrigation sewage farming, waste waters reuse.

UNIT V

Plumbing for Design of Buildings: Various systems of plumbing – one pipe, two pipes, single

stack, traps, layout of house drainage.

Recommended Reference Books

1. Sanitary Engineering by B.C Punmia
2. Sanitary Engineering by K.R Arora
3. Water Supply & Sanitation Engg. by J.S Birdie & G.S Birdie

BTCE 804 CONCRETE STRUCTURES-II

UNIT I

Elements of Pre-stressed Concrete: Principles and systems, material properties, losses of pre-stress, I.S. specifications, analysis and design of sections for flexure and shear, Introduction to continuous beams.

UNIT II

Torsion: Design of beams for torsion.

Continuous and Curved Beams: Design of continuous R.C. beams, moment redistribution, beams curved in plan.

UNIT III

Circular Domes: Circular domes with u.d.l. & concentrated load at crown.

Yield Line Theory: Application of Y.L.T. to slabs with simple support conditions.

UNIT IV

Water Tanks and Towers: Water Tanks and Water Towers-design of rectangular, circular and Intze type tanks, column brace type staging.

UNIT V

Culverts and Bridges: Design of slab culverts for I.R.C. loading.

Cantilever Retaining Walls: Design of cantilever type retaining walls & introduction and stability analysis of counter-fort and buttress type retaining walls.

Recommended Reference Books

1. Design of RCC Structures by B.C Punmia
2. Design of Concrete Structures by Ramamurtham
3. Design of Concrete Structures-II by A.K Jain

BTCE 805A Hydraulic Structures

UNIT I

Water Storage Works : Types of Dams and basis of their selection; Gravity Dams,Forces on gravity dams, Causes of failure and criteria for structural stability of gravity dams, Galleries in gravity dams: Embankment dams; Advantages and disadvantages, Types and causes of failure, Methods of determination of Phreatic Line with a horizontal drainage blanket.

UNIT II

Spillways: Function and types of spillways, Location of spillways,Discharge over an ogee spillway; Energy dissipation below spillways with hydraulic jump formation.

UNIT III

Diversion Headworks: Introduction,Objective and site selection,Various components alongwith their layout and functions; Bligh's Creep Theory,Safety against piping and uplift pressure, Basic concept of Khosla's theory, Exit gradient.

UNIT IV

Canal Falls: Introduction, types and necessity of falls,Basic design parameters of a Vertical Drop fall and Sarda type fall.

UNIT V

Cross Drainage Works: Introduction and definition, Types of cross drainage works, Fluming of canal in Aqueducts,Methods for the design of channel transitions.

Recommended Reference Books:

1. Irrigation Engineering and Hydraulic Structures by Santosh Kumar Garg.
2. Text book of Irrigation Engineering and Hydraulic Structures by R.K. Sharma.

BTCE 805B Water Resource System Planning

UNIT I

Introduction of Water Systems engineering-scope and approach

Issues and the systems planning approach, Water system dynamics, Water Resource [W.R.] development alternatives, Water systems planning objectives, Constraints and Criteria,

Economic and Econometric principles, Cost and Benefit Curves.

UNIT II

Application of Linear programming [LP] and Dynamic programming [DP] models in Water Resource Engineering, Problem formulation for W.R. systems, Multi-objective Water Resource Planning, Non-inferior Solutions, Plan Formulation, Weighting Method, Constraint Method, Plan Selection.

UNIT III

Reservoir Operation, Standard Operating Policy, Optimal Operating Policy using LP Rules, Curves for Reservoir Operations. Reservoir Systems [Deterministic Inflow], Reservoir Sizing, Sequent Peak Analysis Neglecting Evaporation, Sequent Peak Analysis Considering Evaporation Loss, Reservoir Capacity using LP , Storage Yield Function, Mixed Integer LP Formulation for Maximizing Yield.

UNIT IV

Multireservoir Operation, Stationary Policy using DP, Simulation of Reservoir Operation for Hydropower Generation, Reservoir Systems [Random Inflow], Lognormal and Exponential Distributions, Chance Constrained LP, Linear Decision Rule, Deterministic Equivalent of a chance constraint

Concept of Reliability, Reliability-based Reservoir Sizing, Maximum Reliability, Stochastic Dynamic programming for reservoir operation, State variable discretisation, Inflow as a stochastic process, Steady state operating policy, Steady State Probabilities, Real-time Operation, Case Study.

UNIT V

Water quality managements planning and associated models, Regional planning models, Policy issues for improvement in utilization of water resources, Optical Irrigation Water allocation for single and multiple crops, Crop Yield optimization.

Applications of Linear Programming in [1] Optimal Irrigation water allocation to multiple crops, [2] Multireservoir system for irrigation planning, [3] Reservoir Operation [Short term] for irrigation, [4] Reservoir operation for Hydropower optimization.

Application of dynamic programming in - [1] Steady State Reservoir operating policy for irrigation, [2] Real-time Reservoir Operation for Irrigation, An Example application for inflow forecasting, Fuzzy Sets and Fuzzy logic, Introduction, Fuzzy rule based reservoir operation model.

Recommended Reference Books

1. Water Resources Systems Planning and Management, Sharad K. Jain, 2003 ,reiveslE ,hgniS .P.V
2. Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications, Daniel P. Loucks, Eelco Van Beek, 2005.
3. S.Vedula, P.P.Majumdar-Water Resources Systems, Tata Mcgraw Hill Publishing Company Ltd., ND
4. M.C. Chaturvedi, W.R.Systems-Planning and Management, Tata McGraw Hill Publications, New Delhi

BTCE 805C Project Planning & Construction Management

UNIT I

FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING:

Capital investment proposals, criterions to judge the worth whileness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management.

UNIT II

PROJECT SCHEDULING: Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.

UNIT III

PROJECT COST AND TIME CONTROL: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation.

UNIT IV

CONTRACT MANAGEMENT: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.

UNIT V

SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.

Recommended Reference Books:

1. Construction Project Management by K. K. Chitkara, Tata Mc Graw Hills
2. Porject Management by Modder & Phillph, CBS Publishers.

BTCE 805D Construction Management

UNIT-I

Master Plan and Building By laws: Objectives and necessity of Master Plan, Land use features, Building Bylaws, Function of Local Authority. Provision of Building Regulation, Salient features of Land Acquisition, etc

Project Planning: Scheduling, Controlling, Methods of Planning and Programming, Schedules for Labour, Materials and Equipment, Graphical Presentation of Earthwork.

UNIT-II

Work Accounts: Muster roll, measurement book, cash book imprest, temporary advance, classification of stores, stock, receipt and issue of stores, authority of use, and materials at site account, Master Test Register- Site Order Book, Dismantle Register, Inspection Register, Hindrance Register, Building Register surplus and shortage, A Sample Case Study.

UNIT-III

Contract Management: Scope of work, Detailed Estimate [approved plan], Administrative approval/Estimate Sanction, Notice inviting tenders and its types, Tender, earnest money deposit, security deposit, types of contracts, Essentials of legally valid contract, Contract between Engineer and Employers, Appointment and authority of Engineer for execution of civil construction works, Category of contractors.

UNIT-IV

Public Works Administration: C.P.W.D. Organization set up, system of accounts, classes of works in PWD, Estimates, Delhi Scheduled Rules [CPWD], Cost adjustment indices sub head, sub works, administrative approval, technical sanction, possession of funds, expenditure sanction, Various methods of executing works.

UNIT V

Construction Equipment: Equipment for excavation and transportation of earth, hauling equipment, hoisting equipment, pile driving equipment, Equipment for pumping water, Dozers and cranes,
Scraper, Batching plants, RMC equipment etc.

Recommended Reference Books:

1. Managing Construction Projects by Graham M. Winch, John Wiley and Sons, 2010
2. Construction project management: planning and scheduling by Henry F. W. Naylor -Delmar Pub, 1995
3. Peurifoy-Construction Planning, equipment and methods, Tata Mc Graw Hill
4. Joseph Frein- Handbook of Construction Management and Organization, Springer
5. CPWD Manual of Works.
6. G. K. Hirashan -Fundamentals of Town Planning , Dhanpat Rai Publication
7. Essentials of Construction Project Management by Martin Loosemore UNSW press – 2003

BTCE 805E Advance Transportation Engineering

UNIT: I
Traffic Studies: Road inventories, Traffic Volume Studies, Spot Speed Studies, Travel Time and delay Studies, Origin-Destination studies, Methodology and Analysis of O-D data, Traffic capacity, Parking studies and characteristics, Accident studies and characteristics, causes and preventive measures.

UNIT: II
Statistical Methods for Traffic Engineering: Elementary concepts and Probability, Mean, Standard Deviation and variance, Poisson and Binomial Distribution, Normal distribution, sampling Theory and Significance testing, Linear Regression and correlation.

UNIT: III
Traffic Characteristics: Macroscopic and Microscopic Characteristics related to Volume, Speed and Density, their relationships, Road User Characteristics – Human and vehicular Characteristics.
Traffic Engineering Design: Principles of Road Junction design, Design of Roundabouts, Bus Stops and Parking Lots, Design of Signals.

UNIT: IV
Traffic Management: Traffic Laws, Regulations and Ordinances for Drivers, Pedestrians and Mixed Traffic. Traffic control Measures – One Way streets, Kerb Parking Control, Intersection Control, Speed Control, Access Control. Expressways. Traffic Control Devices – Traffic Markings, Signs, Signals, Traffic Islands, their Classification, types and Sketches, Street Lighting.

UNIT V
Traffic and Environment: Detrimental Effects of Traffic on the environment – air pollution, noise pollution, visual intrusion, aesthetics etc.
Road Safety: The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment.

Recommended Reference Books:

1. Traffic engineering and transport planning by L.R. Kadiyali, Khanna Tech Publication, Delhi.
2. Principles of transportation engineering by parbha chakrarborty & animesh dash, PHI
3. Traffic system analysis wohl and martin, Mc Graw Hill co.

BTCE 806A Earthquake Resistant Designs And Construction

UNIT I

Introductory Seismology: Various terminologies related with earthquake, Causes of earthquake, plate tectonics, Tsunami, Seismic wave propagation, Magnitude, intensity & energy of earthquake, magnitude & intensity scales, classifications of earthquakes, Seismic zoning case histories of earthquakes, Seismic hazards, induced hazards.

UNIT II

Earthquake recording, Seismic instruments, Seismographs & Seismograms, Basic concept of liquefaction and isolation. Introduction to various IS related codes, Structural systems, Effects of earthquake on buildings in general, structural and nonstructural failures, Dynamic characteristics of buildings, natural period of vibration, damping, stiffness etc., Seismic performance of traditionally built masonry constructions, typical failure mechanism of masonry buildings under earthquakes.

UNIT III

IS 4326: 1993: Planning consideration & architectural concept, provisions for earthquake resistant construction/ seismic strengthening of masonry constructions.

UNIT IV

Seismic performance of reinforced concrete buildings, Plan, elevation & stiffness irregularities & their effects, Typical earthquake damages of RC constructions, short column effect, soft storey effect, strong column-weak beam analogy, IS 13920: 1993: Ductile detailing of reinforced concrete buildings and shear wall concept.

UNIT V

Seismic design philosophy IS 1893 (part I):2002, codal provisions: Load combinations, Design lateral loads, response reduction factors, structural modeling of building frames and equivalent load method for earthquake analysis of multistory frames.

Recommended Reference Books:

(1) "Earthquake Resistant Design of Structures" by Pankaj Agarwal & Manish Shri Khande, PHI.

(2) "Advanced Reinforced Concrete Design" by Varghese, PHI "Dynamics of Structures by Chopra, PHI.

BTCE 806B Rural Water Supply & Sanitation

UNIT: I

General: Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects.

Sources of water: Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.

UNIT II

Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, standards of water quality.

Communicable Diseases: Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.

UNIT III

Water Treatment: Slow sand filter, horizontal roughing filter and their combination. Disinfection of rural water sources, Fluoride and its removal.

Schemes of Rural water supply: Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.

UNIT IV

Milk and Food sanitation: Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism.

Fly and Mosquito control: Life cycle of flies and mosquitoes, various methods of flies and mosquito control.

UNIT V

Rural Sanitation: Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes.

Community Awareness and user participation: Planning of communication support in rural supply and sanitation projects.

Recommended Reference Books:

1. Rural water supply & sanitation manual by govt. of india
2. Municipal and Rural sanitation E. W. steel, Mc Graw Hill Book co.
3. Reports of Rajeev Gandhi national drinking water mission

BTCE 806C Prestressed concrete

UNIT I

INTRODUCTION – THEORY AND BEHAVIOUR : Principles of Prestressing Types of prestressing systems – Materials – Systems and devices – Behavior of prestressed concrete elements – General concept of Prestress – Force transmitted by pretensioned and post tensioned systems – losses in prestress – analysis for Ultimate Strength – Comparison of codal

UNIT II

DESIGN FOR FLEXURE : Concept of Limit State design –Limit state of Collapse and serviceability – Design using allowable stresses – Stress range approach – Lins approach – Magnels approacg.

UNIT III

DESIGN FOR SHEAR, TORSION AND ANCHORAGE ZONE : Shear resistance in beams- Design for shear in rectangular and flanged beams – Behavior under torsion – Modes of failure –Design for torsion, shear and bending Anchorage Zone – analysis and design of pretension and post tensioned end blocks – IS code provisions – Comparison of other codes.

UNIT IV

STATICALLY INDETERMINATE STRUCTURES : Analysis of indeterminate structures – Continuous beam – Concept of concordance and linear transformations – Single storied rigid frames – Choice of cable profiles.

UNIT V

PSC SPECIAL STRUCTURES: Concept of circular prestressing – Design of prestressed concrete pipes and cylindrical water tanks – Composite construction types, behavior, flexural stresses, longitudinal shear transfer, transverse shear – Compression members – Design of poles and piles – Partial pre stressing – Principles , analysis and design concepts.

Recommended Reference Books:

1. Prestressed Concrete by N.Rajagobalan, Norosa Publishing House 2002
2. Prestressed Concrete by N.Krishnaraju, Tata Mc Graw Hill 3rd Edition 1985
3. BIS 13431980 Code of Practice for Prestressed concrete.

BTCE 806D Non Destructive Testing Techniques

UNIT I

OVERVIEW OF NDT :NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterisation. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection ¡V Unaided and aided.

UNIT II

SURFACE NDE METHODS Liquid Penetrant Testing – Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III

THERMOGRAPHY AND EDDY CURRENT TESTING (ET): Thermography-Principles, Contact and non contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation – infrared radiation and infrared detectors, Instrumentations and methods, applications.Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV

ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE): Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique ¡VPrinciple, AE parameters, Applications

UNIT V

RADIOGRAPHY (RT): Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films – graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts, Radiographic equivalence. Fluoroscopy- Xero-Radiography, Computed Radiography, Computed Tomography

Recommended Reference Books:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu ¡§Practical Non-Destructive Testing¡¨, Narosa Publishing House, 2009.
2. Ravi Prakash, ¡§Non-Destructive Testing Techniques¡¨, 1st revised edition, New Age International Publishers, 2010
3. ASM Metals Handbook,¡¨Non-Destructive Evaluation and Quality Control¡¨, American Society of Metals, Metals Park, Ohio, USA, 200, Volume-18.
4. Paul E Mix, ¡§Introduction to Non-destructive testing: a training guide¡¨, Wiley, 2nd Edition New Jersey, 2005

5. Charles, J. Hellier,¡§ Handbook of Nondestructive evaluation¡¨, McGraw Hill, New York 2001.
6. ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook,Vol. Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and

BTCE 806E Applications of Remote Sensing and GIS in Civil Engineering

UNIT I

Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics.

Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water.

UNIT II

Introduction to Aerial and space borne platforms. Global positioning system (GPS) photogrammetry – analog, analytical and digital photogrammetry, height and plan metric.

UNIT III

Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensing satellites,

Digital image processing; introduction, image rectification and restoration, image enhancement, manipulation, image classification, fusion.

UNIT IV

GIS system : Definition terminology and data types, Map projection and Co-ordinate system, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation, principle of cartography and cartographic design.

GIS customization concepts, approaches of Multi-criteria decision making, concepts and applications of Geostatistics.

UNIT V

Application of Geo-spatial technology in Civil Engineering, assessment of cyclones, rainfall, atmospheric humidity etc., weather analysis, forecasting and modelling.Land use, inventory and monitoring, urban planning, snow and glaciers, coastal zone management, air and water pollution, commercially available remote sensing and GIS software.

Recommended Reference Books:

1. Chang K.T., “Introduction to Geographic Information System”, Tata McGraw Hill Education (P) Ltd.,
2. John R.Jensen, “Remote Sensing of the Environment”, Pearson Education
3. Clarke K.C., Parks B.O., Crane M.P., “GIS and Environmental Modelimg”, PHI Learning (P) Ltd., ND
4. Lillesand T.M. and Kiefer R.W, “Remote Sensing and Image Interpretation”, John Wiley and Sons, NY
5. Lo C.P. and Yeung A.K.W., “Concept and Techniques of Geographic Information Systems”, PHI

6. Chakraborty D. and Sahoo R.N., "Fundamentals of Geographic Information System", Viva Books, ND.
7. Joseph G., "Fundamentals of Remote Sensing", University Press (India) Ltd., Hyderabad.
8. L.R.A. Narayan, "Remote Sensing and its Applications", University Press.

BTCE 807 Advanced Structural Engineering Lab

1. Deflection of a truss
2. Clark-Maxwell reciprocal theorem with truss
3. Funicular polygon for flexible cable
4. Analysis of redundant frame
5. Deflection of curved members
6. Buckling of columns
7. Clark-Maxwell reciprocal theorem with simply supported beam
8. ILD for deflection in a steel beam using unit load method
9. Unsymmetrical bending

BTCE 808 COMPUTER AIDED BUILDING DESIGN LAB

Residential /Commercial /Institutional Buildings Planning & Designing

BTCE 809 SANITARY ENGINEERING LAB

List of Experiments:

1. To determine the pH of the given sample of sewage.
2. To determine Total Solids of the given sewage sample.
3. To determine the Total Dissolved Solids of the given sewage sample.
4. To find out Total Settle-able Solids of the given sewage sample.
5. To determine Total Suspended Solids of the given sewage sample.
6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method.
7. To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
8. To find out Chemical Oxygen Demand of the waste water sample.
9. To study various Sanitary Fittings.

BTCE810 Design of Concrete structures Lab-I

Design the structures as per the theory subject

BTCE811 Estimation & Construction Management Lab**

1.Estimation of building(long wall and short wall method)
2. Estimation of building(center line method)
3. Analysis of rate for concrete work
4. Analysis of rate for brick work

5. Analysis of rate for plaster work
6. Estimate quantity of reinforcement
7. Preparation for approximate estimate for road project
8. Estimating cost of building on plinth area method

BTCE812 PROJECT