JAGANNATH UNIVERSITY

Faculty of Engineering & Technology

B.Tech(Civil Engineering)

Scheme of Examination & Detailed Syllabi

(w.e.f. 2016-2017)

University Campus

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

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

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Tota**	**Credi**
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**			**Session**	**Practic**	**Tota**	**Credi**
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**

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 Lab-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

THIRD SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 301	**Advanced Engineering Mathematics**	3	-	-	30	70	100	3
BTCE 302	**Strength of Materials-I**	3	1	-	30	70	100	4
BTCE 303	**Civil Engineering Materials**	3	-	-	30	70	100	3
BTCE 304	**Engineering Geology**	3	-	-	30	70	100	3
BTCE 305	**Construction Technology**	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	**Civil Engineering Materials Lab**	-	-	2	30	20	50	1
BTCE 308	**Engineering Geology Lab**	-	-	2	30	20	50	1
BTCE 309	**Building Drawing-I**	-	-	2	30	20	50	1
BTCE 310	**Fluid Mechanics Lab**	-	-	2	30	20	50	1
BTCE 311	**Professional Ethics & Disaster Management**	-	-	2	30	20	50	1
		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	Strength of Materials-II	3	1	-	30	70	100	4
BTCE 402	Concrete Technology	3		-	30	70	100	3
BTCE 403	Hydraulics & Hydraulic Machines	3	1	-	30	70	100	4
BTCE 404	Surveying-I	3		-	30	70	100	3
BTCE 405	Building Planning	3		-	30	70	100	3
BTCE 406	Quantity Surveying & Valuation	3		-	30	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 407	**Concrete Technology Lab**	-	-	2	30	20	50	1
BTCE 408	**Hydraulics & Hydraulic Machines Lab**	-	-	2	30	20	50	1
BTCE 409	**Surveying Lab-I**	-	-	2	30	20	50	1
BTCE 410	**Building Drawing-II**	-	-	2	30	20	50	1
BTCE 411	**Material Testing Lab**	-	-	2	30	20	50	1
	TOTAL	18	2	10	330	520	850	25

FIFTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 501	Theory Of Structures-I	3	1	-	30	70	100	4
BTCE 502	Environmental Engineering-I	3		-	30	70	100	3
BTCE 503	Geotechnical Engineering – I	3		-	30	70	100	3
BTCE 504	Surveying – II	3	1	-	30	70	100	4
BTCE 505	Building Design	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose any one)								
BTCE 506A	Ground Improvement Techniques	3	-	-	30	70	100	3
BTCE 506B	Advanced Concrete Technology	3	-	-	30	70	100	3
BTCE 506C	Solid Waste Management	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 507	Environmental Engineering Design & Lab. -I	-	-	2	30	20	50	1
BTCE 508	Geotechnical Engg.-I Laboratory	-	-	2	30	20	50	1
BTCE 509	Survey Lab. -Ii	-	-	2	30	20	50	1
BTCE 510	Computers Aided Building Design	-	-	2	30	20	50	1
BTCE 511	Structural Engineering Lab	-	-	2	30	20	50	1
BTCE512	Discipline & Extra Curricular Activity	-	-	-		50	50	1

	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	Theory Of Structures-II	3	1	-	30	70	100	4
BTCE 602	Geotechnical Engineering – II	3		-	30	70	100	3
BTCE 603	Environmental Engineering-II	3	1	-	30	70	100	4
BTCE 604	Design Of Concrete Structures – I	3	1	-	30	70	100	4
BTCE 605	Transportation Engineering–I	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose Any One)								
BTCE 606A	Remote Sensing And Gis	3	-	-	30	70	100	3
BTCE 606B	Rock Mechanics	3	-	-	30	70	100	3
BTCE 606C	Repair And Rehabilitation Of Buildings	3	-	-	30	70	100	3
Practicals/Viva Voce		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 607	Geotechnical Engg. Design And Laboratory. – II	-	-	2	30	20	50	1
BTCE 608	Environmental Engineering Lab. & Design – II	-	-	2	30	20	50	1

BTCE 609	Design Of Concrete Structures- I	-	-	2	30	20	50	1
BTCE 610	Road Material Testing Lab	-	-	2	30	20	50	1
BTCE 611	Technical Seminar & Project	-	-	2	30	20	50	1
BTCE 612	Discipline & Extra Curricular Activity	-	-	-		50	50	1
	TOTAL	18	4	10	360	540	900	28

SEVENTH SEMESTER

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 701	Water Resource Engineering-I	3	-	-	30	70	100	3
BTCE 702	Design of Steel Structures-I	3	1	-	30	70	100	4
BTCE 703	Design of Concrete Structures-II	3	1	-	30	70	100	4
BTCE 704	Transportation Engineering-II	3	-	-	30	70	100	3
BTCE 705	Application of Numerical Methods in Civil Engineerinng	3	-	-	30	70	100	3
ELECTIVE (Choose any one)								
BTCE 706A	Advance Transportation Engineering	3	-	-	30	70	100	3
BTCE 706B	Design of Prestress Concrete Structures	3	-	-	30	70	100	3
BTCE 706C	Rural Water Supply & Sanitation	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of**			**Sessional**	**Practical**	**Total**	**Credits**

		Teaching Hours						
BTCE 707	DESIGN OF WATER RESOURCE STRUCTURES LAB-I	-	-	2	30	20	50	1
BTCE 708	STEEL STRUCTURES DESIGN LAB-I	-	-	2	30	20	50	1
BTCE 709	CONCRETE STRUCTURES DESIGN LAB-II	-	-	2	30	20	50	1
BTCE 710	APPLICATION OF NUMERICAL METHODS IN CIVIL ENGINEERINNG LAB	-	-	2	30	20	50	1
BTCE 711	PRACTICAL TRAINING & INDUSTRIAL VISIT	-	-	2	-	-	50	1
BTCE 712	PROJECT-I	-	-	2	30	20	50	1
BTCE 713	DISCIPLINE & EXTRA CURRICULAR ACTIVITY	-	-	-	-	-	50	1
	TOTAL	**18**	**2**	**12**	**330**	**520**	**950**	**27**

EIGHTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 801	Water Resource Engineering-II	3	-	-	30	70	100	3
BTCE 802	Design of Steel Structures-II	3	1	-	30	70	100	4
BTCE 803	Project Planning & Construction Management	3	1	-	30	70	100	4
ELECTIVE (Choose any one)								
BTCE 804A	Bridge Engineering	3	-	-	30	70	100	3
BTCE 804B	Advance Foundation Engineering	3	-	-	30	70	100	3
BTCE 804C	Earthquake Resistant Construction & Design	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**

BTCE 805	Design of Water Resource Structures Lab-II	-	-	2	30	20	50	1
BTCE 806	Professional Practice & Estimating Lab	-	-	2	30	20	50	1
BTCE 807	Steel Structures Design-II Lab	-	-	2	30	20	50	1
BTCE 808	Design of Foundations Lab	-	-	2	30	20	50	1
BTCE 809	Structural Analysis by Matrix Methods Lab	-	-	2	30	20	50	1
BTCE 810	Seminar	-	-	4	60	40	100	2
BTCE 811	Project-II	-	-	4	60	40	100	2
BTCE 812	Discipline & Extra Curricular Activity	-	-	-	-	-	50	1
	TOTAL	**12**	**2**	**18**	**390**	**560**	**900**	**24**

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Tota**	**Credi**
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**			**Session**	**Practic**	**Tota**	**Credi**
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**

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

5. Berkley Physics Course Vol 1 & Vol. 3

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, 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 or demineralization.

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

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 Lab-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

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	**Advanced Engineering Mathematics**	3	-	-	30	70	100	3
BTCE 302	**Strength of Materials-I**	3	1	-	30	70	100	4
BTCE 303	**Civil Engineering Materials**	3	-	-	30	70	100	3
BTCE 304	**Engineering Geology**	3	-	-	30	70	100	3
BTCE 305	**Construction Technology**	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	**Civil Engineering Materials Lab**	-	-	2	30	20	50	1
BTCE 308	**Engineering Geology Lab**	-	-	2	30	20	50	1
BTCE 309	**Building Drawing-I**	-	-	2	30	20	50	1
BTCE 310	**Fluid Mechanics Lab**	-	-	2	30	20	50	1
BTCE 311	**Professional Ethics & Disaster Management**	-	-	2	30	20	50	1
		18	2	10	330	520	850	25

BTCE 301 Advanced Engineering Mathematics

UNIT 1

Fourier Series & Z Transform – Expansion of simple functions in fourier series. Half range series, Change of intervals, Harmonic analysis. Introduction,Properties, Inverse Z Transform.

UNIT 2

Laplace Transform - Laplace transform with its simple properties. Unit step function, Dirac delta function their Laplace transforms, Inverse Laplace, transform – convolution theorem, applications to the solution of ordinary and partial differential equations having constant coefficients with special reference to wave and diffusion equations

UNIT 3

Fourier Transform - Complex form of Fourier Transform and its inverse, Fourier sine and cosine transform and their inversion. Applications of Fourier Transform to solution of partial differential equations having constant co-efficient with special reference to heat equation and wave equation.

UNIT 4

Numerical Analysis: Difference operation Forward backward and central, shift and average operators and relation between them. Newton's forward and backward differences interpolation formulae. Sterling's formulae, Lagrange's interpolation formula. Numerical differentiation and integration. Trapezoidal rule, Simpson's one third and one eighth rule

UNIT 5

Numerical integration: Numerical integration of ordinary differential equations of first order, Picards method, Euler's method & Modified Euler's Method, Mille's method and Ranga Kutta fourth order method

REFERENCE BOOKS

1. *Engineering Maths Vol-I by Chandrika Prasad, Standard Publishers and Distributers*
2. *Vol-II by Chandrika Prasad, Standard Publishers and Distributers.*
3. *Higher Engineering Maths by Gaur & Kaul, Jaipur Publishing House*

BTCE 302 STRENGTH OF MATERIALS– I

UNIT 1

Simple Stresses and Strains: Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus; Tension test of mild steel and other materials: true and apparent stress, ultimate strength,yield stress and permissible stress;Stresses in prismatic & non prismatic members and in composite members;Thermal stresses; Shear stress, Shear strain, Modulus of rigidity,Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants; Stresses in composite members,Compatibility condition

UNIT 2

Compound Stress: Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress,Mohr's circle & it's application.

Moment of Inertia: Polar and product moment of inertia, Principal axes and principal moment of inertia

UNIT 3

Columns: Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae.

Membrane Analysis: Stress and strain in thin cylindrical & spherical shells under internal pressures.

UNIT 4

Bending of Beams: Types of supports, support reactions, determinate and indeterminate structures, and static stability of plane structures. Bending moment, Shear force and Axial thrust diagrams for statically. Determinate beams subjected o various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM

UNIT 5

Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections

REFERENCE BOOKS

1. *Strength of Material by Singer and Pytel, Harper Collins Publishers.*
2. *Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Co.*
3. *Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributers.*

BTCE 303 CIVIL ENGINEERING MATERIALS

UNIT 1

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 2

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 3

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 4

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 5

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.

REFERENCE BOOKS

1 *"Affordable Housing" by B.N. Moolchandani, Published by Indian Building Congress, Delhi.*
2 *Building Materials:Products, Properties and Systems by Ghambir,Tata Mc Graw Hill, Delhi*
3 *Construction Materials: Their nature & Behaviour by J.M. Illston; E&FN Spon*
4 *Building Materials by S. Duggal; New Age International Publishers. 2006*

BTCE 304 ENGINEERING GEOLOGY

UNIT 1

General Geology: Branches and Scope of Geology, Internal Structure of the Earth, Types of Weathering & Geological work of natural agencies like River& Wind. Geological Time Scale. Physical Properties of Minerals.

UNIT 2

Petrology:Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.

Structural Geology: Causes, Terminology, Classification, Recognition,

UNIT 3

Effects and Engineering consideration of Fold, Fault, Joints and Unconformities. Dip & Strike Problems.

UNIT 4

Engineering Geology: Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.

UNIT 5

Remote Sensing & GIS: Remote Sensing & GIS System, Nature of Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interactions with Earth's Surface Materials, Remote Sensing Platforms & Sensor's Characteristics. Application, Advantages and Limitations of Remote Sensing and GIS in Various fields of Civil Engineering.

REFERENCE BOOKS

1. *S.K.Garg- Physical & Engineering Geology- Khanna Publishers*
2. *N Chenna Kesavulu- A Text book of Engineering Geology- Macmillan India Ltd.*
3. *M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher*
4. *Remote Sensing and GIS: B.Bhatta- Oxford Publishers*
5. *Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & sons*

BTCE 305 CONSTRUCTION TECHNOLOGY

UNIT 1

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 2

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 3

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 4

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.

UNIT 5

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 & It 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.

REFERENCE BOOKS

1. *Affordable Housing", Published by Indian Building Congress, Delhi*
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*

BTCE 306 FLUID MECHANICS

UNIT 1

Fluids: Definition, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids.Properties of Fluids: Units of measurement, Mass density, Specific weight,Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

UNIT 2

Hydrostatics : Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.

Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and met centric height experimental and analytical determination of met centric height.

UNIT 3

Equilibrium of Fluid particles and flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation. Hydro-kinematics : Types of Flows : Steady and unsteady, uniform and non- uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flownet. Euler's equations of motion and integration of Euler's equations, Bernoulli's equation for incompressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.

UNIT 4

Applications of Bernoulli's equation: Pitot tube, Venturimeter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs. Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications– Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.

UNIT 5

Flow Through Pipes: Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow : Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.

REFERENCE BOOKS

1. *Fluid Mechanics by Dr. K.R. Arora, Standard Publishers and Distributers, Delhi.*
2. *Fluid Mechanics by Dr. R.K. Bansal, Laxmi Publication (P) Ltd.*
3. *Fluid Mechanics by H.M.Raghunath, CBS Publishers and Distributers.*
4. *Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi.*
5. *Fluid Mechanics by Modi & Seth, Standard Publishers, Delhi*

BTCE 307 CIVIL ENGINEERING MATERIAL LAB

Identification of Materials by Visual Inspection

1. To determine Normal Consistency, Initial & Final setting time, Specific Gravity, fineness & compressive strength of Cement (IS: 269-1967)
2. To Study the Utilization of Fly Ash
3. To Study the Procedure for Testing of Stone
4. To Study the Fiber Reinforced Concrete
5. To Study the Properties and Use Of Different Glasses
6. To Study the Different Aluminum and Steel Sections
7. To Study the Manufacture and Use of Concrete Hollow Blocks
8. To Determine Compressive and Tensile Strength of Timber Parallel and Perpendicular to Grain
9. To Study the Properties and Uses of Kota Stone
10. To determine the Water Absorption and Tolerance Limit of Bricks

BTCE308 ENGINEERING GEOLOGY LAB

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models a) Structural Geological Diagrams

b) Petrological Diagrams

c) Engineering Geological Diagrams

6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

BTCE 309 BUILDING DRAWING- I

Building Components –

1. Drawing of walls

i. Brick and Stone masonry

1. Partition wall, cavity wall and cross section of external wall
2. Pointing, Arches, Lintels and Floors

3. Doors and Windows

4. Stairs, Cross section of Dog legged stairs

5. Roofs: Flat and Inclined (Steel)

6. Foundations for Masonry Structures and Framed Structures, Provision of Damp Proof Course

Building Planning –

1. Development of Front Elevation and Sectional Elevation from a given plan

2. Development of Plan, Front Elevation and Sectional Elevation from line diagram

BTCE 310 FLUID MECHANICS LAB.

1. To verify the Bernoulli's theorem.
2. To calibrate the Venturimeter.
3. To calibrate the Orificmeter.
4. To determine Metacentrie Height.
5. To determine Cc, Cv, Cd of an orifice.
6. To determine Cd of a mouthpiece.
7. To determine Cd of a V-notch.
8. To determine viscosity of a given fluid.
9. Bye Pass.

BTCE 311 MORAL VALUES, PROFESSIONAL ETHICS AND DISASTER MANAGEMENT

HUMAN VALUES:

 Effect of Technological Growth and Sustainable Development.

 Profession and Human Values: Values crisis in contemporary society. Nature of values. Psychological Values, Societal Values and Aesthetic Values. Moral and Ethical values.

PROFESSIOAL ETHICS:

1. **Professional and Professionalism**- Professional Accountability, Role of a professional, Ethic and image of profession.
2. **Engineering Profession and Ethics**- Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
3. **Professional Responsibilities**- Collegiality, Loyalty, Confidentially, Conflict of Interest, Whistle Blowing.

DISASTER MANAGEMENT:

Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, impact and preventive measures:

 Natural Disasters- Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions.

 Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents. Disaster profile of Indian continent. Case studies. Disaster Management Cycle and its components.

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 401	Strength of Materials-II	3	1	-	30	70	100	4
BTCE 402	Concrete Technology	3		-	30	70	100	3
BTCE 403	Hydraulics & Hydraulic Machines	3	1	-	30	70	100	4
BTCE 404	Surveying-I	3		-	30	70	100	3
BTCE 405	Building Planning	3		-	30	70	100	3
BTCE 406	Quantity Surveying & Valuation	3		-	30	70	100	3

PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 407	**Concrete Technology Lab**	-	-	2	30	20	50	1
BTCE 408	**Hydraulics & Hydraulic Machines Lab**	-	-	2	30	20	50	1
BTCE 409	**Surveying Lab-I**	-	-	2	30	20	50	1
BTCE 410	**Building Drawing-II**	-	-	2	30	20	50	1
BTCE 411	**Material Testing Lab**	-	-	2	30	20	50	1
	TOTAL	18	2	10	330	520	850	25

BTCE 401 STRENGTH OF MATERIALS–II

UNIT 1

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, area moment method and conjugate beam method.

UNIT 2

Analysis of prop cantilever structures, Analysis of Indeterminate Structure using Area moment method, Conjugate beam method Combined direct and bending stress, middle third rule, core of a section, gravity retaining wall

UNIT 3

Fixed Beams & Continuous Beams: Analysis of fixed beams & continuous beams by three moments Theorem and Area moment method.

UNIT 4

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, springs in series and parallel, laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.

UNIT 5

Vibrations: Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series.

Simple Harmonic Motion: vector representation, characteristic, addition of harmonic motions, Angular oscillation.

Undamped free vibration of SDOF system: Newton's law of motion, D'Almbert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Introduction to damped and forced vibration.

REFERENCE BOOKS

1. Strength of Material by Singer and Pytel, Harper Collins Publishers.
2. Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributers
3. Mechanics of Structures Vol. I & II by S.B Junarkar, Charotar Publishing House.
4. Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia Laxmi Publications (P) Ltd.

BTCE 402 CONCRETE TECHNOLOGY

UNIT 1

Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio and its significance. Aggregates: types, physical properties and standard methods for their determination.

Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, methods of determination.

UNIT 2

Properties of hardened concrete such as strengths, permeability, creep, shrinkage, factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, maturity concept.

NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half cell potential meter, corrosion resistivity meter, core sampling.

UNIT 3

Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipments. Curing of concrete: various methods their suitability. Durability of concrete.

UNIT 4

Concrete mix deign (ACI, IS method), quality control for concrete. Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.

UNIT 5

Form work: Requirements, their types and codal guidelines for the design. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, arches and staircase. Slip and moving formwork. Special types of concrete: Introduction to high strength concrete, high performance concrete, sulphate resisting concrete, under water concreting, self compacting concrete, pumpable concrete: their salient properties and application.

REFERENCE BOOKS

1.*Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.*
2.Concrete Technology by M.S.Shetty, S.Chand & Co.
3.Concrete materials by Popovics, Standard Publishers.
4.Chemistry of Cement and Concrete by Peter C.Hewlett, Elsevier Butterworth Heinemann.
5. Concrete Technology by Neville & Brooks, Pearson Education

BTCE 403 HYDRAULICS AND HYDRAULIC MACHINES

UNIT 1
Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem, applications of dimensional analysis to pipe Friction problems, resistance to motion of partially and fully submerged bodies and other simple problems. Ship model experiments.

UNIT 2
Laminar Flow: Relation between shear & pressure gradient. Flow between plates & pipes. Equations for velocity distribution, pressure difference.
Turbulent Flow in pipes: Theories of Turbulence, Nikuradse's Experiments.
Hydro dynamically smooth & rough boundaries. Laminar, Sub layer, Equations of velocity distribution and friction coefficient. Stanton Diagram, Moody's diagram.

UNIT 3
Flow through channels: Uniform, Non-Uniform and variable flow. Resistance equations of Chezy, Mannring and Bazin. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Equations of gradually varied flow in Prismatic channels. Limitation of its applicability and assumption made in its derivation. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation .

UNIT 4
Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. Broad crested weirs for channel flow: Measurement, velocity distribution in open channels, parshall flume. Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes.

UNIT 5

Centrifugal pumps and turbines: Volute and whirlpool chambers, Loses of head due to variation of discharge Manometric and Hydraulic efficiencies, Description of single and multistage pumps. Specific speed, characteristic curves. Model Test. Reaction and Impulse turbines, specific speed, Mixed flow turbines. Pelton wheel turbine, Francis turbine, propeller turbine and Kaplan turbine Efficiency, Characteristics of turbines. Basic principles of governing of turbines, Draft-tube, Selection of turbines, model tests.

REFERENCE BOOKS

1. Fluid Mechanics & Hydraulics by John F.Douglas & Lynne B. Jack, Prentice Hall Inc.
2. Fluid Mechanics & Hydraulics by Dr. R.K. Bansal, Laxmi Publications (P) Ltd.
3. Fluid Mechanics & Hydraulics by Modi & Seth, Standard Publishers & Distributers, Delhi
4. Fluid Mechanics & Machinery by C.S.P.Ojha, R.Berndtsson and P.N.Chandramauli, Oxford Publishers, Delhi
5. Fluid Mechanics & Hydraulics by Dr. K.R, Arora, Standard Publishers & Distributers, Delhi

BTCE 404 SURVEYING – I

UNIT 1

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. Advance techniques of distance measurements.

UNIT 2

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 3

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

UNIT 4

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.

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.

UNIT 5

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

REFERENCE BOOKS

1. Plane Surveying by Dr. A.M. Chandra, New Age International.
2. Surveying Volume –I & II by Dr. K.R. Arora Standard Book House Delhi
3. Surveying & Leveling by Subramanian Oxford University Press
4. Surveying Vol.1 by S.K.Duggal Tata Mc Graw Hill,Delhi.
5. Surveying Volume I by Dr. B.C. Punamia Laxmi Publications (P) Ltd.

BTCE 405 BUILDING PLANNING

UNIT 1

Introduction: Types of buildings, Classification of buildings by occupancy, Multi storey building, criteria for location and site selection, site plan and its detail. Sun Consideration: Different methods of drawing sun chart, sun shading devices, design of louvers, energy conservation in buildings, passive solar cooling and heating of buildings.

UNIT 2

Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, comfort conditions, biclimatic chart, climate modulating devices.
Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.

Building Bye Laws and NBC Regulations: Objective of by-laws, Regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.

UNIT 3

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, office buildings.

UNIT 4

Functional design and Accommodation requirements of
(A) **Residential Buildings:**
Anthrometry, activities and their spatial requirements; Area planning, living area, sleeping area, service area; Bubble diagram showing sequence of arrangement of area, plan, elevation, sectional elevation.
(B) **Non Residential Buildings:** viz-school buildings, rest house, primary health centers, post office, bank, College library, cinema theatres etc.

UNIT 5

Services in Buildings

(A) Lighting and ventilation, doors and windows, lifts.
(B) Acoustics, sound insulation and noise control.
(C) Fire fighting provisions.

REFERENCE BOOKS

1. Manual of Tropical Housing and Buildings by Koenigs Berger Orient and Longman.
2. Building Drawing by M.G.Shah, C.M. Kala, S.Y.Patki , Tata Mc Graw Hills.
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 406 QUANTITY SURVEYING & VALUATION

UNIT 1

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of Imeasurement, 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 2

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 3

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

UNIT 4

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

UNIT 5

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

1. *Estimating Costing Specification & Valuation in Civil Engg. M .Chakroborty, Bhakti Vedanta, Book Trust, delhi.*
2. *Quantity Surveying and Valuation by S.C. Rangawala , Charotar Publishing House.*
3. *Estimating & costing by B.N.Dutta, UBS Publishers & Distributers*

BTCE 407 CONCRETE TECHNOLOGY LAB.

1. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
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 optimum dose of super plastsizers by by Flow table test.
10. To design concrete mix of M-20 grade without admixture in accordance with I S recommendations.
11. To design concrete mix of M-40 grade with admixture in accordance with I S recommendations.
12. To determine the Elstic Modulus of Concrete.
13. To determine the Permeability of Conerte.
14. NDT

BTCE 408 HYDRAULICS LAB.

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine C_d of Broad crested wier.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given flume.
7. To plot characteristics curve of hydraulic jump.
8. To plot characteristics curve of Pelton Wheel.
9. To plot characteristics curve of Centrifugal Pump.

BTCE 409 SURVEYING LAB. I

1. Ranging and Fixing of Survey Station.
2. Plotting Building Block by offset with the help of cross staff.
3. To determine the magnetic bearing of a line

a. Using surveyor's compass

b. Using prismatic compass

4. Measurement and adjustment of included angles of traverse using prismatic compass.
5. To determine the reduced levels using Tilting Level/Automatic Level.
6. To determine the reduce levels in closed circuit using Dumpy Level.
7. To carry out profile leveling and plot longitudinal and cross sections for road

8. To carryout temporary adjustment of Theodolite & Measurement of horizontal angle.

a. By method of repetition.

b. By method of Reiteration

9.To determine the horizontal and vertical distance by tachometric survey

10. To study the various minor instrumen

BTCE 410 BUILDING DRAWING- II

1.To plan 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 a Primary Health Center

3- To design and draw a Primary School

4- To design and draw a Rest House

5- To design and draw a Post Office

6- To design and draw a Bank

7- To design and draw a College Library

8- To design and draw a Cinema Theatre

BTCE 411 MATERIAL TESTING LAB.

1. Tensile Strength Test – Mild Steel and HYSD bar
2. Compressive Strength Test – Mild Steel and Cast Iron
3. Compressive Strength Test – Cement Cubes and Concrete Cubes
4. Compressive Strength Test – Bricks
5. Compressive Strength Test – Wooden Blocks
6. Hardness Test – Rockwell Hardness and Brinell Hardness
7. Impact Test – Izod and Charpy
8. Modulus of Rupture of Wooden Beam
9. Fatigue Test
10. Spring Test
11. Torsion Test

FIFTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 501	Theory Of Structures-I	3	1	-	30	70	100	4
BTCE 502	Environmental Engineering-I	3		-	30	70	100	3
BTCE 503	Geotechnical Engineering – I	3		-	30	70	100	3
BTCE 504	Surveying – II	3	1	-	30	70	100	4
BTCE 505	Building Design	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose any one)								
BTCE 506A	Ground Improvement Techniques	**3**	-	-	**30**	70	100	**3**
BTCE 506B	Advanced Concrete Technology	3	-	-	**30**	70	100	3
BTCE 506C	Solid Waste Management	3	-	-	**30**	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 507	Environmental Engineering Design & Lab. -I	-	-	2	30	20	50	1
BTCE 508	Geotechnical Engg.-I Laboratory	-	-	2	30	20	50	1
BTCE 509	Survey Lab. -Ii	-	-	2	30	20	50	1
BTCE 510	Computers Aided Building Design	-	-	2	30	20	50	1
BTCE 511	Structural Engineering Lab	-	-	2	30	20	50	1
BTCE512	Discipline & Extra Curricular Activity	-	-	-		50	50	1
	TOTAL	18		10	360	540	900	27

BTCE501 THEORY OF STRUCTURES –I

UNIT 1

Introduction to scope, objective and outcome of subject, Introduction to Indeterminate structures, Degrees of freedom per node,Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope deflection method

UNIT 2

Analysis of structures using Moment-distribution method applied to continuous beams and portal frames with and without inclined members

UNIT 3

Unit load method & their applications: deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.
Introduction to Energy Methods**:** Strain energy for gradually applied, suddenly applied and impact loads, Strain energy due to axial loads, bending, shear and torsion;. Castiglione's theorems & their applications in analysis of determinate and redundant frames up to two degree of redundancy and trussed beams; Stresses due to temperature& lack of fit in redundant frames; deflection of determinate beams, frames using energy methods

UNIT 4

Column Analogy method for indeterminate structures, determination of carry over factor for non-prismatic section.
Kani's Method: Analysis of beams and frames with & without sway by Kani's method

UNIT 5

Approximate methods for lateral loads: Analysis of multistory frames by portal method, cantilever method & factor method. Analysis of determinate space trusses by tension coefficient method.

REFERENCE BOOKS

1. Advanced Structural Analysis by Dr. A.K. Jain, Nem Cahnd and Brothers, Roorkee.
2. 2- Mechanics of Structures by Timoshenko & Young, Mc Graw Hill Book Co.

3- Mechanics of Structures Vol.-I by Junarkar & Shah, Charotar Publishing House.

4- Theory of Structures by Jangid & Negi, Tata Mc Graw Hill.

BTCE502 ENVIRONMENTAL ENGINEERING –I

UNIT- I

Introduction to scope, objective and outcome of subject.

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, ultaneous flow, design of plumbing system.

REFERENCE BOOKS

1. Environmental Engineering by Peavy, H.S., Rowe D.R. and Techobanoglous, Mc Graw Hill, Book Company.

3Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.

BTCE503 GEOTECHNICAL ENGINEERING –I

UNIT-I

Introduction to scope, objective and outcome of subject.
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. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems.

UNIT-II

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-III

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, principle of drainage by electro Osmosis, phreatic line, Flow net through earth dam.

UNIT-IV

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. Triaxial and unconfined compression test apparatuses. Typical stress-stain curves for soils. Typical failure envelopes for cohesion less soils and normally consolidated clay soils.

UNIT-V

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, compaction equipments. Soil stabilization, Mechanical Stabilization. Stabilization with cement, lime and bitumen.

REFERENCE BOOKS

1. 2- Soil Mechanics & Foundation Engineering by Arora K.R, Standard Publishers and Distributers, Delhi.

2. 3- Soil Engineering in Theory & Practice by Alam Singh, CBS Publishers and Distributers, Delhi.

BTCE504 SURVEYING –II

UNIT-I

Introduction to scope, objective and outcome of subject.

Trigonometric Leveling: Trigonometric leveling, Objects accessible and non accessible, Determination of levels object- when two instrument positions in same and different vertical planes**.**

Curvature, Refraction and **A**xis Signal corrections, Determination of difference in elevations of points by trigonometric leveling by single observation method (angle of elevation, angle of depression), reciprocal method.

UNIT-II

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

UNIT-III

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.

Indivisibility 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-IV

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-V

Field Astronomy: Definitions of terminology used in Astronomy, Co-ordinate Systems.
Relationships between different Co-ordinate systems. Astronomical Triangle, Napier's Rule. Different methods of determination of Azimuth. Electronic distance measurement and use of Total station.

REFERENCE BOOKS

1. Surveying Vol. 2 & 3 by B C Punmia Laxmi Publications, Delhi.
2. Advance Surveying by Sathees Kumar, R.Sathis Kumar , N. Madhu, Pearson Education
3. Plane and Geodetic Surveying Vol.I &II, BY David Clark, CBS Publishers and Distributers.
4. Surveying Vol.2 by S.K.Duggal, Tata Mc Graw Hill, Delhi.
5. Advance Surveying by A.M.Chandra, New Age Inetrnational, Delhi.

BTCE 505 BUILDING DESIGN

UNIT-I
Introduction to scope, objective and outcome of subject.
Design Loads: Design loads for different types of buildings. (IS-875 part 1 &2). Load distribution & concept of load flow to different structural components.
Structural Systems: Assumption of integrity aspect ratios & over turning resistance, strength & stiffness of buildings, symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.

UNIT-II
Lateral loads: Wind loads & calculation of wind load on structures (IS: 875- Part 3).

UNIT-III
Lateral loads: Earthquake loads & calculations of earthquake loads on buildings masonry & framed structures. (IS: 1893 – Part 1).

UNIT-IV
Masonry and Framed Buildings: Design of masonry buildings and framed buildings, Earthquake resistant construction of buildings, and various provisions as per IS codes; IS-4326, IS-13827, IS-13828, IS-13920, IS-13935.

UNIT-V
Mass Housing: Prefabricated construction for mass housing.
Special Roofs: Introduction to folded plates, cylindrical shells, north-light shell roofs, grid and ribbed floors.

REFERENCE BOOKS

IS : 875, Part I, II & III

IS : 1893

IS : 4326

IS : 13920

BTCE506A GROUND IMPROVEMENT TECHNIQUES

UNIT-I

Introduction to scope, objective and outcome of subject.

Introduction: Formation of soil, major soil types, collapsible soil, expansive soil, reclaimed soil, sanitary land fill, ground improvements; objective, potential.

General principles of compaction: Mechanics, field procedure, quality control in field.

UNIT-II

Ground Improvement in Granular soil: In-place densification by (a) Vibro floatation, (b) Compaction piles in sand (c) Vibro compaction piles(d)Dynamic compaction (e) Blasting

UNIT-III

Ground improvement in cohesive soil: Preloading with or without vertical drains. Compressibility vertical and radial consolidation, Rate of consolidation, Preloading methods. Types of drains, Design of vertical drains, Construction techniques.

Stone column: Function, Design principles, load carrying capacity, construction techniques, settlement of stone column foundation.

UNIT-IV

Ground Improvement by Grouting & Soil Reinforcement: Grouting in soil: Types of grout, desirable characteristics, Grouting pressure, Grouting methods.

Soil Reinforcement – Mechanism, Types of reinforcing elements, Reinforcement-Soil interaction, Reinforced soil application beneath roads, foundation and retaining walls

UNIT-V

Soil Stabilization:

Lime Stabilization – Base Exchange mechanism, Pozzolonic reaction, lime- soil interaction, lime columns, Design of foundation on lime column.

Cement stabilization-Mechanism, amount, Age and curing.

Fly ash-Lime stabilization

Soil bitumen stabilization

REFERENCE BOOKS

1. Text book of Geostatic Engineering by Gulhati & Dutta, Tata Mc Graw Hills, Delhi.
2. Principles of Foundation Engg by B.M. Das, Thomson, Books/Cole.
3. Foundation Design Manual By N.V Nayak, Dhanpat Rai and Sons.
4. Soil Engineering in Theory and Practice Vol. III by Alam Singh CBS Publishers

BTCE506B ADVANCE CONCRETE TECHNOLOGY

UNIT-I

Introduction to scope, objective and outcome of subject.

Concrete Production: Difference in mix proportioning for **v**ibrator compacted concrete, pumpable and roller compacted concrete. Considerations in a plant operations in ready mixed concrete (RMC). Different types of mixers, transportation systems and pumps in RMC

Rheology of Concrete: Flow ability, Segregation, Bleeding and Viscosity etc. - Factors affecting, related standards including slump flow test, v funnel test, U box test, J Ring test, Stability test, L Box test, rheometer test etc.

UNIT-II

Mineral and Chemical admixtures in Concrete:

Chemical: Applications of accelerators, importance of chloride free admixtures, Typical dosages and applications, Case studies of use in tunnels. Application of Retarders, particularly in RMC applications. High range water reducing admixtures: Naphthalene and melamine based, PCE based. Principle of working. Application procedure, Shelf life, Outline of different commercial types available in Indian market (more than 10)

Mineral : Flyash : Basic properties, IS 3812 specifications for use in cement and concrete. Properties of typical flyashes available in the country.Graded flyash, Pozzocrete and its applications.

Ground Granulated Blast Furnace Slag (GGBFS): Basic properties**,** Indian standards, Applications. **Ultra fine powders:** Micro Silica, Metakaolin, Limestone, Calcium carbonate powders etc: Basic properties, role in cement concrete and pplications.

UNIT-III

Strength of Concrete: Strength- porosity relationship, factors affecting compressive strength, behaviour of concrete under uniaxial, biaxial and triaxial stress states, Split Tensile strength and modulus of rupture -test methods and empirical formulae for their estimation as per ACI manual of concrete practice and Indian standards.

Elasticity, Creep and Shrinkage of Concrete: Elastic behaviour, Method of determination of Elastic modulus, factors affecting modulus of elasticity, early

volume change in concrete due to plastic shrinkage, autogeneous shrinkage and drying shrinkage- factors affecting them, typical values and their methods of determination. Creep of concrete- specific creep, typical values, creep recovery, factors affecting creep and its determination with ASTM procedure.

UNIT-IV

Microstructure of Concrete: Interfacial transition zone, hydration kinetics, hydrated cement paste (hcp), ettringite, calcium hydroxide, presence of micro-cracks in concrete mass - their characteristics and significance on performance of concrete, **Penetrability of Concrete**: Permeability, sorptivity and diffusion in concrete- test methods and significance. **Durability of Concrete**: Physical and chemical processes, recently employed methods of tests for ensuring longer and durable concrete structures like Resistivity, RCPT, etc- case studies involving decision based on rapid chloride permeability test (RCPT), DIN permeability, etc

UNIT-V

Special Aggregates: Light weight, heavy weight- their characteristics and uses in concrete. Specific purpose concretes and cement based composites: Self Compacting Concrete: Mix proportioning, EFNARC guidelines. Fiber cements and fiber reinforced cement based composites, mass concrete and polymer concrete etc.- materials, production and application areas.

High performance concrete- performance characteristics in fresh and hardened states, production precautions - case studies of use of HPC in India: Delhi Metro construction, Mumbai – Worli Sea link project, atomic power projects, Hydro electric power projects etc. **Nano Technology in Cement and Concrete:** Use of nano silica, CNTs and other nano materials.

REFERENCE BOOKS

1. Concrete Technology by M.S. Shetty, Dahnpat Rai & Sons.
2. Concrete Technology by Nevillee & Brooks, Pearson Education.
3. Concrete Microstructure P.K. Metha, Tata Mc Graw Hill.
4. Concrete Technology- A. S. Santhakumar, Oxford University Press

BTCE506C SOLID WASTE MANAGEMENT

UNIT-I

General: Problems associated with Solid Waste Disposal. **Generation of Solid Waste:** Goals and objectives of solid waste management, Classification of Solid Waste. Solid Waste Generation, Factors Influencing Generation of Solid Waste, Characteristics of Solid Waste, Analysis of Solid Waste.

UNIT-II

Onsite Handling, Storage and Processing: Public Health and Aesthetics, Onsite Handling, Onsite, Storage, Dust bins, Community Containers, Container Locations, On-site Processing Methods.

UNIT-III

Solid Waste Collections, Transfer and Transport: Collection Systems, Equipment and Labor requirement, Collection Routes, Options for Transfer and Transport Systems.

UNIT-IV

and Transport Systems. Disposal, Sanitary land filling, Composting and Incineration, Bioremediation.

UNIT-V

Recovery of Resources, Conversion, Products and Energy: Material Recovery, Energy Generation and Recovery Operation, Reuse in other industry.
Industrial Solid Waste: Nature, Treatment and Disposal Methods.

REFERENCE BOOKS

1-Solid Waste Engineering Principles and Management Issues by G.Technobanogious H.Theisen & R.Blssen, Mc Graw Hill Book Co.

2.Solid Waste Management by C.L.Mantell, Mc Graw Hill Book Co.

3. Solid Waste Management in Developing Countries by Bhide& Sunrashen PHI.

BTCE 507: ENVIRONMENTAL ENGINEERING DESIGN & Lab. -I

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 hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

BTCE 508: GEOTECHNICAL ENGG.-I LABORATORY

1. Grain size distribution by Sieve Analysis
2. Determination of water content by Pycnometer.
3. Determination of specific Gravity by Pycnometer.
4. Determination of liquid limit by Casagrande's apparatus.
5. Determination of liquid limit by cone penetrometer.
6. Determination of plastic limit
7. Determination of shrinkage limit

8. Determination of field density by core-cutter

9. Determination of field density by sand replacement method

10. Determination of compaction properties by standard Proctor Test Apparatus

11. Determination of C-Ø values by Direct Shear Test Apparatus

12. Determination of Unconfined Compressive Strength by unconfined compression Test Apparatus

BTCE 509: SURVEY LAB. -II

1. To measure the horizontal and vertical angles by Theodolite.

2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane).

3. To determine the Height of an object by trigonometric leveling (Instruments in different vertical planes).

4. To shift the R.L. of known point by double leveling.

5. To measure and adjust the angles of a braced quadrilateral.

6. To prepare a contour map by indirect contouring.

6. To prepare the map of given area by plane tabling.
7. To determine the Azimuth of a given line by ex-meridian observations of Sun
8. Survey Camp (including exercise on triangulation, topographic, or project survey) with maximum duration of 10 days

BTCE 510 : COMPUTERS AIDED BUILDING DESIGN

Design Problems as syllabus of theory

BTCE 511 : STRUCTURAL ENGINEERING LAB

1. Study of friction, screw jacks, winch crabs etc.

2. Deflection of a truss

3. Clark-Maxwell reciprocal theorem with truss

4. Funicular polygon for flexible cable
5. Analysis of redundant frame
6. Deflection of curved members
7. Buckling of columns
8. Clark-Maxwell reciprocal theorem with simply supported beam

9. ILD for deflection in a steel beam using unit load method
10. ILD for support reaction using Muller-Breslau Principle

11. Unsymmetrical bending.
12. Two hinged and three hinged arches**.**

SIXTH SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 601	Theory Of Structures-II	3	1	-	30	70	100	4
BTCE 602	Geotechnical Engineering – II	3		-	30	70	100	3
BTCE 603	Environmental Engineering-II	3	1	-	30	70	100	4
BTCE 604	Design Of Concrete Structures – I	3	1	-	30	70	100	4
BTCE 605	Transportation Engineering–I	3	1	-	30	70	100	4
GENERAL ELECTIVE –I(Choose Any One)								
BTCE 606A	Remote Sensing And Gis	3	-	-	30	70	100	3
BTCE 606B	Rock Mechanics	3	-	-	30	70	100	3
BTCE 606C	Repair And Rehabilitation Of Buildings	3	-	-	30	70	100	3
Practicals/Viva Voce		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 607	Geotechnical Engg. Design And Laboratory. – II	-	-	2	30	20	50	1
BTCE 608	Environmental Engineering Lab. & Design – II	-	-	2	30	20	50	1
BTCE 609	Design Of Concrete Structures- I	-	-	2	30	20	50	1
BTCE 610	Road Material Testing Lab	-	-	2	30	20	50	1
BTCE 611	Technical Seminar & Project	-	-	2	30	20	50	1
BTCE 612	Discipline & Extra Curricular Activity	-	-	-		50	50	1
	TOTAL	18	4	10	360	540	900	28

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BTCE601 THEORY OF STRUCTURES – II

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**.**

UNIT-III

Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, girder.

UNIT-IV

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

UNIT-V

Introduction to matrix method, Force displacement relation, flexibility and stiffness coefficients, relation between flexibility and stiffness matrices, system approach of flexibility method and stiffness method, coordinate transformation matrix, rotation matrix, element and global stiffness matrix for pin jointed structures and beam element in 2D only

REFERENCE BOOKS

1-Mechanics of Structures Vol. I & II by S.B. Junarkar & Shah, Charotar Publishing House.

2- Theory of Structures by B.C. Purnmia, Laxmi Publication (P) Ltd.

3- Theory of Structures by Timoshenko, Mc Graw Hill Book Co.

4- Structural Analysis by Ghali & Neville, E&FN Spon.

5. Structural Analysis by Hibbler R.C., Pearsons

BTCE 602 GEOTECHNICAL ENGINEERING – II

UNIT-I

Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Horizontal and shear stresses due to concentrated loads. Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram.

Vertical stresses at point under line load and strip load. Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart, Fensk's Chart. Pressure bulb and its significance in Foundation exploration. Contact pressure below foundations.

UNIT-II

Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy. Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils.
Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.
Preconsolidation pressure and its determination. Normally, Over and Under consolidated soils. Methods of computation of Settlement and its rate. Coefficient of consolidation for layered soil. Total and differential Settlement.

UNIT-III

Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability analysis of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number, Taylor stability number curves. Stability of slopes of earthen embankments under sudden draw down, steady seepage and during construction. Bishop's method of stability analysis.

UNIT-IV

Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories of earth pressure. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill. Earth pressure on cantilever sheet piles Stability analysis of retaining walls.

UNIT-V

Bearing Capacity of Soils: Terminology related to bearing capacity, Common types of foundations. Terzaghi and Meyehoff's theory for bearing capacity. Rankine's method for minimum depth of foundation. Skempton's method. Effect of eccentricity and water table on bearing capacity. Plate load and penetration tests for determining bearing capacity. Introduction to pile, well and machine Foundations. Site Investigations: Methods of explorations. Planning of Investigations, Depth of exploration, Number of boreholes, Undisturbed and Disturbed samples. Types of samplers. Brief description of procedures of sampling, Transportation and Storage of samples. Geophysical methods of investigations.

TEXT BOOK

1. Engineering in Theory & Practice Vol. I by Alam Singh, CBS Publishers and Distributers, Delhi. (2003)
2. Soil Mech. & Foundation Engineering by K.R. Arora, Standard Publishers and Distributers, Delhi.

BTCE603 ENVIRONMENTAL ENGINEERING –II

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.
Plumbing for Design of Buildings: Various systems of plumbing–one pipe, two pipes, single stack, traps, layout of house drainage.

UNIT V

Air and Noise Pollution: Air quality, Emission standards, vehicular pollution, Effect of air pollution on human health, Noise Pollution, global effect of air and noise pollution, green house effect, acid rain etc.

REFERENCE BOOKS

1- Environmental Engineering II by B.C. Punmia, Arihant Publishers, Jodhpur.

2- Sanitary Engineering by SK Garg, Khanna Publishing Co.

3.Manual on Sewage and Sewage Treatment Ministry of Urban Development Govt. of India.

1. Water and Waste Water Engineering by Fair, G.M., Geyer G.C. and Okun D.A, Ann Arbor Sc.Publishing.

BTCE604 DESIGN OF CONCRETE STRUCTURES – I

UNIT I
Objective and fundamental concepts of design of RC members, Types and function of reinforcement. Introduction to various related IS codes. Design Philosophies: Working stress, ultimate strength and limit states of design. Analysis and Design of singly reinforced rectangular beam section for flexure using Working Stress Method and Limit State Method.

UNIT II
Analysis and design of singly reinforced, flanged beams and doubly reinforced rectangular beams for flexure using Limit State Method. Limit state of serviceability for deflection, control provisions of empirical coefficients.

UNIT III
Limit state of collapse in shear: analysis and design of prismatic sections for shear using LSM. Limit state of collapse in bond: concept of bond stress, anchorage length and development length, curtailment of reinforcement as per codal provisions.

UNIT IV
Analysis and design of one way and two way slabs using LSM and Flat slab using direct design method as per code, Detailing of reinforcement.

UNIT V
Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of uniaxially eccentrically loaded short columns. Introduction to Pu-Mu interaction curves and their use for eccentrically loaded columns.
Design of Column Footings: Analysis and design of Isolated column footing and combined footing for two columns (without central beam) for axial loads using LSM.

REFERENCE BOOKS

1- *Illustrated Reinforced Concrete Design by Karve & Shah; Standard Publishers, Delhi.*

2- *Limit State Design of Reinforced Concrete by Verghese P.C.; PHI Delhi.*

3- *Limit State Design by Dayaratnam; Oxford and IBH Publishing House.*

4- *Reinforced Concrete : Limit State Design by A.K.Jain; Nem Cahnd and Brothers, Roorkee.*

5- *Reinforced Concrete Structural Elements by P Purushothaman; Mc Graw Hill*

6- *Reinforced Concrete Fundamentals by Phil M. Ferguson; Prentice Hall*

7- *Design of reinforced Concrete by Jack C. Cormac & James K. Nelson; C.H.I.P.S.*

8- *Reinforced Concrete Design by Wang & Salmon; Harper & Row.*

9- *Design of Concrete Structures by Nilson & Winter; Mc Graw Hill*

BTCE605 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. Equipments for highway construction of rigid and flexible pavements.

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. Recommendations Indian Road congress code of Practice.

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. Design as guide lines of relevant Indian Road congress code of Practice. 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

1.Highway Engineering by Khanna SK & CG Justo, Nem Chand and Brothers, Roorkee.

2-Highway Engg. by L.R. Kadiyali, Khanna Tech Publications, Delhi.

3- Specification for Roads & Bridges by Ministry of Road Transports & Highways and Indian Road Congress.

4. Transportation Engineering and Planning, 3rd ed., Papacostas & Prevedouros, PHI Publishers.

5. Highway Engineering by Rangawala, Charotar Publishing House.

BTCE606A REMOTE SENSING AND GIS

UNIT I

Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs, Aerial camera and photo-theodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopic vision and stereoscopes, Height determination from parallax measurements, Flight planning, Maps and Map substitutes and their uses.

UNIT II

Remote Sensing: Introduction and definition of remote sensing terms, Remote Sensing System, Electromagnetic radiation and spectrum, Spectral signature, Atmospheric windows.

UNIT III

Different types of platforms, sensors and their characteristics, Orbital parameters of a satellite, Multi concept in Remote Sensing.

UNIT IV

Image Interpretation: Principles of interpretation of aerial and satellite images, equipments and aids required for interpretation, ground truth collection and verification, advantages of multidate and multiband images.
Digital Image Processing concept.

UNIT V

Geographic Information System (GIS) : Introduction & applications of GIS in map revision, Land use, Agriculture, Forestry, Archaeology, Municipal, Geology, water resources, Soil Erosion, Land suitability analysis, change detection.

REFERENCE BOOKS

1.- Basics of Remote Sensing & GIS by Dr. S.Kumar , Univertsity Sc. Press
2- Geographic Information System by Kang Tsung Chang, Tata Mc Graw Hills.
3-Remote Sensing and GIS by Legg.C.A., Ellis Horwood, London.
4-Remote sensing and GIS by Bhatt Oxford University Press.

BTCE 606B : ROCK MECHANICS

UNIT I

ENGINEERING CLASSIFICATION OF ROCKS: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock rating concept, RMR classification, Q classification. Inter relation between Q and RMR, prediction of ground condition and support pressure. Effect of Tunnel size on support pressure.

UNIT II

ENGINEERING PROPERTIES AND LABORATORY TESTS ON ROCKS: Porosity, Density, Moisture content, Degree of saturation, Co- efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability.

Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.

UNIT III

INSITU TESTS ON ROCKS: Necessity of Insitu test, Plate load test for deformability, Shear test, Test for internal stresses – flat Jack, pressure meter test.

JOINTED ROCKS: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.

UNIT IV

STRENGTHOFROCKSINUNCONFINEDCONDITION: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Hoek Criteria, Barton Methodology.

STRENGTH OF ROCKS IN CONFINED CONDITION: History of Hoek and Brown Failure Criterions and latest methodology, Parabolic Strength Criteria.

UNIT V

GROUTING AND ROCK BOLTING: Grouting materials, Grouting operations, methods of Grouting, Mechanism of Rock Bolting, Principal of design.

BEARING CAPACITY OF ROCKS: Bearing capacity of intact rocks, jointed rocks, IS Code methodology, Singh and Rao Method and latest methodologies.

REFERENCE BOOKS

1. Rock Engg. For Engineers by B.P. Verma , Khanna Publishers.
2. Rock Engg. By Bhawani Singh, Elsevier Science Ltd.
3. Foundation on Rocks by Duncan C.Wyllie, Spon Press

BTCE606C REPAIR AND REHABILITATION OF BUILDINGS

UNIT I

Deterioration of concrete in structures: physical processes of deterioration like F & T 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 Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures.

REFERENCE BOOKS

1- Properties of Concrete by A.M. Neville, Pearson.

2- Concrete Technology by M.S. Shetty, S.Cahnd & Comp.

3- Hand book of Analytical Techniques in Concrete Tech by V.S.. Ram Chandran, Standard Publishers.

BTCE607: GEOTECHNICAL ENGG. DESIGN AND LABORATORY. – II

1. To determine the differential free swell index of soil.
2. To determine the grain size distribution of fine grained soil by Hydrometer.
3. To determine the CBR of soil.
4. To determine the compressibility parameters of soil by consolidation test.
5. To determine the swelling pressure of soil.
6. To determine the permeability of soil by constant and falling head methods.
7. To determine the shear strength parameters of soil by tri-axial test.
8. Design problems based different units of theory syllabus.

BTCE608: ENVIRONMENTAL ENGINEERING LAB. & DESIGN – II

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.

Design as per syllabus of theory.

BTCE609 : DESIGN OF CONCRETE STRUCTURES- I

Design problems as per different units of syllabus of theory.

BTCE610 : ROAD MATERIAL TESTING LAB

1. Aggregate Impact test
2. To determine the flakiness index & Angularity number test of given sample of aggregate.
3. To determine fineness modulus of a given sample of coarse aggregate.
4. Los angles abrasion test
5. Aggregate crushing value test
6. Specific gravity and water absorption test of aggregate.
7. Standard tar viscometer test

8. To determine the elongation index for given sample of aggregate.
9. Ductility test
10. To determine the softening point for give sample of bitumen.
11. Marshell stability test
12. Float test

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 701	Water Resource Engineering-I	3	-	-	30	70	100	3
BTCE 702	Design of Steel Structures-I	3	1	-	30	70	100	4
BTCE 703	Design of Concrete Structures-II	3	1	-	30	70	100	4
BTCE 704	Transportation Engineering-II	3	-	-	30	70	100	3
BTCE 705	Application of Numerical Methods in Civil Engineerinng	3	-	-	30	70	100	3
ELECTIVE (Choose any one)								
BTCE 706A	Advance Transportation Engineering	3	-	-	30	70	100	3
BTCE 706B	Design of Prestress Concrete Structures	3	-	-	30	70	100	3
BTCE 706C	Rural Water Supply & Sanitation	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 707	DESIGN OF WATER RESOURCE STRUCTURES LAB-I	-	-	2	30	20	50	1
BTCE 708	STEEL STRUCTURES DESIGN LAB-I	-	-	2	30	20	50	1
BTCE 709	CONCRETE STRUCTURES DESIGN LAB-II	-	-	2	30	20	50	1
BTCE 710	APPLICATION OF NUMERICAL METHODS IN CIVIL ENGINEERINNG LAB	-	-	2	30	20	50	1
BTCE 711	PRACTICAL TRAINING & INDUSTRIAL VISIT	-	-	2	-	-	50	1
BTCE 712	PROJECT-I	-	-	2	30	20	50	1
BTCE 713	DISCIPLINE & EXTRA CURRICULAR ACTIVITY	-	-	-	-	-	50	1
	TOTAL	**18**	**2**	**12**	**330**	**520**	**950**	**27**

WATER RESOURCES ENGINEERING – I (BTCE 701)

UNIT-I

Introduction: Definitions, functions and advantages of irrigation, present status of irrigation in India, classification for agriculture, soil moisture and crop water relations, Irrigation water quality. Consumptive use of water, principal Indian crop seasons and water requirements, multiple cropping, hybrid crops, water harvesting and conservation.

UNIT-II

Canal Irrigation: Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels, silt control in canals.

Water Distribution System: Rotational delivery (Warabandi, Jama Bandi, Khasra Bandi, Sajra Sheets), continuous delivery and delivery on demand, Role of command area development authority, Functions and organizational structures.

UNIT-III

Distribution of Canal Water: System of regulation and control, outlets, assessment of canal revenue.

Hydraulics of Alluvial Rivers : Critical tractive force, regimes of flow, resistance relationship for natural streams, bed load, suspended load and total equations, different stages of rivers, meandering, aggradations, and degradation, river training & bank protection works.

UNIT-IV

Water Logging: Causes, preventive and curative measures, drainage of irrigated lands, saline and alkaline lands, types of channels lining and design of lined channel.

Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water.

UNIT-V

Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of runoff.

REFERENCE BOOKS:

1- Irrigation Water Power and Water Resource Engineering By KR Arora, Standard Publishers and Distributers, Delhi.

2- Water Resource Engineering by Modi, Standard Publishers.

3-Irrigation and Water Power Engineering by BC Punmia & B B Lal, Laxmi Publication (P) Ltd.

4.Irrigation Engineering by G.L.Asawa, New Age International Publishers, New Delhi.

DESIGN OF STEEL STRUCTURES – I (BTCE 702)

UNIT-I

Introduction: Types of steels and their broad specifications.

Plastic Analysis: Plastic analysis of steel structures, fundamentals, static and mechanism method of analysis, bending of beams of rectangular and I sections beams, shape factor.

Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment-rotation.

UNIT-II

Connections: Types of bolts, load transfer mechanism, prying action. Design of bolted and welded connections under axial and eccentric loadings.

Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members.

UNIT-III

Compression Member: Types of buckling. Column buckling curves, Imperfection factor, Buckling curves for different cross sections. Design of compression member; Axially loaded compression members including angle section design: single and in pair, built up columns, design of lacings and battens.

UNIT-IV

Beams: Design of beams: simple and compound sections, main and subsidiary beams and their connections. Laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.

UNIT-V

Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment Column Bases: Design of column bases, Slab base, gusseted base for axial and eccentric compressive load. Grillage foundation design.

REFERENCE BOOKS:

1-Design of Steel Structures by N. Subramanian, Oxford University Press.

2. Limit state Design of Steel Structures: S K Duggal, TMH publication

3- Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.

4- Design of Steel Structures by V.L. Shah, Structures Publications.

DESIGN OF CONCRETE STRUCTURES-II (BTCE 703)

UNIT-I

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

UNIT-II

Torsion: Analysis and Design of beams for torsion as per codal method.

Continuous and Curved Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution. Analysis and design of beams curved in plan.

UNIT-III

Circular Domes: Analysis and design of Circular domes with u.d.l. & concentrated load at crown.

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

UNIT-IV

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

Retaining walls: Analysis and design of Cantilever Retaining Walls: Introduction to counterfort and buttress type retaining walls, their structural behaviour and stability analysis.

UNIT-V

Culverts and Bridges: Analysis and Design of super structure of slab culverts and T-bridge for I.R.C. loading.

REFERENCE BOOKS:

1. Reinforced Concrete Vol. II by H.J. Shah; Charotar Publication House.

2. Advanced Reinforced Concrete Design by Verghese; Tata Mc Graw Hill.

3. Advanced Reinforced Concrete Design by Krishnaraju; Tata Mc Graw Hill.

4. Bridge Engineering by Ponnuswamy; Tata Mc Graw Hill

5. Prestressed Concerte Structures by N. Krishna Raju; Tata Mc Graw Hill.

6. Bridge Engineering by Johnson Victor; Oxford and IBH Publishers.

7. Prestressed Concrete by T.Y.Lin and Burn; John Wiley & Sons.

8. Reinforced Concrete Structures by Park & Poulay; Willey.

TRANSPORTATION ENGINEERING – II (BTCE 704)

UNIT-I

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, Rail Fastenings.

Study of Specific Aspects: Coning of Wheels, Creep, Wear, failures in Rails, Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards and Sidings, Turn-Table, Signaling.

UNIT-II

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 system of Mumbai, Chennai and Delhi), Underground system (Metro of Kolkata/ Delhi), Elevated Systems (as Proposed for Jaipur, Delhi, Mumbai), Light Rail System (MRTS, Thane). Recent Developments in Railway Networking.

UNIT-III

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

UNIT-IV

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-V

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

REFERENCE BOOKS:

1- Transportation Engineering by A.K. Upadhyay, S.K.Kataria and Sons.

2. Railway Engineering by Satish Chandra and M.M Agarwal, Oxford University Press, Delhi.

Applications Numerical Methods in Civil Engineering (BTCE 705)

UNIT-I

Errors & Approximations in Numerical Computation: Introduction to Mathematical Modeling and Engineering Problem Solving. Decimal & Binary Number system. Accuracy, Precision and Significant Digits. Errors and their types.: absolute and relative errors, approximations and round off errors, truncation errors and Taylor's series. Propagation of errors.

UNIT-II

Roots of Equations: Iterative processes and their Convergence. Existence of roots in engineering practices & their geometrical representation. Roots of the equations by: Graphical Method, Method of Successive Substitution, Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Regula Falsi Method. Application to simple civil engineering problems.

UNIT-III

Matrices and Determinants: Their types and basic operations. Rank of a matrix. Solution of Linear system of equations by Direct methods: Cramer's Rule, Gaussian elimination method, Gauss-Jordan Method and Cholesky Method. Application to simple civil engineering problems.

UNIT-IV

Iterative Methods for solving Linear system of equations: Jacobi Method, LU decomposition and Matrix inversion, Gauss Seidel method. Application to simple civil engineering problems.

UNIT-V

Interpolation and Curve Fitting: Newton's Forward Difference, Newton's Backward Difference, Newton's Central Difference, Newton's Divided Difference, Lagrangian Interpolation, Hermitian Interpolation, Method of least square. Application to simple civil engineering problems.

REFERENCE BOOKS:

1. Introductory Methods of Numerical Analysis, Sastry S.S., Prentice Hall India

2. Numerical Methods for Engineering and Scientific Computation, Jain and Jain, New Age International Pvt. Ltd. New Delhi.

3. Engineering Statistics, Bowker, A.H. and Liberman G.J., Prentice Hall.

4. Probability and Statics in Engineering, Hines, John Willey and Sons.

5. Applied Statistics and Probability for Engineers, Montgomery, John Wiley and Sons.

ADVANCE TRANSPORTATION ENGINEERING (BTCE 706A)

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.

REFERENCE BOOKS:

1. Principles of Transportation Engineering by Parbha Chakrarborty & Animesh Dash, PHI.

2. Traffic System Analysis Wohl and Martin, Mc Graw Hill Co.

DESIGN OF PRE-STRESSED CONCRETE STRUCTURES (BTCE 706B)

UNIT-I

Introduction: Systems of pre-stressing in detail, pre-stressing techniques, transfer of pre-stress, types of commercially available jacks, computation of losses of pre-stress.

Anchorage Zone: end block stresses, design.

UNIT-II

Cable profiles: Concordant and non-concordant cable profile and associated factors in continuous members. Modern cable laying: materials & practices, precautions etc. Computation of deflection in pre-stressed concrete members.

UNIT-III

Design of Pre-stressed Concrete Sections: Flexural, shear and torsion resistance of members, preliminary and final design of sections, design of pre and post tensioned flexural members; simply supported and continuous members.

UNIT-IV

Pre-stressed Slab: Design of slabs, tendon layout, precast slab, production and their applications.

Partial Prestressing: Principles and advantages, methods, practices and design.

UNIT-V

Design of circular pipes and circular water retaining structures etc. Case study of one bridge girder with design and constructional features.

REFERENCE BOOKS:

1- Design of Pre stressed Concrete by T.Y. Lin, Wiley Eastern International.

2- Design of Pre stressed Concrete Structures by N.Sinha Ray, S.Chand Co.

3. Prestressed concrete structures by Praveen Nagrajan, Pearsons

RURAL WATER SUPPLY AND SANITATION (BTCE 706C)

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.

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

DESIGN OF WATER RESOURCES STRUCTURES LAB – I (BTCE 707)

1. Design Problems as per syllabus of theory.

STEEL STRUCTURES DESIGN LAB – I (BTCE 708)

1.Design Problems as per different units of syllabus of theory.

CONCRETE STRUCTURES DESIGN LAB -II (BTCE 709)

1.Design Problems as per different units of syllabus of theory.

APPLICATION OF NUMERICAL METHODS IN CIVIL ENGINEERING LAB (BTCE 710)

1.Computer programming for application of numerical methods (as described in BTCE 705) in solving problems related to Civil Engineering

BTCE 711 PRACTICAL TRAINING & INDUSTRIAL VISIT

BTCE 712 PROJECT-I

BTCE 713 DISCIPLINE & EXTRA CURRICULAR ACTIVITY

EIGHTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 801	Water Resource Engineering-II	3	-	-	30	70	100	3
BTCE 802	Design of Steel Structures-II	3	1	-	30	70	100	4
BTCE 803	Project Planning & Construction Management	3	1	-	30	70	100	4
ELECTIVE (Choose any one)								
BTCE 804A	Bridge Engineering	3	-	-	30	70	100	3
BTCE 804B	Advance Foundation Engineering	3	-	-	30	70	100	3
BTCE 804C	Earthquake Resistant Construction & Design	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 805	Design of Water Resource Structures Lab-II	-	-	2	30	20	50	1
BTCE 806	Professional Practice & Estimating Lab	-	-	2	30	20	50	1
BTCE 807	Steel Structures Design-II Lab	-	-	2	30	20	50	1

BTCE 808	Design of Foundations Lab	-	-	2	30	20	50	1
BTCE 809	Structural Analysis by Matrix Methods Lab	-	-	2	30	20	50	1
BTCE 810	Seminar	-	-	4	60	40	100	2
BTCE 811	Project-II	-	-	4	60	40	100	2
BTCE 812	Discipline & Extra Curricular Activity	-	-	-	-	-	50	1
	TOTAL	**12**	**2**	**18**	**390**	**560**	**900**	**24**

Water Resource Engineering-II (BTCE 801)

UNIT-I

Regulation of works: Falls, Classification of falls, Design of falls, Distributory head regulator and cross-head regulator, Escape, bed bars.

Cross-Drainage Structure: Necessity of Cross-drainage structures, their types and selection, comparative merits and demerits, design of various types of cross-drainage structure-aqueducts, siphon aqueduct, super passage siphon, level crossing and other types.

UNIT-II

Diversion Head works: Design for surface and subsurface flows, Bligh's and Khosla's methods. Selection of site and layout, different parts of diversion head works, types of weirs and barrages, design of weirs on permeable foundation, silt excluders and different types of silt ejectors. Energy dissipation.

UNIT-III

Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flownet, slope stability analysis, precautions of piping, principles of design of earth dams.

Gravity Dams: Force acting on a gravity dam, stability requirements, Instrumentation.

UNIT-IV

Spillways: Spillway capacity, flood routing through spillways, different types of spillways and gates, energy dissipation below spillways.

Hydro Power Plant: General features of hydroelectric schemes, elements of power house structure, selection of turbines, draft tube and setting of turbine, cavitations

UNIT-V

Reservoirs: Evaluation of impact of water projects on river regimes and environment. Reservoir sedimentation and water shed management.

Optimization: Introduction to optimization techniques and system approach. Introduction to G.I.S. and Computer aided irrigation design

REFERENCE BOOKS:

1- Irrigation Water Power and Water Resource Engineering By KR Arora, Standard Publishers and Distributers, Delhi.

2- Water Resources Engineering by Modi ,Standard Publishers.

3. Fundamentals of Irrigation Engineering by Bharat Singh, Nem Chand Brothers, Roorkee.

Design of Steel Structures-II (BTCE 802)

UNIT-I

Design of gantry girder. Design of roof trusses including wind loading and purlin design, Introduction to Pre Engineered Buildings and tubular sections and their applications.

UNIT-II

Design of plate girder: Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Curtailment of plates. Shear strength determination by post critical and tension field action methods. End panel design options and procedure as per IS 800.

UNIT-III

Bridges: Types of bridges, Loadings, Standard loading for railway bridges, Design of Deck type plate-girder bridges, design of its bracings and frames.

UNIT-IV

Design aspects of foot over bridges. Design of through type truss girder bridges including stringer design, cross girder design, main truss members, portal and sway bracings etc.

UNIT-V

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

REFERENCE BOOKS:

1-Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.

2- Design of Steel Structures by V.L Shah, Structures Publications.

3. Limit State Design of Steel Structures: S K Duggal- Tat Mc Graw Hill

4-Design of Steel Structures by N. Subrananian, Oxford University Press.

5-Design of Steel Structures by B.C. Punmia Laxmi Publication

6-Design of Steel Structures Vol. II by Ram Chandra, Standard Publishers.

PROJECT PLANNING & CONSTRUCTION MANAGEMENT (BTCE 803)

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.

REFERENCE BOOKS:

1.Construction Project Management by K.K. Chitkara, Tata Mc Graw Hills.

2- Project Management by Modder & Phillph, CBS Publishers.

BRIDGE ENGINEERING (BTCE 804A)

UNIT-I

Introduction: Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. Steel bridges Design of through type & deck type steel bridges for IRC loading. Design of deck type & through type truss bridges for railway loadings.

UNIT-II

Reinforced concrete culverts & bridges: Reinforced concrete slab culvert, T-beam bridges-courbons & Hendry-Jaegar methods. Design of balanced cantilever bridge.

UNIT-III

Prestressed Concrete bridges: Prestressed & Post stressed concrete bridges Design of deck slab & girder sections.

UNIT-IV

Bearings: Bearings for slab bridges and girder bridges. Elastomeric bearings, design concepts as per IRC 83 (Part II).

UNIT-V

Joints: Expansion joints.

REFERENCE BOOKS:

1- Design of Bridge Structures by T.R. Jagadeesh & M.A. Jayaram, Prentice Hall Of India (PHI).

2- Bridge Engineering by Victor, Oxford and IBH Publishers.

3- Design of Bridges by Krishna Raju, Oxford and IBH Publishers.

4- Bridge Super Structures by Raj Gopalan, Standard Publishers & Distributers.

5-Goncrete Bridge Practice by Raina V.K., Tata Mc Graw Hill Co.

6- Bridge Engineering by Ponnuswamy, Tata Mc Graw Hills.

ADVANCED FOUNDATION ENGINEERING (BTCE 804B)

UNIT-I

Shallow Foundation: Methods of estimation of bearing capacity, computation of bearing capacity factors, Effect of eccentric and inclined loads, effect of water table on bearing capacity, Terzaghi, Vesic, Hansen, Moyerhof's analysis, Bearing capacity of stratified soils. IS code recommendations for minimum depth, factor of safety, design for local shear and general shear failure.

UNIT-II

Settlement Under Foundation: Methods of estimation of settlement of footings. Limits of settlements for various structures, Indian Standard Code Provisions (IS: 1904, 6403, 8009). Determination of allowable bearing capacity as per IS code. Schemartman's method, Dee beer's and Mortin method of finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data.

UNIT-III

Pile Foundation: 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. Winkler's assumption. Pile resistance and deflection under lateral loads, elastic method, Brooms method.

UNIT-IV

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

Expensive soils: Behaviour of expansive soil, foundation practices, underreamed 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-V

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:

1- Basic & Applied Soil Mechanics -by Ranjan & Rao, New Age International Publishers.

2- Geotechnical Engineering by Gulhati & Dutta , Tata Mc Graw Hills, Delhi.

3- Design Aids in foundation Engineering by Kaniraj, Tata Mc Graw Hills, Delhi.

EARTHQUAKE RESISTANT CONSTRUCTION & DESIGN (BTCE 804C)

UNIT-I

Introductory Seismology: Various terminology 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, equivalent load method for earthquake analysis of multistory frames.

REFERENCE BOOKS:

1. Structural Dynamics by Anil K Chopra , Pearson Education.

2. Dynamics of Structures by Clough & Penzin, Mc Graw Hill Book Co.

3. Earthquake Engineering by Pankaj Agarwal & Manish Shree Khande, Prentice Hall of India.

4. Earthquake Tips by C.V R. Murthy, IIT Kanpur.

5. Earthquake-Resistant Design of Steel Structures by Duggal, Oxford University Press.

DESIGN OF WATER RESOURCES STRUCTURES– II LAB (BTCE805)

1. Design as per syllabus of theory.

PROFESSIONAL PRACTICES AND ESTIMATING LAB

(BTCE 806)

1. Estimates – Methods of building estimates, types; site plan, index plan, layout plan, plinth area, floor area; Technical sanction, Administrative approval; estimate of buildings, roads, earthwork and R.C.C. works.
2. Analysis of rates- for earthwork, concrete work, D.P.C., stone masonry,, plastering, pointing and roadwork.
3. Specifications- For different classes of building and Civil Engineering works.
4. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
5. Arbitration
6. Valuation of real estate.

STEEL STRUCTURES DESIGN LAB – II (BTCE 807)

1. Design problems as per different units of syllabus of theory.

Design of Foundations Lab (BTCE 808)

1. Design of isolated shallow footings, combined footings, raft foundations.
2. Design of pile foundations.
3. Design of wells and cassions.
4. Design of machine foundation.
5. Design of retaining structures etc.

STRUCTURAL ANALYSIS BY MATRIX METHODS LAB

(BTCE 809)

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. Introduction of Finite Element Methods.