B. Tech. (Civil Engineering): Syllabus Revision in 2016-17.

S.No	Course Code	Session 2015-16	Session 2016-17	Remark Syllabus Change/ new course
1	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. UNIT5-V Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator,viscous & solid friction damping,Qualityfactor,Resonance standing waves,elastic waves,	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. UNIT5-V Oscillation & Waves : Simple harmonic oscillator with example, energy of oscillator, Damping oscillator,viscous & solid friction damping,Qualityfactor,Resonance standing waves,elastic waves,	**No Change**
2	BT102	INTRODUCTION TO COMPUTER FUNDAMENTAL AND IT UNIT-I Computer System: Basics of computer systems, history, types and Generation of	INTRODUCTION TO COMPUTER FUNDAMENTAL AND IT UNIT-I Computer System: Basics of computer systems, history, types and Generation of computer,	**Syllabus Change** **No Change**

		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	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	
3	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,	**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,	No Change

		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.	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.	
4	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-PhaseAC System.	**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-PhaseAC System. **UNIT-IV** **Transformers:** Faraday's Law of	**No Change**

		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.	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.	
5	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.	**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.	**No Change**
6	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,	**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	**No Change**

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

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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

		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.	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.	

7	BT107	**Electrical and Electronics Lab-I**
		List of Experiments
		1. Identification, Study & Testing of various electronic components:
		(a) Resistances-Various types, Color 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 & de soldering practice.
			Electrical and Electronics Lab-I
			List of Experiments
			1. Identification, Study & Testing of various electronic components:
			(a) Resistances-Various types, Color 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 & de soldering practice.
				No Change

8	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
			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
				No Change

		this graph.	graph.	
		3. To determine the specific resistance of a material and difference between two small resistances using "Carey Foster's Bridge ".	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.	4. To determine band gap of a semiconductor- diode.	
		5. To study the Zener diode as a constant voltage regular.	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.	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.	7. To determine the transmission coefficient by using Lummer Brodhum Photometer.	
		8. To determine minimum deviation angle for different light using prism and spectrometer.	8. To determine minimum deviation angle for different light using prism and spectrometer.	
		9. To determine the profile of He -Ne Laser beam.	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.	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.	11. To determine the wavelength of sodium light using Michelson Interferometer.	
		12. To determine the curie temperature of Monel metal	12. To determine the curie temperature of Monel metal	
		13. The determination of viscosity.	13. The determination of viscosity.	
9	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	**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	**No Change**

		knowledge of MS Office, Power Point and Excel: Editing and Reviewing, Drawing, Tables, Graphs, Templates.	and Excel: Editing and Reviewing, Drawing, Tables, Graphs, Templates.	
10	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	**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	**No Change**

		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.	sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.	
11	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	**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	**No Change**
12	BT201	**Engineering Physics II** **UNIT-I** <u>**Electric and Magnetic Fields**</u> :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** <u>**Thermodynamics**</u>: 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.	**Engineering Physics II** **UNIT-I** <u>**Electric and Magnetic Fields**</u> :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** <u>**Thermodynamics**</u>: 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	**No Change**

		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.	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.	
13	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,	**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	**No Change**

| | | 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. | 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.
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Functions: Defining functions, passing arguments to functions, returning values from functions, reference arguments, variables and storage classes, static functions, pointers and functions.
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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. | |
| 14 | BT203 | **ENGINEERING MECHANICS**
Unit I
 Force System: Introduction, force, principle of
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, | **ENGINEERING MECHANICS**
Unit I
 Force System: Introduction, force, principle of tra
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, | **No Change** |

| | | 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. | 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 momentum.

(Right column)

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 momentum.

| 15 | 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- | **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 | **No Change** |

		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.	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.	
16	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.	**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.	**No Change**

		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.	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.	
17	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.	**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.	No Change
18	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	**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.	No Change

		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.	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.	
19	**BT208**	**Engineering Physics Lab-II** <u>List of Experiments:</u> 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.	**Engineering Physics Lab-II** <u>List of Experiments:</u> 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.	
20	**BT209**	**COMPUTER PROGRAMMING LAB** <u>LIST OF EXPERIMENTS</u> 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.	**COMPUTER PROGRAMMING LAB** <u>LIST OF EXPERIMENTS</u> 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	No Change

		4. Write a program to convert temperature given in ∘C to temperature in ∘F.	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.	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.	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.	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.	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.	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.	10. Write a program to generate a Fibonacci series.
		11. Write a program to generate the following series:	11. Write a program to generate the following series:
		0 2	0 2
		1 2 3	1 2 3
		1 2 3 4	1 2 3 4
		1 2 3 4 5	1 2 3 4 5
		12. Write a program to generate the following series:	12. Write a program to generate the following series:
		0 1	0 1
		0 1 0	0 1 0
		0 1 0 1	0 1 0 1
		0 1 0 1 0	0 1 0 1 0
		13. Write a program using a function to check whether the given number is prime or not.	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.	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.	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.	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.	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	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	19. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
		20. Addition of two matrices	20. Addition of two matrices
		21. Subtraction of two matrices	21. Subtraction of two matrices
		22. Finding upper and lower triangular matrices	22. Finding upper and lower triangular matrices
		23. Transpose of a matrix	23. Transpose of a matrix
		24. Product of two matrices.	24. Product of two matrices.
			25. Write a program to copy one file to other, use command line arguments.
			26. Write a program to perform the

		25. Write a program to copy one file to other, use command line arguments. 26. Write a program to perform the following operators an Strings without using String functions 27. To find the Length of String. 28. To concatenate two string. 29. To find Reverse of a string. 30. To Copy one sting to another string. 31. 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. 32. Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.	following operators an Strings without using String functions 27. To find the Length of String. 28. To concatenate two string. 29. To find Reverse of a string. 30. To Copy one sting to another string. 31. 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. 32. Write a programmed to count the no of Lowercase, Uppercase numbers and special Characters presents in the contents of File.	
21	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.	**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.	No Change
22	BT211	**Communication Skills Lab** 1. Introducing your self. 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.	**Communication Skills Lab** 1. Introducing your self. 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.	No Change

		9. Group Discussion. 10. Job Interview.	10. Job Interview.	
23	BTCE3 01	**Numerical Analysis and Statistical Techniques** **UNIT I** Probability Theory: conditional probability, Baye's theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution, Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve . **UNIT II** Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients, ANOVA, Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student's T-distribution, F- distribution, Fisher's Z-distribution. **UNIT III** Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods. Finite differences: Forward differences, backward differences and Central differences **UNIT IV** Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences, Lagrange's interpolation formula for unequi-spaced values. **UNIT V:** Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential	**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	**New course**

| 24 | BTCE 302 | **Strength of material and mechanics of solids**

UNIT I
Simple Stresses and Strains : Concepts of stress and strain in three dimensions and generalized form of Hooke's law; free body diagrams, Young's modulus ; Tension test of mild steel and other materials; yield stress , permissible and ultimate stress; stress in prismatic and non-prismatic structures; thermal stresses; shear stress and strain; modulus of rigidity and Poisson ratio
UNIT II
Compound Stress: Two dimensional stress and strain; Principal stress and strains, state of maximum shear stress; Mohr's circle and its applications; membrane stresses in thick and thin cylinders.
UNIT III
Columns: Short and long columns; crushing and buckling of columns; short columns subjected to axial and eccentric loads; Euler's theory and applications; effective length of columns; Rankine and Secant formula. strain energy for gradual, sudden and impact loads.
UNIT IV
Centroid and Moment of Inertia : First moment of area; centroid and moment of inertia of symmetrical and unsymmetrical sections; radius of gyration; moment of inertia theorems; Simple pin jointed trusses and their analysis; method of joints; method of sections.
UNIT V
Bending of Beams: Shear and compression; various cross-sectional shapes of beams; types of supports; support reactions; static stability of plane structures; bending moment; shear force diagrams for various types of loads and moments. | ==**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== | **New course** |

| 25 | BTCE303 | Civil Engineering Building Materials

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

UNIT II
Clay Products : Manufacturing of Bricks. Types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test. Types of Tiles, Standard tests for tiles as per IS code such as water absorption, tolerance, impact value, glazing. Fly Ash: Properties, classification, use of fly-ash in manufacturing of bricks & cement.
UNIT III
Cement & Lime: Raw materials, chemical composition and manufacturing process of cement. Basic compounds (Bouge's compounds) of cement and their role, types of cement. Setting and hardening of cement, physical properties of cement, various standard tests on Portland cements, as per IS code including consistency, setting time, fineness, soundness and strength.
Lime: Classification as per IS, Manufacturing process, properties, standard tests of lime. Use of lime in construction. Gypsum, properties and use, Plaster of Perris.
UNIT IV
Mortar and Plaster: types of sand, bulking of sand, tests for sand, classification, mortar preparation methods**:** Functions and tests & their uses in various types pointing & plastering.
Timber & Steel: Definitions of related terms, classifications and properties, defects in wood, conversion of wood, seasoning, preservation, fire proofing, Plywoods, fiber boards,. Steel: properties, types mild steel and HYSD steel and their use, common tests on steel various types of paints and Varnishes; white wash and distempers and their application. .
UNIT V
Environmental friendly Building material: concept of embodied energy of materials, energy used in transportation and construction process. Natural material like bamboo, rammed earth, stones, stabilized blocks; supplementary cementious materials like blast furnace slag, silica fume, rice husk ash,; building materials from agro and industrial wastes. | <mark>Civil Engineering Materials</mark>

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 | COURSE NAME CHANGE |

		Miscellaneous: Properties, types and uses of glass, aluminum, Asbestos, G.I., plastics in construction.	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.	
26	**BTCE 304**	**Engineering Geology** **UNIT I** General Geology : Subdivision of Geology; Importance of Geology in Civil Engg.; Internal Structure of the Earth; Physical properties of Minerals; Weathering and Work of Wind & River ; Geological Time Scale. Earthquakes and landslides : Classification, causes and effects of earthquakes and landslides, seismic curve, seismic problems of India, seismic zones of India, **UNIT II** Petrology : Origin, Classification, Texture & Structures of Igneous, Sedimentary and Metamorphic Rocks; Rock Mechanics: Engineering properties (density, unit weight, porosity), strength, index measurements for rock (SPT blow count, RQD, RMR, Point Load Index), relationships of index measurements with strength of soil and rock. **UNIT III** Structural Geology: Causes & Classification of Fold, Fault, Joints & Unconformities. Geophysical Methods: Electrical resistivity & Seismic refraction method for civil engineering importance. **UNIT IV** Engineering Geology: Geological investigation for site selection of site for Dams, Tunnels, Reservoirs and Bridges. Site improvement for different engineering projects. Geological Hazards: Major geological hazards Geological considerations in design of constructed facilities and infrastructure **UNIT V** Remote Sensing and GIS: Introduction of Remote Sensing and GIS, Topographic maps, geologic maps, aerial photographs, applications of Remote Sensing and GIS in Civil Engineering.	**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.	NO CHANGE

27	BTCE3 05	**Soil Mechanics** **UNIT I** Definition of soil mechanics, various terminology scope of soil engineering, origin of soils, formation of soil, transportation of soils, major soil deposits in India, Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc., Inter-relationships of the above. **UNIT II** Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits: plastic limit, liquid limit and shrinkage limit void ratio and density index. **UNIT III** Identification and Classification of soil for general engineering purposes: particle size, textural, H.R.B. Unified and I.S. Classification systems **UNIT IV** Permeability of Soils: introduction, hydraulic head, validity of Darcy's law, Mineralogy of soils, effective stress law, seepage forces and quick sand phenomena, seepage through soils including Flow-Net diagrams, harmful effects of seepage and ways to minimize it, ecological impact of seepage. **UNIT V** Capillarity of soils:Capillary action, stress distribution in soils, compaction of soils, consolidation of soils, consolidation theory, stress history and settlement of soils	**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	NEW COURSE

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

| 28 | BTCE 306 | **Fluid Mechanics**

UNIT I
Fluids and their properties Definition of Fluid, Continuum Hypothesis, Difference between Solids and Fluids, Liquids and gases; definition of density, specific gravity, pressure and vapour pressure, viscosity ;ideal and real fluids, Newton's Law of Viscosity, Newtonian and Non-Newtonian Fluids, Rheological Diagram, Variation of Viscosity with Temperature and Pressure, Surface Tension and Capillarity.
UNIT II
Fluid Statics : Introduction, Pascal's Law, Hydrostatic, Hydrostatic Pressure Variation for Compressible Fluid, Measurement of Pressure, Manometers, Static Forces on Surfaces: Plane Surfaces and Curved Surfaces. Buoyancy and Stability, Metacentre and metacentric heights, Stability of Fully Submerged Bodies, Stability of Floating Bodies. | **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 | NO CHANGE |

UNIT III

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

UNIT IV.

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

UNIT V

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

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, 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.

29	BTCE 307	**Building Drawing Lab** List of Experiments 1. Study of Various joints /Bonds in Brick Masonry 2. Study of Various types of Stone Masonry 3. Study of Various types of Arches 4. Study of Various types of Stair cases 5. Drawing of 2 Bedroom House. 6. Drawing of a Multi-storey Apartment.	**BTCE 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	NEW COURSE
30	BTCE309 / BTCE308	**Fluid Mechanics Lab** **List of Experiments** 1. To determine viscosity of given fluid(Viscometer) 2. To verify Bernoullis theorem(Bernoullis Appratus) 3. To determine the metacentric height apparatus(metacentric apparatus) 4. To calibrate the orificmeter(orificmeter) 5. To determine Cc,Cv & Cd of the orifices & mouth piece. 6. To determine Cd of a V-notch (V-notch) 7. To determine the velocity of flow by pitot tube (pitot tube)	**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 Identification of Geological features through wooden Models a) Structural Geological Diagrams b) Petrological Diagrams c) Engineering Geological Diagrams 5.Interpretation of Geological Map (10 Nos.) 6.Dip & Strike Problems (8 Nos.)	COURSE CODE CHANGE COURSE NAME CHANGE CONTENT CHANGE
31	BTCE309	**Civil Engineering Geology Lab** **List of Experiments** 1. Study of Physical properties of	**BTCE 309 BUILDING DRAWING- I** **Building Components –** 1. Drawing of walls	New course

		minerals. 2. Identification of minerals in hand specimens. 3. Study of Physical properties of rocks. 4. Identification of Rocks in hand specimens. 5. Study of Dip and strike. 6. Profile Drawing of specimens. 7. Identification of various structural features of minerals. 8. Drawing of various Petrological structures.	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	
32	BTCE308 / BTCE310	**Building Material Testing Lab** **List of Experiments** 1. To determine Tensile Strength of Mild Steel and HYSD bar 2. To determine the Compressive Strength of Cement Cubes 3. To determine the compressive strength of Concrete Cubes 4. To determine Compressive Strength of Bricks 5. To determine Compressive Strength of stone specimen. 6. Hardness Test – Rockwell Hardness 7. Impact Test – Izod and Charpy 8. Fatigue Test 9. Spring Test 10. Torsion Test	**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.	COURSE CODE CHANGE
33	BTCE		**BTCE 311 MORAL VALUES, PROFESSIONAL ETHICS AND**	New course

| | 311 | | **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. | |
| 34 | **TCE401** | **Advanced civil engineering Construction Technology**

UNIT I
 Building Requirements & Construction System: Building components, their functions and requirements, types of construction, load bearing construction and framed structure construction. Lift slab construction.
Temporary structures: Types & methods of shoring, underpinning and Scaffolding
Foundation & Site Preparation: Purpose, types of foundation, depth of foundation, Sequence | **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 | New course |

of construction activity and co-ordination, site clearance, marking, foundation plan,

Brick and Stone Masonry: Basic principle of sound masonry work, different types of bonds, relative merits merit and demerits of English, single Flemish and double Flemish bond. Comparison between stone and brick masonry. General principles, classification of stone masonry

UNIT II

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

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

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

UNIT III

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

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

UNIT IV

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

NII V

Equipment Management in Construction Projects Forecasting equipment requirements, Output and capacity of equipments, Selection

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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.

| 35 | BTCE404 / BTCE 402 | **Structural Analysis**

UNIT I
Fixed & Continuous Beams :Fixed beams subjected to various types of loading in simple cases ,Continuous beams in simple cases,
UNIT II
Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections; Shear center and its location in flanged sections,(only for symmetrical bending)
UNIT III
Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method,
UNIT IV
Torsion : Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion; Springs: stiffness of springs, close coiled helical springs, springs in series and parallel, laminated plate springs.
UNIT V
Vibrations : Stress tensor and failure criterion. Elementary concepts of structural vibration, degree of freedom, free vibration of undamped single degree of freedom systems. Newton's law of motion, D'Almbert's principle, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Damped single degree of freedom system: types of damping, | **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. | COURSE CODE CHANGE CONTENT CHANGE |

			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.	
36	**BTCE4 03**	**Hydraulics & Hydraulic Machines** **UNIT I** Flow in open channels: Introduction, Prismatic & Non-Prismatic Channels, Flow Classification, Chezy`s & Manning`s Equations, Most efficient/economical section of rectangular & trapezoidal channels, specific	**BTCE 403 HYDRAULICS AND HYDRAULIC MACHINES** **UNIT 1** Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity	CONTENT CHANGE

energy, specific-energy curves, Rapidly varied flow in channels, hydraulic jump & its characteristics, use & equations, concept of gradually varied flow.

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

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.	
37	**BTCE4 05 / BTCE4 04**	**Modern Concrete Technology** **UNIT I** Concrete : Grade of concrete, proportioning of ingredients, water/cement ratio and its role, concrete mix deign ,quality control for concrete. ,workability,strengths, permeability, creep, shrinkage, standard tests on fresh and hardened concrete as per IS code. ,Aggregate, Ready Mix Concrete. **UNIT II** Concrete Handling in Field:Mixing & batching methods, placing, transportation and Compaction methods, curing methods and compounds. Admixture in concrete : Chemical and mineral	**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.	COURSE CODE CHANGE

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

UNIT III

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

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

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

UNIT IV

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

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

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

UNIT V

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

Roof and Roof Covering : Purposes, classification of roofs, terms used, types of pitched roofs, trussed roofs specially king

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,

		post, queen post, steel roof trusses, details of steel roof trusses, method of construction, roof covering materials for pitched roofs.	contour gradient, Methods of locating contours, uses of contour maps.	
38	**BTCE 605 / BTCE4 05**	**Surveying -I** **UNIT I** Introduction: Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs. Measurement of Distances: Different types of chains, tapes and their uses, sources of error and precautions, corrections to tape measurements, field problems in distance measurement. **UNIT II** Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation, use and adjustment of surveyors and prismatic compass, Vernier and micro-optic theodolite, temporary and permanent adjustment of vernier theodolite, measurement of horizontal and vertical angle by different methods, application of theodolite in field problems. **UNIT III** Traversing: Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bow ditch rule, graphical method, axis method. Gales traverse table. **UNIT IV** Leveling: Definitions of various terms in leveling, different types of leveling, sources of errors in leveling curvature and refraction corrections, temporary and permanent adjustment of dumpy and tilting levels, Computation and adjustment of levels, Profile leveling; L-Section and cross-sections. **UNIT V** Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; intersection, traversing and resection, two point and three point problems. Contouring: Characteristics of contours, contour interval, contour gradient, methods of locating contours, uses of contour maps.	**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	COURSE CODE CHANGED

			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.	

39	**BT CE 406**	**Geo-Technical Engineering** **UNIT I** Basics of Geo Tech engineering: Clay mineralogy: Soil structure; single grained, honeycombed, flocculent, and dispersed, structure of composite soils, clay structure; basic structure, mineral structures, structures of Illite Montmorilinite and kaolinite and their characteristics. Soil water absorbed, capillary and free water, Darcy's law of permeability of soil and its determination in laboratory, Field pumping out tests, factors affecting permeability, permeability of stratified soil masses. **UNIT II** Stresses in soil mass: total, effective and	**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	NEW COURSE

		neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon, Seepage and Seepage Pressure, Laplace's equation for seepage, Flow net and its construction. Uplift pressure, piping, phriatic line and flow net through earth dam.	supplementary estimates for different projects.	
		UNIT III Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box, Tri axial and unconfined compression test apparatuses. Typical stress-stain curves for soils, typical failure envelopes for cohesion less soils and normally consolidated clay soils.	**UNIT 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 IV Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests, Measurement of field compaction, field methods of compaction and its control, dry and wet of optimum, factors affecting compaction, Soil stabilization, Mechanical Stabilization, Stabilization with cement, lime and bitumen.	**UNIT 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 V Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghi's one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, co-efficient of consolidation. Normally, over and under consolidated soils.. Total and differential Settlement.	**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.	
40	**BTCE 407**	**Concrete Lab** **List of Experiments** 1. To determine standard (Normal) consistency of cement. 2. To determine Initial & Final setting time of cement. 3. To determine specific gravity of cement. 4. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.	**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	COURSE NAME CHANGE CONTENT CHANGE

		5. To determine Soundness of cement by Le-chatelier apparatus. 6. To determine the fineness modulus of coarse aggregates and fine aggregates by sieve analysis. 7. To determine the workability of given concrete mix by slump test. 8. To determine the workability o given fresh concrete mix by compaction factor test. 9. To determine the workability of given concrete mix by Flow table test. 10. To design concrete mix in accordance with I S recommendations.	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	
41	**BTCE 408**	**Hydraulic lab** **List of Experiments** 1. To Study Tilting Flume 2. To study the flow charsacteristics in open Channel 3. To Study the Characteristics of Hydraulic jump 4. To determine the various losses in pipe flow.(Pipe network) 5. To study the characteristics of Pelton wheel 6. To study the characteristics of Centrifugal Pump 7. To study the characteristics of Kaplan Turbine	**BTCE 408 HYDRAULICS LAB.** 1. To determine the minor losses. 2. To determine the friction factor. 3. To determine Cd 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.	COURSE NAME CHANGE CONTENT CHANGE
42	**BTCE 409**	**Surveying Lab** **List of Experiments**	**BTCE 409 SURVEYING LAB. I** 1. Ranging and Fixing of Survey Station. 2. Plotting Building Block by offset with the	COURSE NAME CHANGE CONTENT CHANGE

		1. To fix a survey station by ranging rod. 2. to plot a building block by cross-staff 3. To determine the bearing of line by Surveyor Compass 4. To determine the bearing of line by Prismatic Compass 5. To determine RL by dumpy level. 6. To determine RL by Autolevel 7. To study adjustments in theodolite. 8. Measurement of horizontal angle by theodolite 9. Measurement of vertical angle by theodolite 10. To determine the area of a figure using a planimeter. 11. Plane table survey for a given area.	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	
43	BTCE 410	**Geo-Technical Engineering Lab** **List of Experiments** 1. Determination of water content by oven drying method 2. To determine water content in soil specimen. (Pycnometer) 3. To determine specific gravity of soil specimen (-do-) 4. To determine density of soil by core-cutter method. 5. Grain size distribution by sieving. 6. To determine liquid limit by casagrande`s apparatus 7. To determine Liquid limit by cone penetrometer. 8. To determine plastic limit 9. To determine shrinkage limit	**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	NEW COURSE
44	BTCE 411		**BTCE 411 MATERIAL TESTING LAB.** 1. Tensile Strength Test – Mild Steel and HYSD bar 2. Compressive Strength Test – Mild Steel and	NEW COURSE

			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	
45	**BTCE 501**	**Transportation Engineering-I** **UNIT I** Introduction: Importance and Role of Transportation Systems, Technological and Operating Characteristics of Transportation Systems, Components of transportation Systems, Transportation Coordination, Transportation Modes and their comparison. Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment. **UNIT II** Highway Materials and Construction: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly-ash/pond-ash. Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM roads, fly ash embankments, Bituminous roads and Concrete roads, Specific features of rural roads. **UNIT III** Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of Horizontal Alignment – Super elevation, extra widening, transition curves. Design of Vertical Alignment – Gradients, Vertical curves. **UNIT IV** Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study, Importance and types of Traffic Signs, Signals, Road Markings and Road Intersections.	**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	**New course**

		UNIT V Structural design of Highway Pavements: Design of Flexible Pavements by G. I. and CBR methods, Design of Rigid Pavements by Westergard and modified methods. (As per guidelines of IRC) Hill Roads: Special factors in Alignment and Geometric design, Drainage and maintenance of Hill roads, Road side Arboriculture and Landscaping, Recent Developments in Urban Roads and their role in economic developments.	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.	
46	**BTCE604 / BTCE 502**	**Water Resource Engineering**[*] **UNIT I** Irrigation Engineering & Water Requirement of Crops: Functions, advantages & disadvantages of Irrigation; Principal Indian Crops and Seasons; Present status of irrigation in India; Quality of irrigation water; Definitions of various terms, Irrigation efficiencies; Duty,Delta & Base period; Consumptive use of water, Phytometer Method & Field plot method of measuring Transpiration; Classification of soil water or soil moisture,Field capacity & Wilting point, available water and its depth, Frequency of irrigation; Irrigation efficiencies.Methods of application of water. **UNIT II** River Mechanics and Training: Different stages of a river; Behaviour of rivers affected by sediments; Meandering of rivers, Cutoff; Aggradation and Degradation in rivers; Objectives and Classification of River Training Works, Methods of river training;	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,	COURSE CODE COURSE NAME CHANGED

		Bank protection works, Spurs and Groynes. **UNIT III** Hydrology: Definition, Hydrologic cycle,Application to Engineering problems; Measurement of rainfall,rain gauges,optimum number of rain gauges,estimation of missing rainfall data,Mean precipitation over an area; Infiltration and Infiltration indices,factors affecting infiltration;Runoff and its estimation by empirical methods; Hydrograph, Unit hydrograph and its derivation from a simple hydrograph, estimation of peak flow by empirical methods and unit hydrograph. **UNIT IV** Canal Irrigation: Types of canals, Methods of canal alignment; Alluvial channels, Critical tractive force, bed forms and regimes of flow; Kennedy's and Lacey's theories for design of alluvial channels; Cross sections of canals; Lined canals;advantages and disadvantages ,types of canal linings. **UNIT V** Water Logging: Causes,Preventive and Corrective measures, Saline and Alkaline lands. Well irrigation: Open wells and Tube wells, Types of tube wells,Duty of tube well water. Concept and methods of Water Harvesting and Conservation.	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.	
47	**BTCE 503**	**Steel Structure- I** **UNIT I** Introduction: Types of steels and their permissible stresses.	==BTCE503 GEOTECHNICAL ENGINEERING –I==	**New course**

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

UNIT II

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

UNIT III

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

UNIT IV

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

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

UNIT V

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

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.	
48	**BTCE 505 / BTCE 504**	**Theory of Structures** **UNIT I** Introduction to Indeterminate structures, Degrees of freedom , Static and Kinematic indeterminacy (i.e. for beams, frames & portals without sway etc.), analysis of Indeterminate Structures using Moment Area method. **UNIT II** Analysis of Statically Indeterminate Structures using Slope-deflection method and Moment-distribution methods. **UNIT III** Column Analogy method for indeterminate structures, Conjugate beam method for analysis of indeterminate structures. **UNIT IV** Introduction to Energy method: strain energy due to bending, castigieno's theorem, solution of determinate & indeterminate structures using energy methods (i.e. determination of deflection and forces in structures).	**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.	COURSE CODE CHANGE

| | | **UNIT V**
Approximate methods for lateral loads: Analysis of multistory frames by portal method & cantilever method.
Analysis of determinate space trusses by tension coefficient method | **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.	
49	**BTCE 505**	**Surveying-II** **UNIT 1:** Trigonometric Leveling: Methods of trigonometric leveling direct method and reciprocal method, axis Signal corrections, Determination of difference in elevations of points. **UNIT 2**: Curve Surveying: Elements of circular (Simple, compound and reverse) curves, transition curves, degrees of curves Methods of setting out circular and transition curves. **UNIT 3**: Triangulation: Merits and demerits of traversing, triangulation and trilateration, Grades of triangulation, Strength of figure, field procedure of triangulation, Reconnaissance and selection of triangulation stations, Intervisibility of stations and calculation of the heights of towers. Equipment needed for base line measurement, corrections to base line, Satellite station and base line extension. **UNIT 4**: Errors in Surveying: Classification of errors in surveying, the probability curve, its equation and properties, theory of least squares, weight, most probable valve, probable errors, standard errors. Normal equation correlates. Adjustment of Triangulation Figures: Adjustment of levels, adjustment of triangulations figures, braced quadrilateral Triangle with central, station, approximate and method of least squares for figure adjustment, Trilateration. **UNIT 5**: Field Astronomy: Definitions of terminology used in Astronomy, Co- ordinate Systems, relationships between different Coordinate systems. Astronomical Triangle, Napier's Rule, different methods of determination of Azimuth. Electronic distance measurement and use of Total station. Survey camp: (including exercise on triangulation, topographic, or project survey) with duration of maximum 10 days.	**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	**New course**

			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.	
49	**BTCE506C / BTCE 506A**	**FOUNDATION ENGINEERING**[*] **UNIT1**: Shallow foundation: type of shallow foundation and loading on shallow foundation introduction and basic definitions of bearing capacity Methods of estimation of bearing capacity computation of bearing capacity factors, effect of water table on bearing capacity, terzaghi's analysis, Meyerhof's analysis, bearing capacity of stratified soils. **UNIT 2**: Limits of settlements for various structures, Determination of allowable bearing capacity as per Indian Standard Code Provisions (IS: 1904, 6403, 8009). Skempton's method, finding out settlement from static cone penetration test. Methods of finding out bearing capacity from plate load test, standard penetration test data. **UNIT 3**: Pile foundations: types of pile and their use, modes of failure, bearing capacity and settlement of pile foundation. Types of piles, Allowable load, Pile load test, Dynamic and static formulae, bearing Capacity factors Pile group bearing capacity and settlement, negative skin friction, behavior of piles under lateral loading. Pile resistance and deflection under lateral loads. **UNIT4**:	**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.	COURSE CODE CHANGE

		Foundation on difficult Soils: Collapsible soil; identification,Collapse settlement: foundation design, sanitary land fills settlement of sanitary land fill. Expansive soils: Behavior of expansive soil, foundation practices, under-reamed piles. Methods of finding out load carrying capacity of under reamed piles in clayey and sandy soil. Provision of IS 2911 Part III-1980 for design of under-reamed pile foundations. **UNIT 5**: Raft foundation: Common types of raft, combined footing, bearing capacity of raft, differential settlement of raft; semi empirical method of design of raft foundation. Well foundations: design and construction, bearing capacity, settlement and lateral resistance. Tilts and shifts, IS and IRC codes methods.	**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**	
50	**BTCE404 / BTCE506 B**	**OBJECT ORIENTED PROGRAMMING IN C++** **UNIT I**: Evolution of Programming Paradigms; Structured versus Object-Oriented Development; Elements of Object Oriented Programming – encapsulation, data hiding, data abstraction, inheritance, polymorphism, message communication; Popular OOP Languages, Merits and Demerits of Object Oriented Methodology. **UNIT II**: Overview of C++; Class specification, class objects; Inline functions; Nesting of member functions,	**BTCE506B ADVANCE CONCRETE TECHNOLOGY** **UNIT-I** Introduction to scope, objective and outcome of subject. **Concrete Production:** Difference in mix proportioning for vibrator 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	COURSE CODE COURSE NAME CHANGE

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

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.	
51	BTCE50 6C-	**GROUND IMPROVEMENT TECHNIQUES** **UNIT I** Introduction : Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil. **UNIT II** In-situ densification methods in granular soils & Cohesive soils: Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth. Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns. **UNIT III** Mechanical Stabilization: Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control. Cement Stabilization:Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques. Lime and Bituminous Stabilization : Type of admixtures, mechanism, factors affecting, design of	**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.	New course

		mixtures,construction methods.		
		UNIT IV Reinforced earth: Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls. **UNIT V** Geotextiles : Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.	==**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.==	
52	**BTCE50 6 D**	**ADVANCED CONSTRUCTION MATERIALS** **UNIT I** Light weight materials, fibers in reinforced concrete, types of fibers, workability , mechanical and physical properties of fibre reinforced concrete, transparent concrete properties **UNIT II** Industrial waste materials in concrete , their influences on physical and mechanical properties, and durability of concrete **UNIT III** Concrete at high temperature, high strength concrete ,change in concrete with time, corrosion of concrete in various environments, corrosion of reinforcing steel, electro-chemical process, measures of protection, ferro-cement material and properties. **UNIT IV** Polymers in civil engineering, polymers, fibers and composites, fiber reinforced plastic in sandwich panels, modeling, architectural use and aesthetics of compsites. **UNIT V** Adhesives and sealents, structural electrometric bearings and resilent seating, moistrure barriers, polymers		

		foams and polymer resin building physics, polymer concrete composites. Introduction to green concrete and properties.		
53	BTCE 507	**ROAD MATERIAL TESTING LAB** **List of Experiments** 1. Aggregate impact test. 2. Aggregate crushing value test. 3. Loss angels abrasion testing machine. 4. To determine elongation index for a given sample of aggregate. 5. To determine flakiness index for a given sample of aggregate. 6. To determine the percentage of free or surface moisture in coarse aggregate. 7. To determine fineness modulus of a given sample of coarse aggregate. 8. Case studies on BC (Bituminous Concrete) pavements. 9. Case studies on accidents due to defective pavements.	**BTCE 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.	New course
54	BTCE 508	**DESIGN OF STEEL STRUCTURE LAB**	**BTCE 508: GEOTECHNICAL ENGG.-I**	

		List of Experiments: 1. Study of Deflection of a truss 2. Analysis of redundant frame 3. Study of Deflection of curved members 4. Study of Buckling of Columns & Struts 5. Study of Clark –Maxwell reciprocal theorem with simply supported beam 6. Study of Suspension Bridge 7. Study of Deflection of beam	**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	
55	**BTCE 510 / BTCE 509**	**FOUNDATION ENGINEERING LAB** **List of Experiment** 1. Determination of water content by oven drying method. 2. Permeability by falling head method (study) 3. Permeability by constant head method (study)	**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).	COURSE CODE COURSE NAME CONTENT CHANGE

		4. Direct shear test. 5. Unconfined compression apparatus (proving ring type). 6. Determination of compaction properties (standard proctor test) 7. Use of Sand replacement equipment 8. To determine shear strength of soil specimen 9. Plate load test (study) 10. Study of jaipur metro railway piling 11. Study of various components of well foundation	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. 1. To prepare the map of given area by plane tabling. 2. To determine the Azimuth of a given line by ex-meridian observations of Sun 3. Survey Camp (including exercise on triangulation, topographic, or project survey) with maximum duration of 10 days	
56	**BTCE 808 / BTCE 510**	**SURVEY LAB** **List of Experiments** 1. To measure the Horizontal and Vertical Angles by Thedolite. 2. To determine the height of an object by trigonometric leveling. (Single Plane Method). 3. To determine the height of an object by trigonometric leveling. (Two Plane Method). 4. To shift the RL of known points by double leveling. 5. To prepare the Contour map by indirect Contouring. 6. To prepare the map of a given area by plane tabling. 7. Survey camp	**BTCE 510 : COMPUTERS AIDED BUILDING DESIGN** Design Problems as syllabus of theory	COURSE CODE CHANGED

57	BTCE807 / BTCE 511		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**.**	COURSE CODE COURSE NAME CHANGE
58	BTCE512		**BTCE512 Discipline & Extra Curricular Activity**	New course
59	**BTCE 601**	**Transportation Engineering-II** **UNIT 1**: Introduction and Permanent Way Components: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross-sections in different conditions, Drainage, Salient Features and types	**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	New course

of Components viz. Rails, Sleepers, Ballast and Rail Fastenings.

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

UNIT 2:

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

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

UNIT 3:

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

UNIT 4:

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

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

UNIT 5:

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

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

| 60 | BTCE 602 | **CONCRETE STRUCTURES- I**

UNIT 1:

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

UNIT 2:

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

UNIT 3:

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

UNIT 4:

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

Design of T beams

UNIT 5:

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

			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.	
61	**BTCE606C / BTCE603**	**STEEL STRUCTURES II** **UNIT 1** Design of gantry girder: calculation of load moment and shear in horizontal and vertical direction, design of plastic section, combined biaxial capacity, buckling resistance, deflection & shear. **UNIT II** Design of plate girder: design of section, connections for flange plate to flange angles & flange angles to web, web and flange splicing. Vertical, Horizontal, Intermediate and Bearing stiffeners, Curtailment of plates. **UNIT III** Bridges: Standard loading for railway bridges, design of Deck type plate-girder bridges, design of bracings and frames. Design the member of through type roof truss bridge using ILD, design of stringers, cross girder, lateral, sway and portal bracings. **UNIT IV** Water tanks, circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.	**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	COURSE CODE CHANGED COURSE NAME CHANGED

			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.	
62	**BTCE 602 / BTCE 604**	**WATER SUPPLY ENGINEERING** **UNIT I** General: Environment and its components, Importance of water, Role of an Environmental Engineer, Historical overview. Water Demand: Design flow, design periods, design population, factors affecting water consumption, variation in water demand, design capacities for various water supply components. **UNIT II** Source of water and collection works: Alternative sources i.e. rain, surface and ground water, Assessment of yield and	**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	COURSE CODE CHANGED COURSE NAME CHANGED

		development of the source. Quality of water: The hydrological cycle and water quality, physical, chemical and biological water quality parameters, water quality requirements, Indian Standards. **UNIT III** Transmission of water: Hydraulics of conduits, selection of pipe materials, pipe joints, pumps, pumps station. Preliminary Treatment of Water: Historical overview of water treatment, water treatment processes (theory and application): aeration, solids separation, settling operations, coagulation, softening, **UNIT IV** Advanced Treatment of Water: filtration, disinfection, other treatment processes, dissolved solids removal, treatment plant design, preparation of hydraulic profiles. **UNIT V** Distribution of water: Method of distributing water, distribution reservoirs, distribution system, distribution system components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems, pumping required for water supply system. Plumbing of Building for water supply: Service connections, fixture units, simultaneous flow, design of plumbing system.	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.	
63	**BTCE 501 / BTCE 605**	**BUILDING TECHNOLOGY & PLANNING** **UNIT I** Introduction: Types of buildings, criteria for location and site selection, site plan and its detail. Sun Consideration : Sun chart, sun shading devices, energy conservation in buildings, passive solar cooling and heating of buildings.	**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,	COURSE CODE CHANGE

		UNIT II	Transportation Modes and their comparison. Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and	
		Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, comfort conditions.	Road Development Plans, Road Patterns, Controlling Factors and Surveys for Highway Alignment.	
		Orientation: Meaning, factors affecting orientation, orientation criteria .		
		Building Bye Laws and NBC Regulations: Objective of bye-laws, Regulations, setbacks, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.	**UNIT 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	
		UNIT III	constructing different types of roads viz. Earth roads, Stabilized	
		Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.	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.	
		Vastu Shastra In Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.	**UNIT III** Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD, Design of HorizontaL Alignment – Super elevation,	
		UNIT IV	extra widening, transition	
		Functional design and Accommodation requirements	curves. Design of Vertical Alignment – Gradients, Vertical curves. Recommendations Indian Road congress code of Practice.	
		(A) Residential Buildings: Activities and their spatial requirements; Area planning, living area, sleeping area, service area.		
		(B) Non Residential Buildings: School buildings, rest house, primary health centres, post office, bank, college library, cinema theatres etc.	**UNIT IV** Elementary Traffic Engineering: Significance of different Traffic Engineering Studies viz. Speed, Volume, O & D, Parking and Accident's Study. Importance and types of	
		UNIT V	Traffic Signs, Signals, Road Markings and Road	
		Services in Buildings	Intersections.	
		(A) Lighting and ventilation, doors and windows.		
		(B) Acoustics, sound insulation and noise control.		

			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.	
64	**BTCE 806E / BTCE 606A**	**REPAIR AND REHABILITATION OF STRUCTURES** **UNIT I** Deterioration of concrete in structures: physical processes of deterioration like abrasion, erosion, pitting, chemical processes like carbonation, chloride ingress, corrosion, alkali aggregate reaction, sulphate attack; their causes, mechanism, effect, preventive measures. Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures etc. **UNIT II** N.D.T.: Non destructive test methods for concrete including rebound hammer, ultrasonic pulse velocity, rebar locator, corrosion meter, penetration resistance and pull out test, core cutting etc. Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data. **UNIT III** Materials for repair: polymers and resins, self curing compound, FRP, Ferro cement etc; properties,	**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.	COURSE CODE CHANGED

		selection criterion, bonding aspect. **UNIT IV** Repair Techniques: grouting, jacketing, shotcrete, externally bonded plates and under water repair; materials, equipments, precautions process etc. **UNIT V** Investigation for structures: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion damaged structures	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.	
65	**BTCE 606B**	**ADVANCED GEOTECHNICAL ENGINEERING** **UNIT-I** **Soil Dynamics:** One Dimensional wave propagation, One Dimensional Wave in layered body, impedance ratio, angle of refraction, critical angle of incidence, introduction of attenuation of stress waves, Definitions of Material Damping and Radiation Damping in soil. Measurements of Wave Propagation Velocity, Shear Modulus, Thickness of soil layers etc; Field Tests like Low Strain Test, Seismic Reflection Test, Seismic Refraction Test for Horizontal Layering and inclined or irregular layering, Suspension	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.	New course

Logging Test, Steady States Vibration [Raleigh wave] Test, Seismic Cross Hole Test, Seismic Down Hole Test, Seismic Cone Test, Details and interpretation of Standard Penetration Test and Cone Penetration Tests. Laboratory Tests: Cyclic Triaxial Shear Test, Introduction of Centrifuge and Shaking Table Test.

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Environmental Geo-technology: Contamination due to landfills, subsurface contamination due to lechate and its effects. One dimensional analysis of contaminant transport, contaminated sites, Containment of solid waste in

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

STRENGTH OF ROCKS IN UNCONFINED CONDITION: 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

		landfills, Vertical barrier for containment, Geo-technical reuse of construction and industrial waste materials Case study of Ash disposal from Thermal power plant, Ash pond and its design with/without geo-textiles, Environmental impact and control	<mark>BOLTING: Grouting materials, Grouting operations, methods of Grouting, Mechanism of Rock Bolting, Principal of design.</mark> <mark>BEARING CAPACITY OF ROCKS: Bearing capacity of intact rocks, jointed rocks, IS Code methodology, Singh and Rao Method and latest methodologies.</mark>	
66	<mark>BTCE 606A / BTCE 606C</mark>	**WATER ENGINEERING** **UNIT I** **Demand of water**: Domestic, commercial and public requirements, Factors affecting demand fluctuations, Estimate of prospective population, fire demand requirements and other allowances. **Sources of water:** Estimating the quantity of water from various sources, surface and underground sources, such as, impounded, perennial stream, shallow wells artesian wells, deep wells, infiltration galleries, intake works from different sources. **UNIT II** **Water quality**: Suspended solids, turbidity, colour, taste odour, temperature, Total dissolved solids, pH, acidity, alkalinity, hardness, nitrates, chlorides, fluorides, metals, organics, nutrients, and Pathogens. **In-stream standards**: Potable water standards, waste water / effluent standards, standards for receiving wastes in natural streams / sewer / sea, Bio-monitoring of streams and lakes Groundwater quality, chemical/ biological remediation of ground water. **UNIT III** **Water purification processes in natural system**: Water pollutants and their sources, Physical processes: Dilution, sedimentation and re-suspension, filtration, gas transfer, heat transfer, Chemical	**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.	COURSE CODE CHANGE

		processes, metabolic processes, role of micro-organisms in natural water systems. Stream water quality changes due to waste disposal, Streeter-Phelps D.O. model, and water quality management of rivers having multiple discharges, lakes and estuaries. **UNIT IV** **Analysis and Design [as per CPHEEO manual etc] of Engineered systems for water purification**: Water treatment process and design, economic construction in water works design, solids separation by aeration, settling operations, coagulation, softening, mixing and flocculation, sedimentation. **Analysis and design of other system for water purification**: Filtration, disinfection, [Residual chlorine, chlorine demand and brake point chlorination] adsorption, membranes, Water plant waste management, Pump drive units and analysis of pumping systems. **UNIT V** **Distribution system**: Methods of distributing water, distribution reservoirs, stand pipes and water tanks, design of pumping mains, use of nomograms, appurtenances, distribution systems and their components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems.	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.	
67	**BTCE 606D**	**PLANNING AND DESIGN OF GREEN BUILDINGS** **UNIT I** Green building concept- History, Increased public focus on Sustainability and Energy Efficiency, Supportive Framework and general condition, Green Home Certifications, CO_2 Emission Trade, High Performance Building Characteristic, the LEED rating		

		system, Rating system for Sustainable Building. An integrated view of green building-Lifecycle engineering, Barriers to green building growth. **UNIT II** Green Building Requirements : Principles of Energy, Heat Flow, Fuel Types, Air Flow, Moisture Flow, Condensation and Dew Point, Relative Humidity, Concept of Earth air Tunnel System for moderating air temperature. Design, construction, commissioning and monitoring for green building-Urban development and infrastructure, building shape and orientation, building envelope, building materials and furnishing, natural resources. **UNIT III** Planning of Green From Start-Traditional Design, Integrated Design, Site Selection , Site Development, House Design, Construction and Planning, Construction Waste, Remodeling **UNIT IV** Structural System- Types of Foundation, Foundation Selection, Materials required, Soil Gas, Tree Protection, Pest Control, Floors and Exterior walls, Roofs, Landscaping. **UNIT V** Sustainable building procedure requirement, Blower door test, Thermography, Indoor Comfort, Air Quality, Noise Protection, Day light Performance and Non-Glaring, Emulation, Monitoring and Energy Management, Conscious handling of resources- Energy benchmark as target values for design, regenerative energy resources, primary energy demand for indoor climate conditioning, Energy demand for Lifecycle of a building, Water requirement, Case study		
68	**BTCE 607**	**BTCE 607 CONCRETE DESIGN LAB** **List of Experiments:** 1. To determine the various concrete grades	**BTCE607: GEOTECHNICAL ENGG. DESIGN AND LABORATORY. – II** 1. To determine the differential free swell index of soil.	New course

		2. To determine the fineness modulus of fine aggregates by sieve analysis. 3. To determine the fineness modulus of coarse aggregates by sieve analysis 4. To determine the workability of given concrete mix by slump test. 5. To determine the workability of given fresh concrete mix by compaction factor test. 6. To determine the workability of given concrete mix by Flow table test. 7. To design concrete mix in accordance with I S recommendations. 8. To study the ready mix concrete.	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.	
69	BTCE 608	**TRANSPORTATION LAB** **List of Experiments** 1. Angularity number test. 2. Standard tar viscometer test. 3. Specific gravity and water absorption test. 4. Marshell stability test.(only demo given by faculty/lab assistant) 5. Ductility test on bitumen. 6. Softening test of bitumen. 7. Case studies on bituminous Mixes. 8. Case studies on traffic sign and marking . 9. Case studies of "JAIPUR METRO".	**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.	NEW COURSE
70	BTCE810 / BTCE 609	**BUILDING TECHNOLOGY & PLANNING LAB** **List of Experiments** 1- To design and draw working drawing of a Residential building with following detail. (a) Site plan (b) Foundation plan (c) Plan	**BTCE609 : DESIGN OF CONCRETE STRUCTURES- I** Design problems as per different units of syllabus of theory.	COURSE CODE COURSE NAME CHANGE

		(d) Two sectional elevations (e) Front elevation (f) Furniture plan (g) Water supply and sanitary plan (h) Electric fitting plan 2- To design and draw any type of building		
71	**BTCE 507 / BTCE 610**	**WATER SUPPLY ENGINEERING LAB** **List of Experiments** 1. To determine the pH of the given sample of water. 2. To determine the turbidity of the given sample of water 3. To determine Total Solids of the given water sample. 4. To determine the Total Dissolved Solids of the given water sample. 5. To find out conductivity of the given water sample. 6. To determine hardness of the given water sample. 7. To find out chloride of the given water sample. 8. To determine alkalinity of the given water sample. 9. To find out acidity of the given water sample. 10. To determine the optimum dose of alum by Jar test. 12. To study various water supply Fittings.	**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	COURSE CODE CHANGED
72	**BTCE611**	**Technical Seminar II**		
73	**BTCE612**	**Surveying Camp**	**BTCE612 Discipline & Extra Curricular Activity**	New course
74	BTCE	Major project/ Industrial Training	**WATER RESOURCES ENGINEERING – I (BTCE 701)**	New course

	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.	
75	**BTCE 503 / BTCE7 02**		**DESIGN OF STEEL STRUCTURES – I (BTCE 702)** **UNIT-I** **Introduction:** Types of steels and their broad specifications.	COURSE CODE CHANGE

			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.	
76	**BTCE8 04 / BTCE 703**		**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**	COURSE CODE COURSE NAME CHANGED

			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.	
77	BTCE 704		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	COURSE CODE CHANGE

			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.	
78	BTCE 705		**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,	New course

			Newton's Divided Difference, Lagrangian Interpolation, Hermitian Interpolation, Method of least square. Application to simple civil engineering problems.	
79	BTCE706A		**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.	NEW COURSE
80	BTCE706B		**DESIGN OF PRE-STRESSED CONCRETE STRUCTURES (BTCE 706B)** **UNIT-I** **Introduction:** Systems of pre-stressing in detail,	New Course

			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.	
81	BTCE706C		**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	New Course

			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.	
82	BTCE7077		**DESIGN OF WATER RESOURCES STRUCTURES LAB – I (BTCE 707)** 1. Design Problems as per syllabus of theory.	New Course
83	**BTCE 708**		**STEEL STRUCTURES DESIGN LAB – I (BTCE 708)** 1.Design Problems as per different units of syllabus of theory.	COURSE CODE CHANGE
84	BTCE709		**CONCRETE STRUCTURES DESIGN LAB - II (BTCE 709)** 1.Design Problems as per different units of syllabus of theory.	New Course
85	**BTCE 710**		**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	NEW COURSE
86	**BTCE 701 / BTCE**		BTCE 711 PRACTICAL TRAINING & INDUSTRIAL VISIT	COURSE CODE COURSE NAME CHANGED

	711			
87	BTCE 701 / BTCE 712		BTCE 712 PROJECT-I	COURSE CODE COURSE NAME CHANGED
88	BTCE 713		BTCE 713 DISCIPLINE & EXTRA CURRICULAR ACTIVITY	NEW COURSE
89	BTCE 801	**Estimation And Construction Management** **UNIT I** Introduction: Purpose and importance of estimates, principles of estimating, Methods of taking out quantities of items of work, Mode of measurement, measurement sheet and abstract sheet; bill of quantities, Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects. **UNIT II** Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work, Current schedule of rates. (C.S.R.) **UNIT III** Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works and earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification. **UNIT IV** **Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.** **UNIT V** Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings	**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	New Course
90	BTCE603 /	**Advanced Structural Analysis** **UNIT I**	**Design of Steel Structures-II (BTCE 802)** **UNIT-I**	COURSE CODE COURSE NAME

	BTCE 802	Influence line diagram & rolling load: ILD for beams & frames, Muller-Breslau principle and its application for drawing ILD, Rolling load, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure**.** **UNIT II** Arches: analysis of three hinged two hinged and fixed type parabolic arches with supports at the same level and at different levels. Cable and Suspension bridges: Analysis of cables with concentrated and continuous loading, analysis of two & three hinged stiffening girder. **UNIT III** Kani's Method: Analysis of beams and frames with & without sway by Kani's method. **UNIT IV** Unsymmetrical bending: Definition, location of NA, computation of stresses and deflection, shear center and its location. Composite Sections: Flexural analysis of composite sections**.** **UNIT V** Matrix methods of structural analysis: Introduction to matrix methods; Stiffness (Deflection) and Flexibility (Force) matrices for bar, plate, and beam elements w.r.t. local axes and global axes, for entire structure w.r.t. global axes (Direct method and by assembly method).	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.	CHANGE
91	**BTCE805E / BTCE803**	**SANITATION ENGINEERING** **UNIT I** General: Terms: sewerage, domestic sewage, sewage treatment, disposal scope, Role of an Environmental engineer, historical overview. Sewage Characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards. **UNIT II** Collection of Sewage: Systems of sewerage, Separate, combined, and partially separate, components of sewerage systems, systems of layout, quantity of sanitary sewage and variations, quantity of storms water, rational	**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**	COURSE CODE CHANGE

		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.	**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

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

UNIT IV

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

sewage disposal by irrigation sewage farming, waste waters reuse.

UNIT V

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

stack, traps, layout of house drainage.

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.

| 92 | **BTCE 804** | **CONCRETE STRUCTURES-II**

 UNIT I

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

 UNIT II

Torsion: Design of beams for torsion.

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

 UNIT III | **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. | New Course |

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

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

UNIT IV

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

UNIT V

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

Cantilever Retaining Walls: Design of cantilever type retaining walls & introduction and stability analysis of counter-fort and buttress type retaining walls. | **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. | |
| 93 | **BTCE 804B** | | **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 | New Course |

			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.	
94	BTCE 804C		**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.	New Course

95	BTCE 805A	**Hydraulic Structures** **UNIT I** Water Storage Works : Types of Dams and basis of their selection; Gravity Dams,Forces on gravity dams, Causes of failure and criteria for structural stability of gravity dams, Galleries in gravity dams: Embankment dams; Advantages and disadvantages, Types and causes of failure, Methods of determination of Phreatic Line with a horizontal drainage blanket. **UNIT II** Spillways: Function and types of spillways, Location of spillways,Discharge over an ogee spillway; Energy dissipation below spillways with hydraulic jump formation. **UNIT III** Diversion Headworks: Introduction,Objective and site selection,Various components alongwith their layout and functions; Bligh's Creep Theory,Safety against piping and uplift pressure, Basic concept of Khosla's theory, Exit gradient. **UNIT IV** Canal Falls: Introduction, types and necessity of falls,Basic design parameters of a Vertical Drop fall and Sarda type fall. **UNIT V** Cross Drainage Works: Introduction and definition, Types of cross drainage works, Fluming of canal in Aqueducts,Methods for the design of channel transitions.	**DESIGN OF WATER RESOURCES STRUCTURES– II LAB (BTCE805)** 1. Design as per syllabus of theory.	New Course

96	BTCE 805B	**Water Resource System Planning**		
		UNIT I		
		Introduction of Water Systems engineering-scope and approach		
		Issues and the systems planning approach, Water system dynamics, Water Resource [W.R.] development alternatives, Water systems planning objectives, Constraints and Criteria,		
		Economic and Econometric principles, Cost and Benefit Curves.		
		UNIT II		
		Application of Linear programming [LP] and Dynamic programming [DP] models in Water Resource Engineering, Problem formulation for W.R. systems, Multi-objective Water Resource Planning, Non-inferior Solutions, Plan Formulation, Weighting Method, Constraint Method, Plan Selection.		
		UNIT III		
		Reservoir Operation, Standard Operating Policy, Optimal Operating Policy using LP Rules, Curves for Reservoir Operations. Reservoir Systems [Deterministic Inflow], Reservoir Sizing, Sequent Peak Analysis Neglecting Evaporation, Sequent Peak Analysis Considering Evaporation Loss, Reservoir Capacity using LP , Storage Yield Function, Mixed Integer LP Formulation for Maximizing Yield.		
		UNIT IV		
		Multireservoir Operation, Stationary Policy using DP, Simulation of Reservoir Operation for Hydropower Generation, Reservoir Systems [Random Inflow], Lognormal and Exponential Distributions, Chance Constrained LP, Linear Decision Rule, Deterministic Equivalent of a chance constraint		
		Concept of Reliability, Reliability-based Reservoir Sizing, Maximum Reliability, Stochastic Dynamic programming for reservoir operation, State variable discretisation, Inflow as a stochastic process, Steady state operating policy, Steady State Probabilities, Real-time Operation, Case Study.		

		UNIT V Water quality managements planning and associated models, Regional planning models, Policy issues for improvement in utilization of water resources, Optical Irrigation Water allocation for single and multiple crops, Crop Yield optimization. Applications of Linear Programming in [1] Optimal Irrigation water allocation to multiple crops, [2] Multireservoir system for irrigation planning, [3] Reservoir Operation [Short term] for irrigation, [4] Reservoir operation for Hydropower optimization. Application of dynamic programming in - [1] Steady State Reservoir operating policy for irrigation, [2] Real-time Reservoir Operation for Irrigation, An Example application for inflow forecasting, Fuzzy Sets and Fuzzy logic, Introduction, Fuzzy rule based reservoir operation model.		
97	**BTCE 805C**	**Project Planning & Construction Management** **UNIT I** **FINANCIAL EVALUATION OF PROJECTS AND PROJECT PLANNING:** Capital investment proposals, criterions to judge the worth whileness of capital projects viz. net present value, benefit cost ratio, internal rate of return, Risk cost management, main causes of project failure. Categories of construction projects, objectives, project development process, Functions of project management, Project management organization and staffing, Stages and steps involved in project planning, Plan development process, objectives of construction project management. **UNIT II** **PROJECT SCHEDULING:** Importance of project scheduling, project work breakdown process – determining activities involved, work breakdown structure, assessing activity duration, duration estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.		

		UNIT III **PROJECT COST AND TIME CONTROL:** Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, cost slope, Process of crashing of activities, determination of the optimum duration of a project, updating of project networks, resources allocation. **UNIT IV** **CONTRACT MANAGEMENT:** Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration. **UNIT V** **SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT:** Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.		
98	**BTCE 805D**	**Construction Management** **UNIT-I** **Master Plan and Building By laws**: Objectives and necessity of Master Plan, Land use features, Building Bylaws, Function of Local Authority. Provision of Building Regulation, Salient features of Land Acquisition, etc **Project Planning**: Scheduling, Controlling, Methods of Planning and Programming, Schedules for Labour, Materials and Equipment, Graphical Presentation of Earthwork. **UNIT-II** **Work Accounts**: Muster roll, measurement		

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

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

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

UNIT V
Construction Equipment: Equipment for excavation and transportation of earth, hauling equipment, hoisting equipment, pile driving equipment, Equipment for pumping water, Dozers and cranes,
Scraper, Batching plants, RMC equipment etc | | |
| 99 | **BTCE 805E** | **Advance Transportation Engineering**
UNIT: I
Traffic Studies: Road inventories, Traffic Volume Studies, Spot Speed Studies, Travel Time and delay Studies, Origin-Destination studies, Methodology and Analysis of O-D data, Traffic capacity, Parking studies and characteristics, Accident studies and characteristics, causes and preventive measures.

UNIT: II | | |

		Statistical Methods for Traffic Engineering: Elementary concepts and Probability, Mean, Standard Deviation and variance, Poisson and Binomial Distribution, Normal distribution, sampling Theory and Significance testing, Linear Regression and correlation. **UNIT: III** **Traffic Characteristics**: Macroscopic and Microscopic Characteristics related to Volume, Speed and Density, their relationships, Road User Characteristics – Human and vehicular Characteristics. **Traffic Engineering Design**: Principles of Road Junction design, Design of Roundabouts, Bus Stops and Parking Lots, Design of Signals. **UNIT: IV** **Traffic Management**: Traffic Laws, Regulations and Ordinances for Drivers, Pedestrians and Mixed Traffic. Traffic control Measures – One Way streets, Kerb Parking Control, Intersection Control, Speed Control, Access Control. Expressways. Traffic Control Devices – Traffic Markings, Signs, Signals, Traffic Islands, their Classification, types and Sketches, Street Lighting. **UNIT V** **Traffic and Environment**: Detrimental Effects of Traffic on the environment – air pollution, noise pollution, visual intrusion, aesthetics etc. **Road Safety**: The identification of problem, causation and Prevention, Road layout and Improvements, Safety equipment.		
100	**BTCE 806A**	**Earthquake Resistant Designs And Construction** **UNIT I** Introductory Seismology: Various terminologies related with earthquake, Causes of earthquake, plate tectonics, Tsunami, Seismic wave propagation, Magnitude, intensity & energy of earthquake, magnitude & intensity scales, classifications of earthquakes, Seismic zoning case histories of earthquakes, Seismic hazards, induced hazards. **UNIT II**	**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.	New Course

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

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

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

UNIT V
Seismic design philosophy IS 1893 (part I):2002, codal provisions: Load combinations, Design lateral loads, response reduction factors, structural modeling of building frames and equivalent load method for earthquake analysis of multistory frames. | 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. | |
| 101 | **BTCE 806B** | **Rural Water Supply & Sanitation**
UNIT: I
General: Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects.
Sources of water: Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.
UNIT II
Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, | | |

		standards of water quality.		
		Communicable Diseases: Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.		
		UNIT III **Water Treatment:** Slow sand filter, horizontal roughing filter and their combination. Disinfection of rural water sources, Fluoride and its removal. **Schemes of Rural water supply:** Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.		
		UNIT IV **Milk and Food sanitation:** Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism. **Fly and Mosquito control:** Life cycle of flies and mosquitoes, various methods of flies and mosquito control.		
		UNIT V **Rural Sanitation:** Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes. **Community Awareness and user participation:** Planning of communication support in rural supply and sanitation projects.		
102	**BTCE 806C**	**Prestressed concrete** **UNIT I** **INTRODUCTION – THEORY AND BEHAVIOUR :** Principles of Prestressing Types of prestressing systems – Materials – Systems and devices – Behavior of prestressed concrete elements – General concept of Prestress – Force transmitted by pretensioned		

and post tensioned systems – losses in prestress – analysis for Ultimate Strength – Comparison of codal

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

103		**BTCE 806D Non Destructive Testing Techniques**		
		UNIT I		
		OVERVIEW OF NDT :NDT Versus Mechanical testing, Overview of the Non Destructive Testing Methods for the detection of		

manufacturing defects as well as material characterisation. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection ¡V Unaided and aided.

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

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

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

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

		Radiography, Computed Radiography, Computed Tomography		
104	**BTCE 806E**	**Applications of Remote Sensing and GIS in Civil Engineering** **UNIT I** Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics. Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water. **UNIT II** Introduction to Aerial and space borne platforms. Global positioning system (GPS) photogrammetry – analog, analytical and digital photogrammetry, height and plan metric. **UNIT III** Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensing satellites, Digital image processing; introduction, image rectification and restoration, image enhancement, manipulation, image classification, fusion. **UNIT IV** GIS system : Definition terminology and data types, Map projection and Co-ordinate system, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation, principle of cartography and cartographic design. GIS customization concepts, approaches of Multi-criteria decision making, concepts and applications of Geostatistics. **UNIT V** Application of Geo-spatial technology in Civil Engineering, assessment of cyclones, rainfall,		

105	**BTCE 807**	**Advanced Structural Engineering Lab** 1. Deflection of a truss 2. Clark-Maxwell reciprocal theorem with truss 3. Funicular polygon for flexible cable 4. Analysis of redundant frame 5. Deflection of curved members 6. Buckling of columns 7. Clark-Maxwell reciprocal theorem with simply supported beam 8. ILD for deflection in a steel beam using unit load method 9. Unsymmetrical bending	**STEEL STRUCTURES DESIGN LAB – II (BTCE 807)** **1.** Design problems as per different units of syllabus of theory.	COURSE CODE CHANGED
106	**BTCE 808**	**COMPUTER AIDED BUILDING DESIGN LAB** Residential /Commercial /Institutional Buildings Planning & Designing	**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.	NEW COURSE
107	**BTCE 809**	**SANITARY ENGINEERING LAB** **List of Experiments:** 1. To determine the pH of the given sample of sewage. 2. To determine Total Solids of the given sewage sample. 3. To determine the Total Dissolved Solids of the given sewage sample. 4. To find out Total Settle-able Solids of the given sewage sample. 5. To determine Total Suspended Solids of the given sewage sample. 6. To find out the Quantity of Dissolved Oxygen present in the given water sample by Winkler's Method. 7. To determine Biochemical Oxygen Demand	**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.	NEW COURSE

		8. To find out Chemical Oxygen Demand of the waste water sample. 9. To study various Sanitary Fittings.		
108	**BTCE810**	**Design of Concrete structures Lab-I** Design the structures as per the theory subject	BTCE 810 Seminar	New course
109	BTCE811	BTCE811 Estimation & Construction Management Lab** 1.Estimation of building(long wall and short wall method) 2. Estimation of building(center line method) 3. Analysis of rate for concrete work 4. Analysis of rate for brick work 5. Analysis of rate for plaster work 6. Estimate quantity of reinforcement 7. Preparation for approximate estimate for road project 8. Estimating cost of building on plinth area method	BTCE 811 Project-II	New course
110	BTCE812	PROJECT	BTCE 812 Discipline & Extra Curricular Activity	New Course