

# **SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)**



## **SYLLABUS**

**For  
BTECH IN CIVIL ENGINEERING**

**Course Code : BTCE**

Department of Civil Engineering  
Faculty of Civil Engineering

Duration of Course : 4 Year  
Examination Mode : Semester  
Examination System : Grading

Swami Vivekanand University, Sironja Sagar (M.P.)  
2014-2015



**Mathematics - I (BTCE-0101)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	Max	Min	(h) = (e+f)									
		(a)	(b)				(c)	(d) = (a+c)	(e)	(f)	(g)	(i) = (d+h)			
BTCE-0101	Mathematics - I	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

**UNIT – I**

**Marks :16**

MATRICES Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Caley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

**UNIT – II**

**Marks :16**

DIFFERENTIAL CALCULUS Curvature – Cartesian and polar coordinates – Circle of curvature – Involutives and Evolutives – Envelopes – Properties of envelopes.

**UNIT – III**

**Marks :16**

FUNCTIONS OF SEVERAL VARIABLES Function of two variables – Partial derivatives – Total differential – Taylor’s expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

**UNIT – IV**

**Marks :16**

ORDINARY DIFFERENTIAL EQUATIONS Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form

**UNIT – V**

**Marks :16**

THREE DIMENSIONAL ANALYTICAL GEOMETRY Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

**Text Books**

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition.,
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan,” Engineering Mathematics” – Vol I & II Anuradha Publications, Revised Edition 2006.
3. Veerajan, T., Engineering Mathematics, Tata McGraw Hill Publishing Co., New Delhi,2000.

**Reference Books**

1. Kreyszig.E, “Advanced Engineering Mathematics”, 8th edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. “Engineering Mathematics”, Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., “Advanced Mathematics for Engineering students”, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.



## Fundamentals of Physics (BTCE-0102)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	(d) = (a+c)	Max	Min	(h) = (e+f)								
		(a)	(b)		(c)	(e)		(f)	(g)	(i) = (d+h)					
BTCE-0102	Fundamentals of Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

### UNIT – I

**Marks :16**

WAVE OPTICS-I Interference- definition, types, explanation of interference, Interference by division of wave front: Fresnel's biprism, fringe width, Interference in thin films

Wedge shaped films, Interference by division of amplitude: Newton's rings, Michelson's Interferometer and its applications.

### UNIT – II

**Marks :16**

WAVE OPTICS-II Diffraction :- Introduction - Differences between Fresnel and Fraunhofer diffractions Single slit diffraction ( Qualitative and quantitative treatment) – Differences between interference and diffraction, resolving power of optical instruments (prism and grating). Polarization:- Introduction – double refraction –Negative crystals & Positive crystals - Nicol's prism – Quarter wave plate and half wave plate – Production and detection of circularly and elliptically polarised light.

### UNIT – III

**Marks :16**

QUANTUM PHYSICS De Broglie's hypothesis, De Broglie's wave length, Davisson and Germer's experiment, Compton Effect, concept of wave packet & their properties, wave function & probability interpretation, Heisenberg's Uncertainty Principle, its elementary proof and applications, energy and momentum operators, time dependent and time independent Schrödinger wave equation. Application of time independent Schrödinger wave equation to particle trapped in a one dimensional square potential well.

### UNIT – IV

**Marks :16**

#### NUCLEAR PHYSICS

General properties of nucleus, Nuclear model (liquid drop model and shell model), accelerator, linear particle accelerator, cyclotron, general betatron, Counters and particle detectors Geiger-Muller Counter, nuclear fission, nuclear fusion, nuclear reaction, nuclear reactors.

### UNIT – V

**Marks :16**

#### LASER AND FIBER OPTICS

Laser: Stimulated and spontaneous processes, main part of laser, laser action population inversion, pumping, Optical resonators, characteristics of laser beam, Principles and working of Ruby, Nd:YAG, He-Ne & with energy level diagram and Applications of lasers Fiber Optics - Fundamental idea about optical fiber, types of fibers, acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fiber (Ray theory) pulse dispersion, attenuation, losses, various uses, and application of optical fibers.

### Text Books

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"



### **Reference Books**

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Jenkins and White: "Optics", McGraw-Hill Book Company.
4. Sanjeev Puri: Modern Physics, Narosa Pub.Co. 2004.
5. Kaplan: Nuclear Physics, Narosa Publishing, 1987.
6. Tyagrajan and Ghatak: Lasers, Macmillan, 2001.

### **List of Experiments**

1. Keiser: G Optical fiber Communication, McGraw-Hill, 2000.
2. Fresnel Biprism,
3. Newton's Rings,
4. Michelson's Interferometer.
5. Resolving Powers –Telescope,
6. Spectrometers-R.I., Wavelength, using prism and grating
7. Optical polarization based experiments: Brewster's angle, polarimeter etc.
8. Measurements of wavelength of LASER
9. To study the CRO.
10. Charging and discharging of capacitor
11. Other conceptual experiments related to theory syllabus



## Chemistry (BTCE-0103)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks							Grand Total	Duration of Exam	
						Theory		MST	Total	Practical		TW			Total
		Max	Min	Max	Min										
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)	(g)	(h) = (e+f)	(i) = (d+h)					
BTCE-0103	Chemistry	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

### UNIT – I

Marks :16

#### TECHNOLOGY OF WATER

Source of water, Impurities in water, Analysis of water- Hardness of water, Estimation of Hardness, Alkalinity of water, Determination of alkalinity, Disadvantages of using hard water in boiler- sludge and scale formation, Boiler corrosion, Water softening techniques (Internal and External treatment), treatment of water for domestic purposes.

### UNIT – II

Marks :16

#### CORROSION AND ITS CONTROL

Corrosion: Basic concept- Principles, Mechanism of Dry or Chemical Corrosion and Wet or Electrochemical Corrosion, Pilling Bedworth rule, Types of corrosion- Galvanic corrosion, Concentration cell corrosion, Pitting corrosion, Stress corrosion, Microbiological corrosion, Factors influencing corrosion, Corrosion control.

### UNIT – III

Marks :16

#### A. FUELS

Definition & Classification of fuels, Calorific values, Analysis of coal, Carbonization of coal, Manufacturing of coke & recovery of by products. Cracking, Knocking, Anti-knocking, Octane & Cetane number, Gaseous fuels.

#### B. LUBRICANTS

Introduction, functions & classification of lubricants, Mechanism of lubrication, Properties and Testing of lubricants.

### UNIT – IV

Marks :16

#### POLYMERS

Introduction and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization, Mechanism of addition polymerization -Free radical and Ionic polymerization, Ziegler Natta polymerization, Vulcanization of rubbers, Preparation, Properties and Applications of important polymers- Polyethylene, PVC, PMMA, Nylons, Terylene, Glyptal, Bakelite, Urea-formaldehyde, Silicone resin, Neoprene, Buna S, Buna N.

### UNIT – V

Marks :16

#### INSTRUMENTATIONAL METHODS OF CHEMICAL ANALYSIS

Introduction to Spectroscopy, Electromagnetic spectrum, Introduction, Principle, Instrumentation and Application of IR, UV- Visible, NMR, Basic Principle and Instrumentation of Potentiometry, Flame photometry and Chromatography.

#### Text Books

1. Jain.P.C and Monika Jain, Engineering Chemistry, Danpat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, Text book of Engineering Chemistry, S. Chand & Company Ltd, New Delhi
3. Sharma B.K., “Instrumental methods of chemical analysis” 24th Edition Krishna Prakashan Media Pvt. Ltd, Meerut, 2005.



### **Reference Books**

1. Kuriacose J.C. and Rajaram J. Chemistry in Engineering and Technology, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, Engineering Chemistry, 1st Edition, Devi Publications, Chennai 2006.
3. Rattan S., Text book of Engineering Chemistry, S.K. Kataria and Sons, Publication, 1st Edition, New Delhi, 2012

### **List of Experiments**

1. Preparation of standard solutions.
2. Conductometric titration-determination of strength of an acid.
3. Determination of alkalinity, hydroxyl, carbonate and bicarbonate in water.
4. Determination of total hardness in water using EDTA titrations.
5. Estimation of iron by potentiometer.
6. Estimation of Copper in Ore
7. Determination of viscosity of lubricating oil with change of temperature by
  - a. Red Wood Viscometer Number 1
  - b. Red Wood Viscometer Number 2
8. Determination of Flash and Fire point of liquid fuel and lubricants by
  - a. Cleaveland's Open Cup Method
  - b. Abel's Flash Point Apparatus
  - c. Pensky Martin's Flash Point Apparatus.
9. Determination of Cloud and Pour point of lubricants by Cloud and Pour point Apparatus.
10. Determination of carbon residue of lubricants by Conradson's Apparatus.

### **REFERENCE BOOKS FOR PRACTICAL**

1. Chemistry department manual, Edition, 2008.
2. Chawla S., Theory and Practicals of Engineering Chemistry, Dhanpat Rai & Co. (Pvt.) Ltd. 6th Edition, New Delhi – 2011.



**Basic Engg.- I (BTCE-0104)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	Max	Min										
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)	(g)	(h) = (e+f)	(i) = (d+h)					
BTCE-0104	Basic Engg.- I	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

**UNIT – I**

**Marks :16**

**AC & DC CIRCUITS**

Circuit parameters, Ohms law, Kirchhoff’s law. Average and RMS values, concept of phasor representation, RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits) Introduction to three phase systems – types of connections, relationship between line and phase values.

**UNIT – II**

**Marks :16**

**MAGNETIC CIRCUITS**

Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits. Faraday’s laws, induced emfs and inductances, brief idea on Hysteresis and eddy currents.

**UNIT – III**

**Marks :16**

**ELECTRICAL MACHINES**

Working principle, construction and applications of DC machines and AC machines (single phase transformers, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

**UNIT – IV**

**Marks :16**

**DIGITAL ELECTRONICS**

– Number system, Boolean Theorems, DeMorgan’s Theorem, Logic gates, Implementation of Boolean expression using logic gates, Half adder, Full adder. Electronic Components – Resistors, Inductors and Capacitors and their types. CRO.

**UNIT – V**

**Marks :16**

**SEMICONDUCTOR** – Energy band diagram, Intrinsic and Extrinsic semi conductors, PN Junction diode, Zener diode and their V-I characteristics , Zener diode used as a Voltage regulator, Light emitting diode and Photo diode. Rectifier – Half wave and full wave Rectifier and their efficiency and ripple factor, Filters.

**Text Books**

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
2. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. Mehta V.K., Principals of Electronics, S. Chand & Co.
6. Moris Mano, Digital Electronics, PHI Pub.
7. Kalsi H.s. , Electronics Instrumentation, ISTE Pub.



### **Reference Books**

1. Kothari D. P and Nagrath IJ, Basic Electrical Engineering, Tata McGraw- Hill, 1991.
2. Thomas L.Floyd Electronic devices, Addison Wesley Longman (Singapore) Pvt . Ltd., 5th Edition.
3. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
4. Mehta V.K., Principals of Electronics, S. Chand & Co.

### **List of Experiments**

1. Study of KVL and KCL.
2. Study of Transformer, name plate rating, determination of ratio and polarity.
3. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
4. Identification and testing of different Electronics components.
5. Observing input and output waveforms of rectifiers.
6. Verification of truth table for various gates.
7. To study the V-I characteristics of PN diode and Zener Diode.
8. To implement basic logic gate by using universal gate(NAND & NOR).
9. Measurement of frequency and time period of a signal using CRO.





**Computer Lab (BTCE-0105)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks							Grand Total	Duration of Exam	
						Theory		MST	Total	Practical		TW			Total
		Max	Min	(d) = (a+c)	Max	Min	(h) = (e+f)								
		(a)	(b)		(c)	(e)		(f)	(g)	(e+f)					
BTCE-0105	Computer Lab	-	-	2	2	-	-	-	-	-	-	50	50	50	

**PURPOSE**

This Lab Course will enable the students to understand the basics of computer and to know the basics of MSOffice.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the basics of computer, Computer Peripherals and its application in real world.
2. Demonstration on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

**Text Books**

1. Introduction to Information Technology IITL Education Solutions Ltd., Pearson 2nd Edition, 2006.

**List of Experiments**

1. Study experiment on evolution of computer programming languages.
2. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
3. Experiments to demonstrate directory creation and file creation.
4. Create a document with all formatting effects.
5. Create a document with tables.
6. Create labels in MS word.
7. Create a document to send mails using mail merge option.
8. Create an Excel File to analyze the student’s performance. Create a chart for the above data to depict it diagrammatically.
9. Create Excel sheet to use built-in-function like sum, count, countif ,if, etc.
10. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
11. Create a Power Point presentation for your personal profile with varying animation effects with timer.
12. Consider student information system which stores student personal data, mark information and non-academic details.
  - \* Use MS Access to create Tables and execute SQL queries to do this following
  - \* Display all student records.
  - \* Display student details with respect to his identity.
  - \* Delete some records from the table.
  - \* Find total marks obtained by student in each list.



## Workshop Practice (BTCE-0106)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	Max	Min										
		(a)	(b)	(c)	(d) = (a+c)	(e)	(f)	(g)	(h) = (e+f)	(i) = (d+h)					
BTCE-0106	Workshop Practice	-	-	2	2	-	-	-	-	50	15	50	100	100	

### PURPOSE

To provide the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

### INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

### Text Books

1. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, practice and work book, Suma Publications, 2005.

### Reference Books

1. Kannaiah,P. & Narayanan,K.C. Manual on Workshop Practice, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. , First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

### List of Experiments

1. EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.
2. FITTING  
Tools & Equipments – Practice in Filing and Drilling.  
Making Vee Joints, Square, dovetail joints, Key Making.
3. CARPENTRY  
Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.
4. SHEET METAL  
Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.
5. WELDING  
Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet.  
Demonstration of Gas welding, TIG & MIG.
6. SMITHY  
Tools and Equipments –Making simple parts like hexagonal headed bolt, chisel.



**English (BTCE-0107)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	(d) =	Max	Min	(h) =								
		(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(i) =					
BTCE-0107	English	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

**UNIT – I**

**Marks :16**

**LANGUAGES AND SKILLS OF COMMUNICATION**

Linguistic Techniques, Reading Comprehension, Phonetic symbols/signs, Oral Presentation, Process of communication, Verbal and non-verbal Communication, Barriers of communication

**UNIT – II**

**Marks :16**

**APPLICATION OF LINGUISTIC ABILITY**

Definitions of Engineering terms, objects, processes & principles ,Paragraph Writing on topics of General Interest, Importance of Listening Skills, Unseen Passage, Conversational Dialogues

**UNIT – III**

**Marks :16**

**LETTER WRITING**

Applications, Enquiry & Complaint letters, Calling & Sending quotations, Placing orders, Tenders.

**UNIT – IV**

**Marks :16**

**PRECISE WRITING**

Slogan – Writing, Technical Description of Simple engineering objects & processes, Note – making.

**UNIT – V**

**Marks :16**

**REPORT WRITING**

Observation Report, Survey Report, Report of Trouble, Laboratory Report, Project Report, Telephonic Etiquettes, Debate, Speech.

**Text Books**

1. Abraham Benjamin Samuel Practical Communication Communicative English LSRW2000 – SRMEC –June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, “English for Engineers /Technologist Vol.-I”. Orient Longman, 1990.

**Reference Books**

1. Herbert. A. J. The structure of Technical English Orient Longman 1995.
2. Pickett and Laster, ‘Technical English, Writing, Reading and Speaking’, New York Harper and Row Publications, 1997.
3. Interactive course in phonetics and spoken English published by Acoustics Engineers (ACEN) 2002.



## Project - I (BTCE-0108)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks						Grand Total	Duration of Exam		
						Theory		MST	Total	Practical				TW	Total
		Max	Min	(d) =	Max	Min	(h) =								
		(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(i) =					
BTCE-0108	Project - I	-	-	4	4	-	-	-	-	-	-	50	50	50	

The objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
3. To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.
4. To adapt students for latest developments and to handle independently new situations.
5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

- i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.
- ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty
- iii) At all the steps of the project, students must submit a written report of the same.



**Mathematics - II (BTCE-0201)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	(d) = (a+c)	Max	Min	(h) = (e+f)			(i) = (d+h)					
		(a)	(b)		(c)	(e)		(f)	(g)						
BTCE-0201	Mathematics - II	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

**UNIT – I**

**Marks :16**

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

**UNIT – II**

**Marks :16**

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform.

**UNIT – III**

**Marks :16**

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method.

**UNIT – IV**

**Marks :16**

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange’s Linear equation, charpit’s method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation. Separation of variable method for the solution of wave and heat equations.

**UNIT – V**

**Marks :16**

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green’s, Stoke’s and Gauss divergence theorem.

**Text Books**

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition., Veerajan, T., Engineering

**Reference Books**

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication
3. Advance Engineering Mathematics by D.G.Guffy



**Material Physics (BTCE-0202)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam	
						Theory		MST	Total	Practical		TW	Total			
		L	T	P	C	Max	Min	(c)	(d) =	Max	Min	(g)	(h) =			(i) =
		(a)	(b)	(a+c)	(e)	(f)	(e+f)		(d+h)							
BTCE-0202	Material Physics	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs	

**UNIT – I**

**Marks :16**

**STRUCTURE OF MATERIALS**

Type of solids, Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Bragg's law X-ray diffraction for crystal structure.

**UNIT – II**

**Marks :16**

**SEMICONDUCTING MATERIALS**

Introduction, intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, carrier concentration in n type semiconductors, carrier concentration in p-type semiconductors, Hall effect and its applications - variation of carrier concentration with temperature, conductivity of extrinsic semiconductor, P-N junction – forward bias – reverse bias –V-I characteristics of a p-n junction. Basic introduction of transistors.

**UNIT – III**

**Marks :16**

**DIELECTRIC MATERIALS**

Introduction, Fundamental definitions, Local field, Clausius- Mossotti relation, different types of electric polarization (dipolar, ionic and electronic polarizations), frequency and temperature effects on polarization, dielectric loss, dielectric breakdown, determination of dielectric constant, properties and different types of insulating materials, ferroelectric materials, spontaneous polarization in BaTiO<sub>3</sub>, electrets.

**UNIT – IV**

**Marks :16**

**MAGNETIC & SUPERCONDUCTING MATERIALS**

**MAGNETIC MATERIALS** Concept of magnetism- Dia, para, ferro magnetic materials · Hysteresis loop· Soft and hard magnetic material· magnetic Storages application of magnetic materials

**SUPERCONDUCTING MATERIALS** Introduction – basic theories for superconductivity Meissner effect - Properties of superconductors - Type-I and Type-II superconductors – High Tc superconductors – application.

**UNIT – V**

**Marks :16**

**NANO MATERIALS**

Introduction to nano science, nano materials synthesis of nano materials (using different routes) properties of nano materials, carbon nano tubes, application of nano materials.

**Text Books**

1. Gaur and Gupta "Engineering Physics"
2. Tiwari and Navneet Gupta "Engineering Physics"
3. Vikram Yadav "Engineering Physics"
4. Materials Science'. By Dr. M. Arumugam.



**Reference Books**

1. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
2. Avadhanulu and Kshirsagar "Engineering Physics".
3. Azroff: Solid State Physics, Tata McGraw-Hill, 2004.
4. Materials Science'. By Dr. M. Arumugam.
5. Science of Engg. Materials and Carbon Nano tubes- C. M. Shrivastava and C. Srinivasan

**List of Experiments**

1. Uses of Potentiometers and Bridges (Electrical)
2. Experiments connected with diodes
3. Experiments connected with transistor.
4. Measurement of energy band gap of semiconductor.
5. To study Hall effect.
6. To study Solar cell.
7. To study the LED
8. Other conceptual experiments related to theory syllabus.



**Energy & Environment Science (BTCE-0203)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min	(c)	(d) =	Max	Min	(g)	(h) =	(i) =	
		(a)		(b)		(a+c)	(e)		(f)	(e+f)	(d+h)				
BTCE-0203	Energy & Environment Science	3	1	-	4	80	25	20	100	-	-	-	-	100	03 Hrs

**UNIT – I**

**Marks :16**

**ENERGY**

Energy, Energy scenario in world and India, Sources of energy, Renewable and nonrenewable sources of energy, Advantages and disadvantages of different sources of energy- Fossil fuel, Coal, Oil, Gas, Nuclear, Solar, Wind, Geothermal, Hydel, Hydrogen and Ocean energy.

**UNIT – II**

**Marks :16**

**ENVIRONMENT AND ECOSYSTEM**

Ecology and ecosystem, Structure and types of an ecosystem, Food chain and food web, segment of Environment-Atmosphere, Hydrosphere, Lithosphere, Biosphere, Cycles in ecosystem- Gaseous, Sedimentary and Water.

**UNIT – III**

**Marks :16**

**ENVIRONMENTAL POLLUTION-I**

Introduction, Air Pollution, Lapse Rate and Inversion Temperature, Air Pollutants, Classification of Air Pollutants, Causes of air pollution, Adverse effect of air pollution, Acid rain, Global warming, Chemical & photochemical smog and Ozone layer depletion, Control of Air Pollution.

**UNIT – IV**

**Marks :16**

**ENVIRONMENTAL POLLUTION-II**

Water Pollution, Classification of water pollutants, Characteristics of waste water, Waste water treatment- Primary, Secondary and Tertiary, Eutrophication, Soil or and Pollution, Radioactive Pollution, Noise Pollution

**UNIT – V**

**Marks :16**

**ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT**

Solid waste management, Treatment and disposal methods, important environmental protection act in India- water, air (prevention and control of pollution) act, Wild life conservation and forest act, Functions of central and state pollution control boards, Environmental impact assessment.

**Text Books**

1. Sharma.B.K. and Kaur, Environmental Chemistry, Goel Publishing House, Meerut, 1994.
2. De A.K., Environmental Chemistry, New Age International Pvt. Ltd., New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, Essential of Environmental Studies, Pearson Education, 2004.

**Reference Books**

1. Dara S.S., A Text Book of Environmental Chemistry and pollution contro, S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, Principles of Environmental Science, 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari.M, Environmental Science – Challenges and Changes, 1st Edition,Sudhandhira Publications, 2007.





**Basic Engg.- II (BTCE-0204)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	(d) = (a+c)	Max	Min	(h) = (e+f)			(i) = (d+h)					
		(a)	(b)		(c)	(e)		(f)	(g)						
BTCE-0204	Basic Engg.- II	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

**UNIT – I**

**Marks :16**

Building Materials & Construction Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

**UNIT – II**

**Marks :16**

Surveying & Positioning:

Introduction to surveying Instruments – levels, theodolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

**UNIT – III**

**Marks :16**

Engineering Mechanics

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non concurrent Co- planner forces, free Diagram, Force Diagram and Bow’s notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems. Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia.

**UNIT – IV**

**Marks :16**

Measurement

Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainly analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lath, drilling, milling and shaping machines.

**UNIT – V**

**Marks :16**

Reciprocating Machines

Thermodynamics: First and second law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol & diesel IC engines.

**Text Books**

1. Raju K.V.B., Ravichandran P.T., Basics of Civil Engineering, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, Civil Engineering, VRB Publishers, Chennai, 2000.



**Swami Vivekanand University, Sagar(M.P.)**



3. Kumar, T., Leenus Jesu Martin., and Murali, G., Basic Mechanical Engineering, Suma Publications, Chennai, 2007.
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.

### **Reference Books**

1. Rangwala, S.C., Engineering Materials, Charotar Publishing House, Anand,
2. National Building Code of India, Part V, Building Materials, 2005
3. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi
4. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., Basic Mechanical Engineering, Scitech Publications, Chennai, 2000.
5. Palanichamy, M.S., Basic Civil & Mechanical Engineering, Tata McGraw-Hill, New Delhi 1991.
6. Nagpal G. R., Power Plant Engineering, Khanna Publisher, Delhi, 2004



**Computer Science (BTCE-0205)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	Max	Min										
		(a)	(b)			(c)	(a+c)	(e)	(f)	(g)	(h) = (e+f)	(i) = (d+h)			
BTCE-0205	Computer Science	3	1	2	6	80	25	20	100	50	15	50	100	200	03 Hrs

**UNIT – I**

**Marks :16**

**PROGRAMMING FUNDAMENTALS**

Computer Basics; Program Development Life Cycle: Flow Chart, Algorithm, Compilation and Execution; Introduction to C Language: program structure, variables, keywords, data types; Input / Output functions: scanf, printf; simple programs.

**UNIT – II**

**Marks :16**

**DECISION AND LOOP CONTROL STRUCTURE**

Logical operators; Decision statements: if/else, switch/case statements; Loop control statements – for, while, do/while.

**UNIT – III**

**Marks :16**

**ARRAYS AND FUNCTIONS**

Arrays: Introduction to arrays; One dimensional array: declaration, reading and printing array elements, sorting and searching. Functions: Definition; declaration of functions; return statement; recursion.

**UNIT – IV**

**Marks :16**

**INTRODUCTION TO OOP CONCEPTS**

OOP concepts: classes and objects, encapsulation, inheritance, overloading, polymorphism, constructor and destructor, data hiding, simple program in C++.

**UNIT – V**

**Marks :16**

**INHERITANCE AND OVERLOADING**

Inheritance – single, multiple, multilevel; Overloading – Function overloading, Operator overloading.

**Text Books**

1. Kanetkar P.Yashwant, “Let us C”, BPB publications, 2002.
2. Ashok N.Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 2006.
3. Herbert Schildt, “The Complete Reference C++”, TataMcGrawHill, 2001, 3rd Edition.
4. Robert Lafore, “Object Oriented Programming in Microsoft C++”, The Waite Group, Galgotia Publications Pvt. Ltd., 2002.

**Reference Books**

1. Robert Lafore, “Object Oriented Programming in Microsoft C++”, The Waite Group, Galgotia Publications Pvt. Ltd., 2002.



### **List of Experiments**

Note to the Instructors: Design exercise problems to demonstrate the use of C and C++ in the area of specialization.

1. Programs to demonstrate the use of scanf( ) and printf( ) functions
2. Programs to evaluate arithmetic expressions
3. Programs using conditional statements
4. Programs using for,while , do...while
5. Programs on arrays
6. Programs to perform matrix addition and multiplication
7. Programs to implement functions
8. Programs to illustrate recursion
9. Program to create classes and objects using C++
10. Program to implement Constructor and Destructor in C++
11. Program to implement single inheritance in C++
12. Program to implement Function overloading in C++
13. Program to implement Operator overloading in C++



**Engg. Graphics Lab (BTCE-0206)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		Max	Min	(d) = (a+c)	Max	Min	(h) = (e+f)								
		(a)	(b)		(c)	(e)		(f)	(g)	(i) = (d+h)					
BTCE-0206	Engg. Graphics Lab	-	-	2	2	-	-	-	-	50	15	50	100	100	

**UNIT – I**

**Marks:16**

**FUNDAMENTALS OF ENGINEERING GRAPHICS**

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

**UNIT – II**

**Marks:16:**

**PROJECTION OF LINES AND SOLIDS**

Projection of straight lines, projection of solids – auxiliary projections

**UNIT – III**

**Marks:16**

**SECTIONS AND DEVELOPMENTS**

Sections of solids and development of surfaces.

**UNIT – IV**

**Marks:16**

**PICTORIAL PROJECTIONS**

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

**UNIT – V**

**Marks:16:**

**BUILDING DRAWING**

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

**Text Books**

1. Jeyapooan, T., Engineering Drawing and Graphics using AutoCAD 2000, Vikas Publishing house Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kanniah, P., Engineering Graphics, Scitech Publications, Chennai, 1999.

**Reference Books**

1. Bhatt, N.D., Elementary Engineering Drawing (First Angle Projection), Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. Engineering Drawing & Graphics, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. Engineering Drawing & Graphics, Private Publication, Chennai, 1990.



**Seminar/GD/Lang. Lab (BTCE-0207)**

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam	
						Theory		MST	Total	Practical		TW	Total			
		L	T	P	C	Max	Min	(c)	(d) =	Max	Min	(g)	(h) =			(i) =
		(a)	(b)	(a+c)	(e)	(f)	(e+f)		(d+h)							
BTCE-0207	Seminar/GD/Lang. Lab	-	-	2	2	-	-	-	-	-	-	50	50	50		

**UNIT – I**

**Marks:16:**

Topics to be covered in the Language Lab Sessions:

Introduction session: Introduce oneself, Family background, Educational qualification, Hobbies and interest, Expertise, Experience (If any), Strength and weaknesses.

**UNIT – II**

**Marks:16:**

Body language: Importance of body language, Dressing sense, Walking sense, Talking and communication, Dining and eating sense.

**UNIT – III**

**Marks:16**

Telephonic etiquettes: How to receive calls, How to respond, How to make a call, Common expressions for calling.

PPTs presentations:

Improving speaking skills: Speech practices, Role plays (on stage), GD and Debate, Extempore speech, Word games, JAM (Just a minute) session, Describing objects and situations.

**UNIT – IV**

**Marks:16**

Reading skills: Improving reading skills, Paragraph reading, Storytelling and reading, Audio and video sessions.

**UNIT – V**

**Marks:16**

Writing skills: Paragraph writing, Word power/ vocabulary building, Article writing, Translations from Hindi to English and vice-versa.

Presentation skills: Oral presentations, on all the learning sessions. Seminar on given topics.



## Project work-II (BTCE-0208)

Paper Code	Title of the paper	Period Per Week				Distribution of Marks								Grand Total	Duration of Exam
						Theory		MST	Total	Practical		TW	Total		
		L	T	P	C	Max	Min			Max	Min			(d) =	(h) =
BTCE-0208	Project work-II	-	-	4	4	(a)	(b)	(c)	(a+c)	(e)	(f)	(g)	(e+f)	(d+h)	
						-	-	-	-	-	-	50	50	50	

The objectives of the course 'Project work' are

1. To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
2. To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
3. To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.
4. To adapt students for latest developments and to handle independently new situations.
5. To develop good expressions power and presentation abilities in students.

The faculty and student should work according to following schedule:

- i) Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff.
- ii) The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.
- iii) At all the steps of the project, students must submit a written report of the same.



Semester-III

**BTCE □ 0301 ENGINEERING MATHEMATICS –III**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0301	Mathematics - III	3	1	-	4	80	25	20	100	0	0	0	0	100	3 Hour's

**UNIT- I**

**Marks : 16**

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals.

**UNIT- II**

**Marks : 16**

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi ,Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

**UNIT- III**

**Marks : 16**

Difference Operators, Interpolation ( Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae ), Numerical Differentiation and Numerical Integration.

**UNIT- IV**

**Marks : 16**

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method ), Correlation and Regression, Curve Fitting (Method of Least Square).

**UNIT- V**

**Marks : 16**

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis |:Students t-test,Fisher's z-test, Chi-Square Method





**Text Books**

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Engineering Mathematics by S S Sastri. P.H.I.

**Reference Books**

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
2. Higher Engineering Mathematics by BS Grewal, Khanna Publication
3. Advance Engineering Mathematics by D.G.Guffy
4. Mathematics for Engineers by S.Arumungam, SCITECH Publication
5. Engineering Mathematics by S S Sastri. P.H.I.



**BTCE-0302 Transportation Bridges and Tunnels**

Course code	Title of the Paper	Periods week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0302	Transportation Bridges and Tunnels	3	1	-	4	80	25	20	100	0	0	0	0	100	3 Hour's

**UNIT- I**

**Marks : 16**

Introduction, Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort.

- i) Rails: types, welding of rails, wear and tear of rails, rail creep.
- ii) Sleepers: types and comparison, requirement of a good sleeper, sleeper density.
- iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
- iv) Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track

**UNIT- II**

**Marks : 16**

Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

**UNIT- III**

**Marks : 16**

Bridge Site Investigation and Planning; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure.

**UNIT- IV**

**Marks : 16**

Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants. inspection and Data collection, strengthening of bridges, Bridge failure.

**UNIT- V**

**Marks : 16**

Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.



**Text Books**

1. Railway Track by K.F. Antia
2. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand

**Reference Books**

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
6. Railway Track by K.F. Antia
7. Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons
8. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9. Railway, Bridges & Tunnels by Dr. S.C. Saxena
10. Harbour, Docks & Tunnel Engineering - R. Srinivasan



**BTCE-0303 Engineering mechanics**

Course code	Title of the Paper	Periods week				Per								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0303	Engineering mechanics	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

**COMPOSITION AND RESOLUTION OF FORCES:**

- Definition , Effect, characteristics of force ,System of Forces, Principle of Transmissibility of Forces ,Concept of Resultant Force ,Law of Parallelogram of Forces, Triangle of Forces ,Polygon of Forces ,Determination of Resultant of two or more concurrent forces ( analytically and graphically)

**PARALLEL FORCES AND COUPLES:**

Classification of Parallel Forces, Methods of finding resultant Force of parallel forces, analytically & graphically  
Position of resultant force of parallel forces, Definition, Classification and characteristics of a force Couple, moment of couple

**UNIT- II**

**Marks : 16**

**MOMENTS AND THEIR APPLICATIONS**

- Definition, Types and law of moment  
- Varignon's Principle of moment and its applications  
- Lever and its Applications  
- Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL).

**EQUILIBRIUM OF FORCES**

- Equilibrium of a system of concurrent forces  
- Conditions and types of Equilibrium  
- Lami's Theorem and its applications

**UNIT- III**

**Marks : 16**

**CENTRE OF GRAVITY**

- Difference between Centroid and Center of Gravity (CG)  
- Centroid of standard plane figures and CG of simple solid bodies  
- Method of finding out Centroid of composite plane laminas and cut sections  
- Method of finding out CG of Composite solid bodies

**FRICTION**

- Concept and types of friction  
- Limiting Friction, coefficient of friction, angle of friction, angle of repose  
- Laws of friction ( Static and Kinetic)  
- Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane  
- Utility / Nuisance value of friction



**UNIT- IV**

**Marks : 16**

**SIMPLE LIFTING MECHINES**

- Concept of lifting Machines
- Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation
- Reversibility of Machines and condition for self locking machine
- Law of Machines, Maximum mechanical advantage and maximum efficiency of machine
- Friction in machine ( In terms of Load and effort)
- Calculation of M.A., V.R. and efficiency of following machines
- Simple wheel and axle
- Differential wheel and axle
- Single purchase crab
- Double purchase crab
- Simple screw jack
- Different System of simple pulley blocks

**MOTION OF A PARTICLE**

- Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration
- Motion under constant acceleration/retardation ( equations of motion)
- Motion under force of gravity
- Concept of relative velocity
- Definition of projectile, velocity of projection, angle of projection, time of flight, maximum height, horizontal range and their determination
- Definition of angular velocity, angular acceleration and angular displacement
- Relation between linear and angular velocity of a particle moving in a circular path
- Motion of rotation under constant angular acceleration

**UNIT- V**

**Marks : 16**

**LAWS OF MOTION**

- Newton's Laws of motion and their applications

**WORK, POWER AND ENERGY**

- Definition unit and graphical representation of work
- Definition and unit of power and types of engine power and efficiency of an engine.
- Definition and concept of Impulse
- Definition, unit and types of energies
- Total energy of a body falling under gravity



**Text Books**

1. A text book of Applied Mechanics – R.S. Khurmi , S.C. Chand & Co. , New Delhi

**Reference Books**

1. Applied Mechanics – I.B. Prasad, Khanna Publishers, New Delhi
2. Applied Mechanics ( Hindi) – R.S. Jog, Anand Publishers, Gwalior
3. Applied Mechanics ( Hindi) – A.R. Page, Deepak Prakashan, Gwalior

**List of Experiments**

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanical advantage, velocity ratio and efficiency of the following lifting machines:
  - a. Simple wheel and axle
  - b. Differential wheel axle
  - c. Single purchase crab
  - d. Double purchase crab
  - e. Simple pulley block
  - f. Simple screw jack
9. Measurement of B.H.P. of an engine using roap break dynamometer



**BTCE-0304 Engineering Geology**

Course code	Title of the Paper	Periods week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0304	Engineering Geology	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Introduction and Physical Geology: Objects and scope of geology. The crust and the interior of the earth, origin and age of the earth, Sub-aerial and sub-terrain weathering, denudation and deposition, wind, river, glacial and marine erosion, volcanoes , soil formation, soil profile, geological classification of soil and concept of earthquake Plate-tectonics.

**UNIT- II**

**Marks : 16**

Mineralogy and Crystallography: Fundamentals of mineralogy, study of common rock forming minerals, ores and minerals of economic importance to civil engineering., elements of crystallography and introduction to crystal systems.

**UNIT- III**

**Marks : 16**

Petrology: Composition of earth's crust, study of igneous, sedimentary and metamorphic rocks and their formation, characteristics classification, Rocks of civil engineering importance, Geology of India: Physical features of India, Brief geological history of India, occurrence of important ores and minerals in India.

**UNIT- IV**

**Marks : 16**

Structural Geology: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. folds, Faults, Joints, Unconformity and their importance in Civil Engineering.

**UNIT- V**

**Marks : 16**

Applied Geology: Introduction to applied geology and its use in civil engg., properties of rocks, selection of sites for roads, bridges, dams, reservoirs and tunnels. Prevention of engineering structures from seismic shocks, stability of hill sides, water bearing strata, artesian wells, Use of remote-sensing techniques in selection of above sites.



**Text Books**

1. Prabin Singh – “Engineering and General Geology”
2. S.K. Garg – “ A text Book of Physical and Engineering Geology”

**Reference Books**

1. Prabin Singh – “Engineering and General Geology”
2. Gulati ; Geotechnical Engineering; TMH
3. P.K. Mukerjee – “ A text Book of Geology”
4. S.K. Garg – “ A text Book of Physical and Engineering Geology”

**List of Experiment (Expandable)**

1. Identification of simple rock forming minerals and important ores.
2. Identification of rock
3. Simple map Exercises.
4. Field Visit / Geological Excursion





**BTCE-0305 Building Design & Drawing**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Ma x (e)	Min (f)				
BTCE-0305	Bldg. Design & Drawing	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

**UNIT- II**

**Marks : 16**

Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

**UNIT- III**

**Marks : 16**

Building Services – Introduction of Building Services like water supply and drainage electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

**UNIT- IV**

**Marks : 16**

Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

**UNIT- V**

**Marks : 16**

Perspective Drawing – Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.



**Text Books**

1. Shah, Kale & Patki; Building Design and Drawing; TMH
2. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

**Reference Books**

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

**List of Experiment (Expandable)**

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings.



**BTCE-0306 Computer Programming**

Course code	Title of the Paper	Periods week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Ma x (e)	Min (f)				
BTCE-0306	Computer Programming	-	-	2	2	-	-	-	-	50	15	50	100	100	3 Hour's

**UNIT- I**

**Marks : 16**

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data, Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes.

**UNIT- II**

**Marks : 16**

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector, Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

**UNIT- III**

**Marks : 16**

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

**UNIT- IV**

**Marks : 16**

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

**UNIT- V**

**Marks : 16**

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.



### **Text Books**

1. The Complete Reference: Herbert Schildt, TMH
2. E. Balaguruswamy, "Programming In Java"; TMH Publications

### **Reference Books**

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming, Manning Publications/Prentice Hall

### **List of Program to be perform (Expandable)**

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show "HELLO JAVA" in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.



Semester-IV

**BTCE-0401 STRENGTH OF MATERIALS**

Course code	Title of the Paper	Periods week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Ma x (e)	Min (f)				
BTCE-0401	STRENGTH OF MATERIALS	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks: 16**

Simple Stress and Strains: Concept of Elastic body, stress and Strain, Hooke’s law, various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr’s circle of stresses, Combined Bending and Torsion, Theories of failure.

**UNIT- II**

**Marks : 16**

Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay’s Method Area Moment Method.

**UNIT- III**

**Marks : 16**

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

**UNIT- IV**

**Marks : 16**

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

**UNIT- V**

**Marks : 16**

Columns and Struts: Euler’s buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.



**Text Books**

1. Sadhu Singh; Strength of Materials, ,
2. Ramamrutham; Strength of Materials,

**Reference Books**

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

**List of Experiments**

The experimental work to cover tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.



**BTCE-0402 Concrete Technology**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0402	Concrete Technology	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Introduction Classification, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications.

**UNIT- II**

**Marks : 16**

Properties of Fresh and Hardened Concrete : Introduction, Workability, Testing of concrete, Factors affecting, Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, thermal properties & micro-cracking of concrete.

**UNIT- III**

**Marks : 16**

Design of Concrete Mix : Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials, design of plastic concrete mix, computer aided design of concrete mix.

**UNIT- IV**

**Marks : 16**

Production and Quality Control of Concrete : Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater, hot & cold weather condition, statistical quality control, field control, non-destructive testing, repair technology for concrete structures, Inspection & Testing of Concrete.

**UNIT- V**

**Marks : 16**

Special Concretes : Light weight concrete, Ready mix concrete, Vacuum concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Rubble concrete, Resin concrete, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.



**Text Books**

1. Gambhir ML; Concrete Technology – TMH
2. New Building Materials Published by B.M.T.P.C., New Delhi

**Reference Books**

1. Varshney RS; Concrete Technology; Oxford & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH
3. Sinha SN; Reinforced Concrete Technology; TMH
4. New Building Materials Published by B.M.T.P.C., New Delhi
5. Hand books on Materials & Technology - Published by BMTPC & HUDCO
6. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction
7. Jackson N; Civil Engineering materials.
8. Properties of Concrete - A.M. Neville - Pearson Education





**BTCE-0403 Surveying**

Course code	Title of the Paper	Periods week				Per								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Ma x (e)	Min (f)				
BTCE-0403	Surveying	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Traversing by theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling.

**UNIT- II**

**Marks : 16**

Tachometry: Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

**UNIT- III**

**Marks : 16**

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscate, vertical curves, setting out.

**UNIT- IV**

**Marks : 16**

Control Surveys: Providing frame work of control points, triangulation principle, conaissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

**UNIT- V**

**Marks : 16**

Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Remote sensing, simple equipments, elements of image interpretation, image-processing systems.



**Text Books**

1. T.P. Kanetkar, Surveying & Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH

**Reference Books**

1. T.P. Kanetkar, Surveying & Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
5. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London.
6. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
7. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
8. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi

**List of Experiments/ Field work (Expandable):**

1. Theodolite traversing
2. Profile leveling, contouring & cross sectioning
3. Determination of tachometric constants & uses of tachometer in various field works
4. Curve setting by different methods.



**BTCE-0404 Construction Materials & Techniques**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0404	Construction Materials & Techniques	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**A) Construction Materials:**

**UNIT- I**

**Marks : 16**

**Stones**

Occurrence, varieties, Characteristics and their testing, uses, quarrying and dressing of stones. Timber : Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, Alternate materials for shuttering doors/windows, Partitions and structural members etc. Brick and Tiles: Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table, Flooring tiles and other tiles and their characteristics.

**UNIT- II**

**Marks : 16**

**Advance Construction Materials**

Use of fly ash in mortars, concrete, Fly ash bricks, stabilized mud blocks, non-erodible mud plinth, D.P.C. materials, Building materials made by Industrial & agricultural waste, clay products P.V.C. materials, advance materials for flooring, doors & windows, facia material, interiors materials for plumbing, sanitation & electrification.

**(B) Construction Techniques:**

**UNIT- III**

**Marks : 16**

**Foundation**

Type of soils, bearing capacity, soil slablisation and improvement of bearing capacity, settlement and safe limits. Spread foundations, wall footings, grillage, foundations well foundation, causes of failure and remedial measures; under reamed piles, foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of foundations. Hyperbolic parabolied footing, Brick arch foundation. Simple methods of foundation design, Damp proof courses, Repairs Techniques for foundations.

**UNIT- IV**

**Marks : 16**

**Masonry and Walls**

Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection, Design of hollow block masonry walls. Doors, Windows and Ventilators: Types based on material etc., size



location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames. Stairs types, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.

**UNIT- V**

**Marks : 16**

**Floors and Roofs**

Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

**Text Books**

1. S.C. Rangwala; Engineering Materials
2. B.C. Punmia; Building Construction ,.

**Reference Books**

1. Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction,.
2. S.C. Rangwala; Engineering Materials
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction ,.
5. Building Construction, Metchell
6. Construction Technology, Chudley R.
7. Civil Engineering Materials, N. Jackson.
8. Engineering Materials, Surendra Singh.

**List of Experiments/ Field work (Expandable):**

1. Tests on Bricks
2. Tests on Aggregates
3. Tests on Cement
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test
6. Determination of workability by compacting factor apparatus.
7. Determination of workability by Vee Bee consistometer.
8. Nondestructive testing of concrete by Rebound hammer test
9. Nondestructive testing of concrete by ultrasonic Method.
10. Test for the effect of admixtures on the concrete compressive strength
11. Testing of microconcrete Design of concrete mix.



**BTCE-0405 Fluid Mechanics**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0405	Fluid Mechanics-I	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, specific volume, specific gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

**UNIT- II**

**Marks : 16**

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & nonuniform, one, two and three dimensional flow, path lines, streaklines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets- their utility & method of drawing flow nets.

**UNIT- III**

**Marks : 16**

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturimeter, weirs and notches).

**UNIT- IV**

**Marks : 16**

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

**UNIT- V**

**Marks : 16**

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.



**Text Books**

1. White ; Fluid Mechanics ; TMH
2. R Mohanty; Fluid Mechanics By; PHI

**Reference Books**

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechanics and machinery; TMH
3. Cengel; Fluid Mechanics; TMH
4. White ; Fluid Mechanics ; TMH
5. Essential of Engg Hyd. By JNIK DAKE; Afrikan Network & Sc Instt. (ANSTI)
6. A Text Book of fluid Mech. for Engg. Student by Franiss JRD
7. R Mohanty; Fluid Mechanics By; PHI
8. Fluid Mechanics; Gupta Pearson.

**List of Experiments/ Field work (Expandable):**

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Venturimeter
4. Determination of  $C_c$ ,  $C_v$ ,  $C_d$  of Orifices
5. Calibration of Orifice Meter
6. Calibration of Nozzle meter and Mouth Piece
7. Reynolds experiment for demonstration of stream lines & turbulent flow
8. Determination of metacentric height
9. Determination of Friction Factor of a pipe
10. To study the characteristics of a centrifugal pump.
11. Verification of Impulse momentum principle.



**BTCE-0406 Computer Programming -II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0406	Computer Programming -II	-	-	2	2	0	-	0	-	50	15	50	100	100	3 Hour's

**UNIT- I**

**Marks : 16**

Introduction .NET framework, features of .Net framework, architecture and component of .Net, elements of .Net.

**UNIT- II**

**Marks : 16**

Basic Features Of C# Fundamentals, Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures. Advanced Features Of C# Interfaces, Arrays, Indexers and Collections; Strings and Regular Expressions, Handling Exceptions, Delegates and Events.

**UNIT- III**

**Marks : 16**

Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. Windows Forms: All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls

**UNIT- IV**

**Marks : 16**

Understanding and handling controls events, ADO.NET- Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader Data base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

**UNIT- V**

**Marks : 16**

XML: Introducing XML, Structure, and syntax of XML, document type definition (DTD), XML, Schema, Document object model, Presenting and Handling XML. xml data source, using navigation controls, introduction of web parts, using java script, Web Services



**Text Books**

1. Web Programming by Chris Bates, Wiley
2. ADO .Net Complete Reference by Odey, TMH

**Reference Books**

1. C# for Programmers by Harvey Deitel, Paul Deitel, Pearson Education
2. Balagurusamy; Programming in C#; TMH
3. Web Commerce Technology Handbook by Daniel Minoli, Emma Minoli , TMH
4. Web Programming by Chris Bates, Wiley
5. XML Bible by Elliotte Rusty Harold,
6. ASP .Net Complete Reference by McDonald, TMH.
7. ADO .Net Complete Reference by Odey, TMH

List of Experiments/ program (Expandable):

1. Working with call backs and delegates in C#
2. Code access security with C#.
3. Creating a COM+ component with C#.
4. Creating a Windows Service with C#
5. Interacting with a Windows Service with C#
6. Using Reflection in C#
7. Sending Mail and SMTP Mail and C#
8. Perform String Manipulation with the String Builder and String Classes and C#:
9. Using the System .Net Web Client to Retrieve or Upload Data with C#
10. Reading and Writing XML Documents with the XML Text-Reader/-Writer Class and C#
11. Working with Page using ASP .Net.
12. Working with Forms using ASP .Net
13. Data Sources access through ADO.Net,
14. Working with Data readers, Transactions
15. Creating Web Application.





**BTCE-0501 – Transportation Engineering - II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0501	Transportation Engineering	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location. Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

**UNIT- II**

**Marks : 16**

Bituminous & Cement Concrete Pavements: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

**UNIT- III**

**Marks : 16**

Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam road-types, specifications, construction, maintenance and causes of failures. Surface and sub-surface drainage, highway materials: properties and testing etc. Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

**UNIT- IV**

**Marks : 16**

Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports. Geometrical elements: taxi ways and runways, pattern of runway capacity.

**UNIT- V**

**Marks : 16**

Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.



**Text Books**

1. Aggregate Crushing Value Test
2. Determination of Los Angeles Abrasion value

**Reference Books**

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

**Reference Books & Study Materials:**

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherly
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker



**BTCE-0502 Advanced Surveying**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0502	Advanced Surveying	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Modern equipments for surveying : Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter .

**UNIT- II**

**Marks : 16**

Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and longitude.

**UNIT- III**

**Marks : 16**

GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datums, GPS receivers, GPS observation methods and their advantages over conventional methods. Digital Terrain Model (DTM) : Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.

**UNIT- IV**

**Marks : 16**

Photogrammetry : Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.

**UNIT- V**

**Marks : 16**

Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS) : Definition, components and advantages. Surveying Project - Student will go for one week Surveying Camp to carry out Project Work.



**Text Books**

1. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
2. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.

**Reference Books**

1. Surveying and Leveling-Part-I & II by T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune
2. Engineering Surveying : Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann, Oxford.
3. Surveying: Problems Solving with theory and objective type questions by A.M. Chandra, New Age International Publishers N. Delhi.
4. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
5. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.



**BTCE-0503 Fluid Mech. - II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0503	Fluid Mech. II	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Turbulent flow : Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes Pipe Network : \*Water Hammer (only quick closure case). transmission of power. \*Hardy Cross Method

**UNIT- II**

**Marks : 16**

Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Venet equation.

**UNIT- III**

**Marks : 16**

Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.

**UNIT- IV**

**Marks : 16**

Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

**UNIT- V**

**Marks : 16**

Fluid Machines: Turbines : Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation. Pumps: Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.



**List of Experiment**

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump Suggested Books & Study Material:
  1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
  2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
  3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
  4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705-B, Nai Sarak, Delhi-6
  5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
  6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
  7. Engineering Hydraulics By H. Rouse
  8. Centrifugal & Axial Flow Pump By Stemanoff A.J. New York Relevant IS codes.



**BTCE-0504 Structural Design & Drawing – I (RCC)**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration Of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0504	Structural Design & Drawing – I (RCC)	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

**UNIT- II**

**Marks : 16**

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

**UNIT- III**

**Marks : 16**

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs, Waffle slabs, Flat slabs, Yield line theory.

**UNIT- IV**

**Marks : 16**

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

**UNIT- V**

**Marks : 16**

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase.

**NOTE :-** All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)



**Text Books**

1. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
2. Plain & reinforced concrete - Rammutham

**Reference Books**

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammutham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.





**BTCE-0505 Theory of Structures -I**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0505	Theory of Structures -I	3	1	0	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

**UNIT- II**

**Marks : 16**

Indeterminate Structures-I : Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)

**UNIT- III**

**Marks : 16**

Indeterminate Structures - II : Analysis of beams and frames by slope Deflection method, Column Analogy method.

**UNIT- IV**

**Marks : 16**

Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.

**UNIT- V**

**Marks : 16**

Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling loads, focallength, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.



**Text Books**

1. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.

**Reference Books**

1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo



**BTCE-0601 Theory of Structures –II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0601	Theory of Structures-II	3	1	2	6	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

**UNIT- II**

**Marks : 16**

Plastic analysis of beams and frames.

**UNIT- III**

**Marks : 16**

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

**UNIT- IV**

**Marks : 16**

Matrix method of structural analysis: force method and displacement method..

**UNIT- V**

**Marks : 16**

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.



**Text Books**

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. . Reddy C.S., Basic Ststructural Analysis, Tata McGraw Hill Publishing Company, New Delhi.

**Reference Books**

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
3. Reddy C.S., Basic Ststructural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi



**BTCE-0602 Water Resources and Irrigation Engineering**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0602	Water Resource & Irrigation Engineering	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, raingauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, Scurve hydrograph, synthetic unit hydrograph.

**UNIT- II**

**Marks : 16**

Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. reclamation of water logged and salt affected lands.

**UNIT- III**

**Marks : 16**

Water resources planning and management : Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

**UNIT- IV**

**Marks : 16**

Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.



**UNIT- V**

**Marks : 16**

Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics. Canal falls & cross drainage works, - description and design, head and cross regulators. Escapes and outlets, canal transitions.

Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.

**Text Books**

1. Engg. Hydrology - J.NEMEC - Prentice Hall
2. . Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.

**Reference Books**

1. Engg. Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engg. Hydrology by H.M. Raghunath



**BTCE-0603 Environmental Engg. - I**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0603	Environmental Engg. - I	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Estimation of ground and surface water resources. quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

**UNIT- II**

**Marks : 16**

Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water, water standards for different uses. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations.

**UNIT- III**

**Marks : 16**

Water Treatment methods-theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

**UNIT- IV**

**Marks : 16**

Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

**UNIT- V**

**Marks : 16**

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.



**Text Books**

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi

**Reference Books**

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
4. Environmental Engineering - H.S. Peavy & D.R.Rowe-Mc Graw Hill Book Company,New Delhi
5. Water Supply & Sanitary Engg. by S.K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Relevant IS Codes

**List of Experiments:**

1. To study the various standards for water
2. To study of sampling techniques for water
3. Measurement of turbidity
4. To determine the coagulant dose required to treat the given turbid water sample
5. To determine the conc. of chlorides in a given water samples
6. Determination of hardness of the given sample
7. Determination of residual chlorine by “Chloroscope”
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved Oxygen (DO) in the water sample





**BTCE-0604– Geo Tech Engg. I**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration Of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0604	Geo Tech Engg-I	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behaviour. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

**UNIT- II**

**Marks : 16**

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flownets, uses of a flownet, Effective, neutral and total stresses. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement.

**UNIT- III**

**Marks : 16**

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution. Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

**UNIT- IV**

**Marks : 16**

Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

**UNIT- V**

**Marks : 16**

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohesion-less and cohesive soils. Effect of surcharge, water table and wallfriction. Arching in soils. Reinforced earth retaining walls.



**Text Books**

1. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
2. Soil Testing for Engg. by T.W. Lambe - John Wiley & Soms. Inc.

**Reference Books**

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Modern Geotech Engg. by Dr. I Aram Singh - IBT Publishers, Delhi.
4. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
5. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
6. Soil Testing for Engg. by T.W. Lambe - John Wiley & Soms. Inc.
7. Relevant I.S. Codes

**List of Experiments:**

1. Determination of Hygroscopic water content
2. Particle - size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit
5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test
9. Consolidation test

**LABORATORY WORK :**

Laboratory work will be based on the above course as required for soil investigators of engineering projects.



**BTCE-0605 Structural Design & Drawing – II (Steel)**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0605	Structural Design & Drawing – II	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, Design of structural connections - Bolted, Rivetted and Welded connections.

**UNIT- II**

**Marks : 16**

Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

**UNIT- III**

**Marks : 16**

Design of simple beams, Built-up beams, Plate girders and gantry girders.

**UNIT- IV**

**Marks : 16**

Effective length of columns, Design of columns-simple and compound, Lacing & battens. Design of footings for steel structures, Grillage foundation.

**UNIT- V**

**Marks : 16**

Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers.

**NOTE:** - All the designs for strength and serviceability should strictly be as per the latest version of IS:600.



**Text Books**

1. Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
2. Design of steel structures by P.Dayaratnam

**Reference Books**

1. Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
2. Design of steel structures by P.Dayaratnam
3. Design of steel structures Vol. I & II by Ramchandra
4. Design of steel structures by L.S. Negi
5. Design of steel structures by Ramammutham
6. Design of steel structures by Punmia



**BTCE-0701 – Design of Hydraulic Structure**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration Of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0701	Design Hydraulic Structure	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

**UNIT- II**

**Marks : 16**

**Earth and Rock fill dams**

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition. Rock fill dams: Types, merits and demerits, conditions favourable for their adoption.

**UNIT- III**

**Marks : 16**

Spillways : Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

**UNIT- IV**

**Marks : 16**

Energy dissipators and gates : Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, Detailed design of Sarda Falls, design of cross drainage works, sphyon aquaduct.

**UNIT- V**

**Marks : 16**

Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.



**Text Books**

1. Hydroelectric Hand Book by Creager
2. . Irrigation & Water Power Engg. by Punmia & Pandey.

**Reference Books**

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey
5. Water Power Engineering by Dandekar



**BTCE-0702 – Advanced Structural Design – II (RCC)**

Course code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0702	Advanced Structural Design –II (R.C.C.)	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Design of Multistory Buildings - Sway and nonsway buildings, Shear walls and other bracing elements.

**UNIT- II**

**Marks : 16**

Earth Retaining Structures: Cantilever and counter fort types retaining walls.

**UNIT- III**

**Marks : 16**

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

**UNIT- IV**

**Marks : 16**

Silos and Bunkers

**UNIT- V**

**Marks : 16**

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.



**Text Books**

1. Essentials of Bridge engineering – D.J. Victor
2. . Bridge Engineering - Ponnuswamy.

**Reference Books**

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin





**BTCE-0703 – Environmental Engg. - II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0703	Environmental Engg. - II	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

**UNIT- II**

**Marks : 16**

Characteristics and analysis of waste water, rcycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Th OD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

**UNIT- III**

**Marks : 16**

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration-theory & design.

**UNIT- IV**

**Marks : 16**

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

**UNIT- V**

**Marks : 16**

Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil Laboratory work shall be based on the topics of environmental engineering I & II and consist of experiments of water and waste water quality as per facility available in the institution.



**Text Books**

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi

**Reference Books**

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
4. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi

**List of Experiment**

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method



**BTCE-0704 – Quantity surveying & Costing**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0704	Quantity Surveying & Costing	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

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**

**Marks : 16**

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

**UNIT- III**

**Marks : 16**

Detailed 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- IV**

**Marks : 16**

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

**UNIT- V**

**Marks : 16**

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



**Text Books**

1. Quantity Surveying & Costing – B.N. Datta
2. . Estimating & Costing for Civil Engg. – G.S. Birdi

**Reference Books**

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

**Practical & Sessional Works:**

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.



**BTCE-0705 Elective- I**  
**(A) Computational Methods in Structural**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0705	Elective -I	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom. Axial, bending, shear and torsional deformations. Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beamcolumn, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. nonprismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

**UNIT- II**

**Marks : 16**

Basics of the Direct Stiffness method - Analysis of pinjointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Nonsway)

**UNIT- III**

**Marks : 16**

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.

**UNIT- IV**

**Marks : 16**

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalised element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)

**UNIT- V**

**Marks : 16**

Two Dimensional Iso parametric elements, shape functions for Simplex. Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.



**Text Books**

1. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
2. . Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

**Reference Books**

1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
3. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
4. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
5. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.
6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London



**BTCE-0705 Elective- I (B) Traffic Engineering**

**UNIT- I**

**Marks : 16**

Traffic Characteristics : (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

**UNIT- II**

**Marks : 16**

Traffic Studies : (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies ( O & D ) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

**UNIT- III**

**Marks : 16**

Traffic Operations and Control : (i) Traffic regulations and various means of control. (ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

**UNIT- IV**

**Marks : 16**

Street Lighting : (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

**UNIT- V**

**Marks : 16**

Accident Studies & Mass Transportation : (i) Accident Studies : Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.



**Text Books**

1. Traffic Engineering by Matson, W.S.Smith & F.W. Hurd
2. . D.R.Drew, Traffic Flaw Theory

**Reference Books**

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S.Smith & F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R.Drew, Traffic Flaw Theory
5. W.R. Mchsne and R.P. Roess "Traffic Engg"
6. Wohl & Martin, Traffic System Analysis for Engineering & Planners





**BTCE-0705 Elective- I (C) Industrial Waste Treatment**

**UNIT- I**

**Marks : 16**

Problem of Water Pollution: Effects of wastes on streams and sewage treatment plant. Natural purification of streams. oxygen sag curve. allowable organic load on streams classification of stream, stream standards and effluent standards. requirement of water for different purposes.

**UNIT- II**

**Marks : 16**

Measurement of Waste Water Volume: Sampling of waste waters, grab and composite samples. analysis of waste water. biochemical oxygen demand. chemical oxygen demand and pH value of waste, toxicity of waste by bioassay method. Pretreatment of Wastes: Volume and strength reduction, salvage of materials, recovery of by products, reuse of waste water.

**UNIT- III**

**Marks : 16**

Conventional Methods of Treatment of Waste Water: Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal, advance methods of treatment, such as reverse osmosis, ion exchange, electro dialysis, algal harvesting etc. low cost treatment plants. common effluent treatment plant, design and operation.

**UNIT- IV**

**Marks : 16**

Combined Treatment of Waste Water Sewage: Energy requirement optimization and budget, municipal regulation, sewer rental charge, instrumentation in waste water treatment plants, collection of data, operation and maintenance of plants, water pollution control board.

**UNIT- V**

**Marks : 16**

Brief study of industrial processes and treatment methods of waste water from common industries, such as textile, dairy, paper and pulp, tannery, distillery. Hazardous wastes- Impact handling and disposal.



**Text Books**

1. Waste Water Treatment - Arceivala - Tata Mc Graw Will, New Delhi
2. . Industrial Pollution Control, hand book - Lund H.F. Tata Mc Graw Will, New Delhi

**Reference Books**

1. "Liquid Waste of Industries - Theories, Practice and Treatment" - N.L. Nemerow, Wesley Publishing Co.
2. Treatment of Industrial Waste - E.B. Besselièvre & Max Schwartz - Mc Graw Hill Book Company
3. "Waste Water Engg. - Treatment Disposal & Reuse" - Metcalf & Eddy - Tata Mc Graw Will, New Delhi
4. Waste Water Treatment - Arceivala - Tata Mc Graw Will, New Delhi
5. Industrial Pollution Control, hand book - Lund H.F. Tata Mc Graw Will, New Delhi



**BTCE-0705 Elective- I (D)**  
**Cost Effective & ECO-Friendly Construction**

**UNIT- I**

**Marks : 16**

Concepts of energy efficient & environment friendly materials and techniques. Cost effective materials :- Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer. Energy Efficient & Environment friendly building material products :- Walls - Stabilised and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferrocement partitions. Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof, M.C.R. tile.

**UNIT- II**

**Marks : 16**

Cost effective construction techniques and equipments :- (a) Techniques :- Rat trap bond construction, Energy Efficient roofings, Ferrocement technique, Mud Technology. (b) Equipments :- Brick moulding machine, Stabilised soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferrocement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.

**UNIT- III**

**Marks : 16**

Cost effective sanitation :- (a) Waste water disposal system (b) Cost effective sanitation for rural and urban areas (c) Ferrocement Drain

**UNIT- IV**

**Marks : 16**

Low Cost Road Construction :- Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.

**UNIT- V**

**Marks : 16**

Cost analysis and comparison :- (a) All experimental materials (b) All experimental techniques



**BTCE-0705 Elective-I (E) Environmental Impact Assessment**

**UNIT- I**

**Marks : 16**

Concept of EIA : Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

**UNIT- II**

**Marks : 16**

Methods of Impact Identification : Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

**UNIT- III**

**Marks : 16**

Impact analysis : Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

**UNIT- IV**

**Marks : 16**

Preparation of written documentation : Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

**UNIT- V**

**Marks : 16**

Public Participation in Environmental Decision making: Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.



**BTCE-0706 – Minor Project**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0706	Minor Project	-	-	2	2	-	-	-	-	50	15	50	100	100	3 Hour's

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR Shall submit a detailed report of experimental work/ software package on any specific problem of importance



**BTCE-0801 Geo. Technical Engg. II**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g)		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0801	Geo. Technical Engg. II	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

**Marks : 16**

Shallow Foundations : Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C.Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

**UNIT- II**

**Marks : 16**

Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

**UNIT- III**

**Marks : 16**

Soil Improvement Techniques : Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilization : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilization and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

**UNIT- IV**

**Marks : 16**

Soil Exploration and Foundations on Expansive and Collapsible soils : Methods of soil exploration. Planning of exploration programmed for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

**UNIT- V**

**Marks : 16**

Sheet piles/Bulkheads and Machine foundation : Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.



**Text Books**

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Relevant IS Code

**Reference Books**

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publications Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah-New AGE International Publishers, Delhi
5. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
6. Relevant IS Code

**LIST OF EXPERIMENTS**

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration ofPlate Load TestSPT & DCPT

**LABORATORY WORK:**

Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I.



**BTCE-0802 Construction Planning & Management**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0802	Construction Planning & Management	3	1	-	4	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

**UNIT- II**

**Marks : 16**

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

**UNIT- III**

**Marks : 16**

Tenders & Contracts: Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

**UNIT- IV**

**Marks : 16**

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

**UNIT- V**

**Marks : 16**

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.





**Text Books**

1. CPM by L.S. Srinath
2. Tendering & Contracts by T.A. Talpasai

**Reference Books**

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

**LIST OF EXPERIMENTS**

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT



**BTCE-0803 Advanced Structural Design II (Steel)**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0803	Advanced Structural Design -II (Steel)	3	1	2	6	80	25	20	100	50	15	50	100	200	3 Hour's

**UNIT- I**

Plate girder bridges (Riveted and welded)

**Marks : 16**

**UNIT- II**

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

**Marks : 16**

**UNIT- III**

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

**Marks : 16**

**UNIT- IV**

Chimneys: Guyed and self supporting steel stacks.

**Marks : 16**

**UNIT- V**

Bunkers, Silos & Towers

**Marks : 16**



**Text Books**

1. Design of Steel Structures – Punia
2. Steel Str. by Ramchandra Vol II

**Reference Books**

1. Design of Steel Structures – Ramammutham
2. Design of Steel Structures – Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya & Ajmani
5. Design of steel structures – L.S. Negi



**BTCE-0804 Elective -II**  
**(A) Structural Dynamics & Earthquake Engineering**

Course code	Title of Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0804	Elective -II	3	1	2	6	80	25	20	100	-	-	-	-	100	3 Hour's

**UNIT- I**

**Marks : 16**

Single DOF systems - Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations.

**UNIT- II**

**Marks : 16**

Numerical Evaluation of Dynamic Response - Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson - q method, Analysis of Nonlinear Response, Introduction to frequency domain analysis.

**UNIT- III**

**Marks : 16**

Elements of seismology - Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs Earthquake Response of structures - Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.

**UNIT- IV**

**Marks : 16**

Multiple DOF systems : Stiffness and Flexibility matrices for shear buildings, free and forced vibrations- undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity.

**UNIT- V**

**Marks : 16**

Earthquake Resistant Design of Structures, Design of structures for strength & servicability, Ductility and energy absorption, Provisions of IS : 1893 and IS : 4326 for aseismic design of structures, Code for ductile detailing IS : 13920.



**Text Books**

1. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
2. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.

**Reference Books**

1. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Engineering, Prentice Hall of India, New Delhi.
2. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
4. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.



**BTCE-0804 Elective -II (B) Pavement Design**

**UNIT- I**

**Marks : 16**

Equivalent Single Wheels Load concepts and applications, Relationship between wheel arrangements and loading effects, tyre contact area, Effect of load repetition, Effect of transient loads, Impact of moving loading, Factors to be considered in Design of pavements, Design wheel load, soil, climatic factors, pavement component materials, Environmental factors, Special factors such as frost, Freezing and thawing.

**UNIT- II**

**Marks : 16**

Flexible Pavements : Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory , Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

**UNIT- III**

**Marks : 16**

Rigid Pavements : Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

**UNIT- IV**

**Marks : 16**

Rigid pavement design : IRC method, Fatigue analysis, PCA chart method. AASHTO Method, Reliability analysis. PAVEMENT JOINTS : Types of joints, contraction and warping joints, dowel bars and tie bars, Temperature reinforcements, filling and sealing of joints.

**UNIT- V**

**Marks : 16**

Evaluation and Strengthening of Existing Pavements : Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures.



**Swami Vivekanand University, Sagar(M.P.)**



**Text Books**

1. Principles of pavement design by E.J.Yoder & M.W. Witzak
2. Srinivasan M. "Modern Permanent Way"

**Reference Books**

1. Principles of pavement design by E.J.Yoder & M.W. Witzak
2. AASHO, "AASHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"



**Swami Vivekanand University, Sagar(M.P.)**



**BTCE-0804 Elective -II (C)**  
**Air Quality Monitoring & Control**

**UNIT- I**

**Marks : 16**

Air pollution problem: Economics and social aspects, historical episodes of air pollution. Sources of Air pollution, effects of air pollution on health, animal, plants and materials

**UNIT- II**

**Marks : 16**

Role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants. general diseases caused by air pollutants. toxicity of various pollutants. Plums patterns and height of chimneys.

**UNIT- III**

**Marks : 16**

Atmospheric chemistry, formation of secondary pollutants – PNN, PBN, Photolytic cycles, general diseases and toxicity of pollutants

**UNIT- IV**

**Marks : 16**

Sampling and Analyzing of Air Pollutants: Instruments pollution survey, standards of air pollution. Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

**UNIT- V**

**Marks : 16**

Air pollution control legislation, public education pollution standards, status of air pollution control in various countries. Industrial Hygiene: Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, control methods.





**Swami Vivekanand University, Sagar(M.P.)**



**Text Books**

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. Air Pollution – Wark and Warner

**Reference Books**

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. "Air Pollution" - Mc Cabe L.C., Mc. Graw Hill, International
3. Air Pollution - Stern A.C., Academic Press N. York
4. Fundamentals of Air Pollutions - Raju BSN Oxford & IBH Publishing Co. Pvt. Ltd.
5. "Air Pollution" - Rao M.N. & Rao HVN - Tata Mc Graw Hill
6. Air Pollution – Wark and Warner



**BTCE-0804 Elective –II**  
**(D) Energy Efficient & Green Building**

**UNIT- I**

**Marks : 16**

Energy efficient Green Buildings - The green Building concept, rating systems in India and world, GRIHA, LEED, etc. , green building rating agencies and some top green buildings in the world, sustainable practices used in the design and construction phases of Energy Efficient Green Buildings. Green Rating for Integrated Habitat Assessment (GRIHA), Energy Efficient Solar Homes & Buildings, Energy Savings in Homes, IGBC certification.

**UNIT- II**

**Marks : 16**

Energy Conscious Buildings - CLIMATE AND BUILDINGS IN INDIA, Introduction ,Factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design ,Urban climate ,Microclimate, Tools for analyzing weather data, Illustrative example,

**UNIT- III**

**Marks : 16**

PRINCIPLES OF ENERGY CONSCIOUS DESIGN OF BUILDINGS IN INDIA – Introduction Building Envelope, Site, Orientation, Building Configuration, Building Components, Passive Heating, Direct Gain ,Indirect Gain, Thermal storage wall, Roof top collectors, Isolated Gain, Solarium (Attached greenhouse / sunspace), Passive Cooling, Ventilation Cooling, Cross ventilation, Wind tower, Induced ventilation, Nocturnal cooling ,Evaporative Cooling ,Passive downdraft evaporative cooling (PDEC) ,Roof surface evaporative cooling (RSEC) ,Direct evaporative cooling using drip-type (desert) coolers 3.4.3 Nocturnal ,Radiation Cooling, Desiccant Cooling, Earth Coupling, Earth-air pipe system ,Daylighting ,Basic Principles of Daylighting ,Daylighting Systems, Building Materials ,Embodied Energy of Building Materials ,Alternative Building Materials

**UNIT- IV**

**Marks : 16**

THERMAL PERFORMANCE OF BUILDINGS - Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation ;Example Computer-based Tools DESIGN GUIDELINES: Description of Buildings, Methodology, General Recommendations, Specific Guidelines.

**UNIT- V**

**Marks : 16**

Zero Energy Buildings - Opportunities and challenges in designing a Net zero building ,Energy efficient solar homes/buildings, Design aspects ,Climatic zones ,Passive design features and ,. their advantages, Orientation of building, Sunshades, Window design, Double glazed windows Building insulation, Roof treatment ,Evaporative cooling ,Landscaping ,Surface to volume ratio Passive heating ,Earth air tunnel ,Solar chimney, Wind tower, Applicable passive features for various climatic zones, Energy-efficient lighting, Indoor lighting ,Outdoor lighting ,Energyefficient air conditioners, Selecting the right size, Selecting an efficient AC ,Installing an AC, Renewable energy devices/systems, Solar water heating system Building integrated PV system, Other renewable energy devices/systems.



**Swami Vivekanand University, Sagar(M.P.)**



**Text Books**

Codes: National Building Code, Energy Conservation Building Codes, Key barriers to 'building green in India, Overcoming the barriers, implementation approach, etc.

**Reference Books**

Codes: National Building Code, Energy Conservation Building Codes, Key barriers to 'building green in India, Overcoming the barriers, implementation approach, etc.



**BTCE-0804 Elective -II**  
**(E) DESIGN OF PRESTRESSED CONCRETE STRUCTURES**

**UNIT- I**

**Marks : 16**

Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning. Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel. Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel.

**UNIT- II**

**Marks : 16**

Flexural strength of prestressed concrete section. Analysis of prestress, Resultant stress at a section, Line of Thrust, Load Balancing. Cracking moments. Shear strength and torsional strength of prestressed concrete section. Principle stresses and principal shear stresses, Ultimate shear resistance.

**UNIT- III**

**Marks : 16**

Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block.

**UNIT- IV**

**Marks : 16**

Design of members for flexure. Code recommendations. Rectangular and I-section. Working out of section dimensions for concrete and prestressing forces for steel. Application to design of slabs and continuous beams and Bridge girders. Design for concordant table and tendon profiles

**UNIT- V**

**Marks : 16**

Design of tension and compression members, Design for combined bending and compressive, Different approaches for design, Introduction to design of transmission poles, roof truss members, purlin, railway sleepers.



**Swami Vivekanand University, Sagar(M.P.)**



**Text Books/ Reference Books**

1. Lin T.Y., *Design of Prestressed Concrete Structures.*
2. Varatnam P., *Prestressed Concrete Structures.*
3. Ramarathan S., *Prestressed Concrete.*
4. Graduate I.I., *Prestressed Concrete.*
5. Krishna Raju, *Prestressed Concrete.*
6. Evans R.H. and Bennett R.S., *Prestressed Concrete. IS-1343.*
7. Mullick S.K. and Rangaswamy R.S., *The Mechanics of Prestressed Concrete Design.*
8. Sinha and Raj, *Prestressed Concrete.*



**Swami Vivekanand University, Sagar(M.P.)**



**BTCE-0804 Elective -II**  
**(F) Advance Water Resources Engg**

**UNIT- I**

**Marks : 16**

Optimal Rain gauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,

**UNIT- II**

**Marks : 16**

Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

**UNIT- III**

**Marks : 16**

System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule

**UNIT- IV**

**Marks : 16**

Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating, Policies, Use of D. P. in Reservoir, Operation.

**UNIT- V**

**Marks : 16**

Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.



**Swami Vivekanand University, Sagar(M.P.)**



**Text Books**

1. Subramany K., Engg. Hydrology.
2. Philipps & Ravindran: Operations Research
3. Hire D.S. & Gupta: Operation Research

**Reference Books**

1. Loucks D.P., Stedinger I.R. & Haith D.A : Water Resources Systems Engg.
2. Kottegoda N. T., Stochastic Water Resources Technology.
3. Singh V.P. : Elementary Hydrology



**BTCE-0805 Major Project**

Course code	Title of the Paper	Periods Per week				Distribution of Marks								Grand Total (i= d+h)	Duration of Exam
		L	T	P	C	Theory		MST (c)	Total (d = a+c)	Practical		TW (g)	Total (h= e+g )		
						Max (a)	Min (b)			Max (e)	Min (f)				
BTCE-0805	Major Project	-	-		6	6	-	-	-	200	60	100	300	300	3 Hour's

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.