Faculty of Engineering & Technology

B.Tech(Civil Engineering)

Scheme of Examination & Detailed Syllabi

(w.e.f. 2017-2018)

University Campus

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

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

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

Phone : 0141-4071551/552, Fax : 0141-4071562

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

Semester - I

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 101	Engineering mathematics-I	3	1	-	30	70	100	4
BT 102	Communication Skills	3	1	-	30	70	100	4
BT 103	Engineering Physics	3	1	-	30	70	100	4
BT 104	Computer Programming-I	3	1	-	30	70	100	4
BT 105	Environmental Engineering and Disaster Management	3	1	-	30	70	100	4
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 107	Communication Skills Lab	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab	-	-	2	30	20	50	1
BT 109	Computer Programming Lab	-	-	2	30	20	50	1
BT 110	Computer Aided Engineering Graphics	-	-	2	30	20	50	1
BT 111	Mechanical Workshop Practice	-	-	2	30	20	50	1
	TOTAL	15	5	10	300	450	750	25

Semester – II

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 201	Engineering Mathematics-II	3	1	-	30	70	100	4
BT 202	Human Values	3	-	-	30	70	100	3
BT 203	Engineering Chemistry	3	1	-	30	70	100	4
BT 204	Computer Programming-II	3	-	-	30	70	100	3
	Elective (any two)*							
BT 205A	Basic Electrical and Electronic Engineering	3	-	-	30	70	100	3
BT 205B	Basic Civil Engineering	3	-	-	30	70	100	3
BT 205C	Basic Mechanical Engineering	3	-	-	30	70	100	3
BT 205D	Engineering Mechanics	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 206	Human Values: Activities	-	-	2	30	20	50	1
BT 207	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 208	Computer Programming-II Lab	-	-	2	30	20	50	1
BT 209	Computer Aided Machine Drawing	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**800**	**24**

THIRD SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	Subject/Paper	L	T	P	**IA**	**EA**	**Total**	**Credits**
BTCE 301	Advance Engineering Mathematics -I	3	-	-	30	70	100	3
BTCE 302	Technical Communication /Managerial Economics & Financial Accounting	3	-	-	30	70	100	3
BTCE 303	Engineering Mechanics	3	-	-	30	70	100	3
BTCE 304	Surveying	3	-	-	30	70	100	3
BTCE 305	Fluid Mechanics	3	-	-	30	70	100	3
BTCE 306	Building Materials and Construction	3	-	-	30	70	100	3
BTCE 307	Engineering Geology	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 308	Surveying Lab	-	-	2	30	20	50	1
BTCE 309	Fluid Mechanics Lab	-	-	2	30	20	50	1
BTCE 310	Computer Aided Civil Engineering Drawing	-	-	2	30	20	50	1
BTCE 311	Civil Engineering Materials Lab	-	-	2	30	20	50	1
BTCE 312	Geology Lab	-	-	2	30	20	50	1
BTCE 313	Industrial Training	-	-	1	30	20	50	0.5
BTCE 314	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	0.5
	TOTAL	21	0	11	390	610	1050	27

FOURTH SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 401	**Advance Engineering Mathematics -II**	3	-	-	30	70	100	3
BTCE 402	**Managerial Economics & Financial Accounting/ Technical Communication**	3	-	-	30	70	100	3
BTCE 403	**Basic Electronics For Civil Engineering Applications**	3	-	-	30	70	100	3
BTCE 404	**Strength Of Materials**	3	-	-	30	70	100	3
BTCE 405	**Hydraulics Engineering**	3	-	-	30	70	100	3
BTCE 406	**Building Planning**	3	-	-	30	70	100	3
BTCE 407	**Concrete Technology**	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		No. of Teaching Hours			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 408	**Material Testing Lab**	-	-	2	30	20	50	1
BTCE 409	**Hydraulics Engineering Lab**	-	-	2	30	20	50	1
BTCE 410	**Building Drawing**	-	-	2	30	20	50	1
BTCE 411	**Advanced Surveying Lab**	-	-	2	30	20	50	1
BTCE 412	**Concrete Lab**	-	-	2	30	20	50	1
BTCE 413	**Social Outreach, Discipline & Extra Curricular Activities**	-	-	-	-	-	50	0.5
TOTAL		21	**0**	**10**	**360**	**590**	**1000**	26.5

FIFTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 501	Construction Technology And Equipment	3	-	-	30	70	100	3
BTCE 502	Structure Analysis-I	3	-	-	30	70	100	3
BTCE 503	Design Of Concrete Structures	3	1	-	30	70	100	4
BTCE 504	Geotechnical Engineering	3	1	-	30	70	100	4
BTCE 505	Water Resource Engineering	3	-	-	30	70	100	3
ELECTIVE –I(Choose any one)								
BTCE 506A	Air & Noise Pollution And Control	3	-	-	30	70	100	3
BTCE 506B	Disaster Management	3	-	-	30	70	100	3
BTCE 506C	Town Planning	3	-	-	30	70	100	3
ELECTIVE –II(Choose any one)								
BTCE 507A	Repair And Rehabilitation Of Structures	3	-	-	30	70	100	3
BTCE 507B	Ground Improvement Techniques	3	-	-	30	70	100	3
BTCE 507C	Energy Science And Engineering	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 508	Concrete Structures Design Lab	-	-	2	30	20	50	1
BTCE509	Geotechnical Engineerding Lab	-	-	2	30	20	50	1
BTCE 510	Water Resources Engineering Design Lab	-	-	2	30	20	50	1
BTCE 511	Industrial Training	-	-	2	30	20	50	1

BTCE 512	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	21	2	8	330	570	950	28

SIXTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 601	Wind & Seismic Analysis	3	-	-	30	70	100	3
BTCE 602	Structural Analysis-Ii	3	1	-	30	70	100	4
BTCE 603	Environmental Engineering	3	-	-	30	70	100	3
BTCE 604	Design Of Steel Structures	3	-	-	30	70	100	3
BTCE 605	Estimating & Costing	3	1	-	30	70	100	4
ELECTIVE –I(Choose any one)								
BTCE 606A	Pre-Stressed Concrete	3	-	-	30	70	100	3
BTCE 606B	Solid And Hazardous Waste Management	3	-	-	30	70	100	3
BTCE 606C	Traffic Engineering And Management	3	-	-	30	70	100	3
ELECTIVE –II(Choose any one)								
BTCE 607A	Bridge Engineering	3	-	-	30	70	100	3
BTCE 607B	Rock Engineering	3	-	-	30	70	100	3
BTCE 607C	Geographic Information System & Remote Sensing	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 608	Environmental Engineering Design And Lab	-	-	2	30	20	50	1
BTCE 609	Steel Structure Design Lab	-	-	2	30	20	50	1
BTCE 610	Quantity Surveying And Valuation Lab	-	-	2	30	20	50	1

BTCE 611	Water And Earth Retaining Structures Design Lab	-	-	2	30	20	50	1
BTCE 612	Foundation Design Lab	-	-	2	30	20	50	1
BTCE 613	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	21	2	10	360	590	1000	29

SEVENTH SEMESTER (NEW JUNE2020)								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE701	Transportation Engineering	3	0	0	30	70	100	3
Open Elective (Choose any one)								
BTCE702A	Human Engineering and safety	3	0	0	30	70	100	3
BTCE702B	Environmental Engineering and Disaster management	3	0	0	30	70	100	3
BTCE702C	Non Destructive Testing	3	0	0	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE703	Road Material Testing Lab	0	0	2	30	20	50	1
BTCE704	Professional Practices & Field Engineering Lab	0	0	2	30	20	50	1
BTCE705	Soft Skill Lab	0	0	2	30	20	50	1
BTCE706	Environmental Monitoring And Design Lab	0	0	2	30	20	50	1
BTCE707	Seminar	2	0	0	60	40	100	2
BTCE708	SODECA	0	0	0	0	50	50	1
	total	**8**	**0**	**8**	**240**	**310**	**550**	**13**

EIGHT SEMESTER (NEW JUNE2020)								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE801	Project Planning and Construction Management	3	0	0	30	70	100	3
Open Elective								
BTCE802A	Energy Management	3	0	0	30	70	100	3
BTCE802B	Waste And By Product Utilization	3	0	0	30	70	100	3
BTCE802C	Disaster Management	3	0	0	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE803	Project Planning and Construction Management lab	0	0	2	30	20	50	1
BTCE804	Pavement design	0	0	2	30	20	50	1
BTCE805	Project	3	0	0	0	50	50	1
BTCE806	SODECA	0	0	0	0	50	50	1
	total	**9**	**0**	**4**	**120**	**280**	**400**	**10**

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

Note;--

1. The total number of the credits of (Civil Engineering)Programme are = 210.
2. Each student shall be required to appear for examinations in all courses. However, for the award of the degree a student shall be required to earn minimum of 200 credits .

For lateral entry students in Third Semester ::--

1.The total number of credits of the B. Tech (Civil Engineering)Programme = 160
2.Each student shall be required to appear for examination for all courses third semester onwards .However, for the award of the degree a student shall be required to earn the minimum of 150 credits .

JAGANNATH UNIVERSITY

FIRST SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 101	Engineering mathematics-I	3	1	-	30	70	100	4
BT 102	Communication Skills	3	1	-	30	70	100	4
BT 103	Engineering Physics	3	1	-	30	70	100	4
BT 104	Computer Programming-I	3	1	-	30	70	100	4
BT 105	Environmental Engineering and Disaster Management	3	1	-	30	70	100	4
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 107	Communication Skills Lab	-	-	2	30	20	50	1
BT 108	Engineering Physics Lab	-	-	2	30	20	50	1
BT 109	Computer Programming Lab	-	-	2	30	20	50	1
BT 110	Computer Aided Engineering Graphics	-	-	2	30	20	50	1
BT 111	Mechanical Workshop Practice	-	-	2	30	20	50	1
	TOTAL	15	5	10	300	450	750	25

BT-101 ENGINEERING MATHEMATICS-I

Unit-I

Differential Calculus:

Asymptotes (Cartesian coordinates only), concavity, convexity and point of inflection, Curve tracing (Cartesian and standard Polar curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral only).

Unit-II

Limit, continuity and differentiability of functions of two variables, Partial differentiation, Euler's theorem on homogeneous functions, change of variables, chain rule.

Unit-III

Taylor's theorem (two variables), approximate calculations, Jacobian, maxima & minima of two and more independent variables, Lagrange's method of multipliers.

Unit-IV

Integral Calculus:

Double integral, change of order of integration, Double integral by changing into Polar form, Applications of Double integrals for evaluating areas & volumes, triple integral; Beta function and Gamma function (simple properties).

Unit-V

Vector Calculus:

Scalar and vector field, differentiation & integration of vector functions: Gradient, Directional derivative, Tangent planes and Normals.

Divergence, Curl and Differential Operator; Line, Surface and Volume integrals; Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications.

Suggested Readings:

1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations.
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Lerning Publication.
3. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGraw Hill Education.
4. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
5. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
6. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.

BT-102 COMMUNICATION SKILLS

Unit-I
Communication: Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication.

Unit-II
Grammar: Passive Voice, Indirect Speech, Conditional Sentences, Modal Verbs, Linking Words.

Unit-III
Composition: Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Report Writing.

Unit-IV
Short Stories: 'The Luncheon' by Somerset Maugham, 'How much Land does a Man Need?' by Leo Tolstoy, 'The Night Train at Deoli' by Ruskin Bond.

Unit-V
Poems: 'No Men are Foreign' by James Kirkup, 'If' by Rudyard Kipling, 'Where the Mind is without Fear' by Rabindranath Tagore.

Suggested Readings:

1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.

3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodriques M. V., 'Effective Business Communication', Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, 'Spoken English' Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. 'Modern Business Correspondence, Pitman Publishing, London.

BT-103 ENGINEERING PHYSICS

Unit-I
Interference of light: Michelson's Interferometer: Production of circular & straight line fringes; Determination of wavelength of light; Determination of wavelength separation of two nearby wavelengths. Optical technology: Elementary idea of anti-reflection coating and interference filters.

Unit-II
Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circularly and elliptically polarized light on the basis of electric (light) vector: Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device.

Unit-III
Elements of Material Science: Bonding in solids; covalent bonding and Metallic bonding; Classification of solids as Insulators, Semiconductors and Conductors; X-Ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications.

Unit-IV
Quantum Mechanics: Compton effect & quantum nature of light; Derivation of time dependent and time independent Schrodinger's Wave Equation; Physical interpretation of wave function and its properties; boundary conditions; Particle in one dimensional box.

Unit-V
Coherence and Optical Fibers: Spatial and temporal coherence; Coherence length; Coherence time and 'Q' factor for light; Visibility as a measure of Coherence and spectral purity; Optical fiber as optical wave guide; Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Laser and Holography: Theory of laser action; Einstein's coefficients; Components of laser; Threshold

conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography; basic requirement of a Holographic laboratory; Applications of Holography in microscopy and interferometry.

Suggested Readings:

1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)
3. Optics : Ajay Ghatak (Tata McGraw Hill)
4. Concept of Modern Phyiscs: A. Baiser (Tata McGraw Hill)
5. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
6. Material Science: Smith (McGraw Hill)

BT-104 COMPUTER PROGRAMMING-I

Unit-I
Computer Fundamentals: Flow chart, pseudocode. binary, octal and hexadecimal number system. ASCII, EBCDIC and UNICODE. boolean operations,

Unit-II
primary and secondary memory. Difference among low-level & high-level languages.

Unit-III
C Programming: Structure of a 'C' program, Datatypes, enumerated, assignment statements, input output statements,

Unit-IV
If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement. Datatype conversion.

Unit-V
Functions & program structure (function call and return), scope of variables, parameter passing methods, recursion v/s iteration.

Suggested Readings:

1. Fundamental of Computers By R. Thareja**,** Oxford University Press.
2. Programming in ANSI C by E Balagurusamy, Tata McGraw-Hill Education.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C:The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Let us C by Yashavant P. Kanetkar, bpb publications.

BT-105 ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Unit-I

Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Ecosystem, Hydrological and
chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

Unit-II

Water Pollution: Water pollutants, effects of oxygen demand, water quality in lakes, reservoirs and groundwater, contaminant transport, self cleaning capacity of streams and water bodies, water quality standards, Waste water management, Treatment &
disposal of wastewater.
Rain water harvesting: Reuse and saving in use of water, methods of rain water harvesting.

Unit-III

Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation. Energy interaction from solid waste.

Unit-IV

Air and Noise Pollution: Primary and Secondary air pollutants, Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution, Global warming, Acid rain, Ozone depletion, Green House effect

Unit-V

Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents.
Disaster profile of Indian continent. Study of recent major disasters. Disaster Management Cycle and its components.

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

Suggested Readings:

1. Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center,Delhi.
2. Understanding Earthquake Disasters by Amita Sinvhal. Tata McGraw Hill, New Delhi.
3. Selected Resources available on www.nidmindia.nic.in
4. Basic Environmental Engineering by Prof. R.C. Gaur, New Age International Publication.

BT-106 COMMUNICATION SKILLS LAB

1. Phonetic Symbols and Transcriptions
2. Extempore
3. Group Discussion
4. Dialogue Writing
5. Listening Comprehension
6. Word Formation
7. Synonyms and Antonyms
8. Affixes

(Note: Wherever appropriate, Language Lab Software is to be used to improve listening comprehension and speaking skills.)

Suggested Readings:

1. Technical Communication: principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press, India.
2. Effective Technical Communication, Barun K. Mitra, Oxford University Press, India.
3. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
4. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
5. Bhattacharya, Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co. (Pvt) Ltd., New Delhi.
6. Wright, Crissy, Handbook of Practical Communication Skills, Jaico Publishing House, Mumbai.
7. Gimson, A C, 'An Introduction to the Pronunciation of English', ELBS.

BT-107 ENGINEERING PHYSICS LAB

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the specific rotation of glucose (sugar) solution using polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the

help of spectrometer.

5. To study the variation of a semiconductor resistance with temperature and hence determine the band gap of the semi conductor in the form of reverse baised P-N junction diode.
6. To determine the height of water tank with the help of sextant.
7. To determine the dispersive power of material of a prim for violet and yellow colour's of mercury light with the help of spectrometer.
8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted.
9. To verify the expression for the resolving power of a Telescope.
10. To determine the coherence length and coherence time of laser using He – Ne laser.
11. To determine the specific resistance of the material of a wire by Carey Froster's bridge.

BT-108 COMPUTER PROGRAMMING-I LAB

The programs shall be developed in C language related with the following concepts:

1. Eight programs using input output statements, if statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, datatype conversion etc.
2. Check a number- palindrome, prime, etc.
3. Eight programs using functions.
4. Two programs using recursion and Iteration.

BT-109 COMPUTER AIDED ENGINEERING GRAPHICS

1.Projections of Point & Lines: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line Inclined to Both the RPs, Traces of a line (One drawing sheet, one assignment in sketch book)

2.Projections of planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both RPs, True shape of the plane, Distance of a point from plane, Angle between two planes (no drawing sheetrequired, only assignment in sketch book)

3.Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs (One drawing sheet, one assignment in sketch book)

4.Section of solids: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres (One drawing sheet, one assignment in sketch book)

5.Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti- Development (One drawing sheet, one assignment in sketch book)

6.Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids (One drawing sheet, one assignment in sketch book)

7.Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Charging properties, Dimensioning other object, Text editing, Isometric drawing (Four assignments on the computer)

Suggested Readings:

1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.
5. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe
6. Engineering Drawing with AutoCAD, B.V.R. Gupta and M. Rajaroy
7. AutoCAD 2017 for Engineers & Designers (Basic and Intermediate), Sham Tickoo,

BT-111 MECHANICAL WORKSHOP PRACTICE

1.Carpentry Shop:
1. T – Lap joint
2. Bridle joint

2. Foundry Shop:
1. Mould of any pattern
2. Casting of any simple pattern

3.Welding Shop:
1. Lap joint by gas welding
2. Butt joint by arc welding
3. Lap joint by arc welding
4. Demonstration of brazing, soldering & gas cutting

4.Machine Shop Practice:
1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling

5.Fitting Shop
1. Finishing of two sides of a square piece by filing
2. Making mechanical joint and soldering of joint on sheet metal
3. To cut a square notch using hacksaw and to drill a hole and tapping

6.Sheet Metal Shop

Making of Funnel using sheet metal

Suggested Readings:

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.
2. Workshop Practice HS Bawa, Tata McGraw Hill 2nd ed. India.
3. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.

4. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

Semester - II

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BT 201	Engineering Mathematics-II	3	1	-	30	70	100	4
BT 202	Human Values	3	-	-	30	70	100	3
BT 203	Engineering Chemistry	3	1	-	30	70	100	4
BT 204	Computer Programming-II	3	-	-	30	70	100	3
	Elective (any two)*							
BT 205A	Basic Electrical and Electronic Engineering	3	-	-	30	70	100	3
BT 205B	Basic Civil Engineering	3	-	-	30	70	100	3
BT 205C	Basic Mechanical Engineering	3	-	-	30	70	100	3
BT 205D	Engineering Mechanics	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BT 206	Human Values: Activities	-	-	2	30	20	50	1

BT 207	Engineering Chemistry Lab	-	-	2	30	20	50	1
BT 208	Computer Programming-II Lab	-	-	2	30	20	50	1
BT 209	Computer Aided Machine Drawing	-	-	2	30	20	50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**800**	**24**

BT:201 ENGINEERING MATHEMATICS-II

Unit-I

Linear Algebra:
Rank of a matrix, Normal forms, consistency of systems of linear simultaneous equations and its solutions, Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), orthogonal matrices, diagonalization ofmatrix.

Unit-II
Fourier Series:
Orthogonal functions, periodic functions, Fourier series of periodic functions, Euler formula, change of intervals, Even and Odd functions, half range Fourier sine and cosine series; Harmonic analysis.

Unit-III
Differential Equations:
Linear differential equations of first order, Reducible to linear form, Exact differential equations, reducible to exact form; Linear Differential Equations of Higher order with constant coefficients, Simultaneous linear differential equations.

Unit-IV
Second order linear ODE with variables coefficients, Homogenous and exact forms, Change of dependent and independent variables; Variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equations.

Unit-V
Partial Differential Equations: Order and Degree, Formation; Linear partial differential equations of first order: Lagrange's form, Standard forms, Charpit's method.
Solutions of PDE of Second order using separation of variable method.

Suggested Readings:

1. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
2. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.
3. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
4. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGrawHill Education.
5. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.
6. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
7. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.

BT-202 HUMAN VALUES

Unit-I
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education
Understanding the need, basic guidelines, content and process for Value Education
Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of

aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit-II
Understanding Harmony in the Human Being - Harmony in Myself
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
Programs to ensure Sanyam and Swasthya

Unit-III
Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship
Understanding harmony in the Family- the basic unit of human interaction
Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;
Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Unit-IV
Understanding Harmony in the Nature and Existence - Whole existence as Co- existence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation innature
Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values Definitiveness of Ethical Human Conduct
Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Unit-V

Competence in Professional Ethics:
a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

Suggested Readings:

1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2009. ISBN: 978-9-350-62091-5
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond &

Briggs, Britain.
4. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
7. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
8. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
9. A N Tripathy, 2003, Human Values, New Age International Publishers.

SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik)

BT-203 ENGINEERING CHEMISTRY

Unit-I

Water:

Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply, requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation), carryover (Foaming and Priming), boiler corrosion and caustic embrittlement, Methods of boiler water treatment(water softening) preliminary treatments, preheating, Lime-Soda process, Zeolite (Permutit) process, Deionization (Demineralization) process.

Numerical problems based on hardness, Lime-Soda and zeolite process.

Unit-II

Organic Fuels:

Origin and classification of fuels. Solid fuels-, coal, classification of coal, significance of constituents, proximate and ultimate analyses of coal, gross and net calorific value, determination of calorific value of coal by Bomb Calorimeter. Metallurgical coke, carbonization processes- Beehive coke oven and Hoffmann Oven (by-products oven) method. Liquid fuels- Advantages of liquid fuels, petroleum and refining of petroleum, reforming, cracking, synthetic petrol, knocking, octane number, anti-knocking agents. Gaseous fuels-advantages, manufacture, composition and uses of coal gas and oil gas, determination of calorific value of gaseous fuels by Junker's calorimeter, flue gas analysis by Orsat's apparatus.

Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

Unit-III

Polymers:

Classification, constituents, general properties of polymers and their uses. Preparation properties and uses of polyethylene, polyethylene terephthalate (PET), nylon 6, nylon 66, nylon 6, 10, Kevlar, Bakelite. Elastomers – natural rubber and vulcanization, synthetic rubbers viz. Buna-S, Buna –N, Butyl and Neoprene Rubbers. Conducting polymers-.

Unit-IV

Lubricants:

Classification, types of lubrication, properties and uses. Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

Corrosion and its control:

Definition and its significance. Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration type corrosion and pitting corrosion. Protection from corrosion- protective

coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Unit-V

Inorganic Engineering Materials:

Cement: Manufacture of Portland cement. Rotary kiln technology. Chemistry of hardening and setting of cement. Role of gypsum. Refractories: Definition properties and classification. Silica and fire clay refractories. Glass: Definition, type and properties of glasses. Manufacture of glass, annealing of glass. Optical fibre grade glass.

Suggested Readings:

1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry Wiley, India.
3. The Chemistry and Technology of Coal, by J G Speigh, CRC Press.
4. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press.
5. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press.
6. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH.
7. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press.
8. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press.
9. Corrosion Understanding the Basic, by Joseph R Davis, ASM International.
10. Engineering Chemistry, by O.G. Palanna, McGraw Hill Education, India.

BT-204 COMPUTER PROGRAMMING-II

Unit-I

Computer System Fundamentals: System software, firmware, freeware/open-source, loader, compiler, peripherals.

Unit-II

Computer Programming: one-dimensional arrays, multi-dimensional arrays, character arrays and strings,

Unit-III

Pointers ,Pointers arithmetic, Dynamic memory allocation: functions like malloc, calloc, free.

Unit-IV

Preprocessor, command line arguments, difference between macro and inline function. Structure & Union, typedef.

Unit-V

File operations and multi-file handling, sscanf()/sprintf(). Graphics using C.

Suggested Readings:

1. Programming in ANSI C by E Baluguamsamy, TaTa McGraw-Hill Education
2. Programming in C by Thareja, Oxford University Press.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C: The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Graphics Under C by Yashavant P. Kanetkar, bpb publications.

BT 205.A BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Unit-I
Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series- Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

Unit-II
Transformers: Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, auto-transformers

Unit-III
Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3- Phase AC System.

Unit-IV
Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3- Phase Synchronous Generator (Alternator), Applications of AC Machines.

Unit-V
Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier. Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables. Electrical Measuring Instruments: DC PMMC instruments, shunt and multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watthour meter, extension of instrument ranges.

Suggested Readings:

1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, WileyIndia.
4. Basic Electrical & Electronics Engineering by Van Valkenburge, Cengage learning Indian Edition
5. Basic Electrical and Electronics Engineering by Muthusubrmaniam, TMH
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Basic Electronics Engineering by Vijay Baru et al, Dream Tech, New Delhi

BT-205.B BASIC CIVIL ENGINEERING

Unit-I
Introduction: Specialization of Civil Engineering, scope of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Surveying: Object & principles of Surveying, plans and maps, Scales, Unit of measurement.

Unit-II
Linear measurements: Direct measurements- Tape & Chain, Ranging out survey lines, taking measurements of sloping ground.
Tape correction, conventional symbols. Introduction to Compass Surveying & Leveling. Introduction to totalstation.

Unit-III
Building & Building materials:
Construction materials: Stone, Brick, Cement, Mortar, Concrete, Steel – their properties & uses.
Unit-IV
Selection of site for Buildings, types of buildings, plinth area, carpet area, floor space index,
Introduction to building byelaws, concept of sun light and ventilation.
Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Unit-V
Transportation, Traffic and Road Safety: Types and characteristics of various modes of transportation, various road traffic signs, causes of accidents and road safety measures.

Suggested Readings:

1. Palancharmy, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.

BT-205.C BASIC MECHANICAL ENGINEERING

Unit-I
Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers, Steam Turbines and Power Plants: Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines.
Introduction and Classification of power plants.

Unit-II
Pumps and IC Engines: Applications and working of Reciprocating and Centrifugal pumps. Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.

Unit-III
Refrigeration and Air Conditioning: Introduction, classification and types of

refrigeration systems and air-conditioning. Applications of refrigeration an Air-conditioning.

Transmission of Power: Introduction and types of Belt and Rope Drives. Introduction to Gears and Gear Trains.

Unit-IV

Primary Manufacturing Processes:
Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces. Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing.
Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.
Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

Unit-V
Engineering Materials and Heat Treatment of Steel:
Introduction to various engineering materials and their properties. Introduction to Heat Treatment and types of Heat Treatment Processes.
Introduction to CAD, CAM, FMS, MEMS and CIM:
Introduction to modern manufacturing systems and their applications.

Suggested Readings:

1. G. Shanmugam and S Ravindran, Basic Mechanical Engieering, Mc Graw hill, fourth edition.
2. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.

BT-205.D ENGINEERING MECHANICS

Unit-I

Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia.

Unit-II

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Unit-III

Kinematics of particles and rigid bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative

Motion.

Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Unit-IV

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.

Unit-V

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, System of variable mass.

Suggested Readings:

1. Engineering Mechanics, Sharma, Pearson Education.
2. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
3. Engineering Mechanics, Basudeb Bhattacharya, Oxford University Press
4. Engineering Mechanics, Hibbeler, Pearson Education.
5. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
6. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
7. Engineering Mechanics, Shames, Pearson Education.

BT- 206 HUMAN VALUES: ACTIVITIES

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you diffierentiate between right and wrong? What have been your salient achievements and shortcomings in your life ? Observe and analyze them.

PS 2:

Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environemental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opininon?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions).

Explore the following:

(i) What is Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?

(ii) What is 'naturally Acceptable' to you - to nurture or to exploit others?

Is your living in accordance with your natural acceptance or different from it?

2. Out of the three basic requirements for fulfillment of your aspirations - right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your dailyroutine.

PS 4:

list down all your important desires. Observe whether the desire is related to Self (I) or the Body. If it appears to be related to both, visualize which part of it is related to Self
(I) and which part is related to Body.

1. a. Observe that any physical facility you use, follows the given sequence with time:

Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.

3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

1. Chalk out some programs towards ensuring your harmony with the body - in tearms of nurturing, protection and right utilisation of the body.
2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

1a. Do I want to make myself happy? 2a. Do I

want to make the other happy?

3a. Does the other want to make himself/herself happy? 4a. Does

the other want to make me happy?

What is the answer?

Intention (NaturalAcceptance)

1b. Am I able to always make myself happy? 2b. Am I

able to always make the other happy?

3b. Is the other able to always make himself/herself happy? What is the

answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS 8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also, observe whether your feeling of respect is based on treating the other as you would treat youself or on differentiations based on body, physical facilities or belieds.

PS 9:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.
2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to balues in a difficult situation.

PS 10:

List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analysis and explain the aspect of mutual fulfillment of each unit with other orders.

PS 11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS 12:

Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basic of natural acceptance of human values. If so, how should one proceed in this direction from the present situation?

PS 13:

1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.
2. Propose a broad outline for humanistic Constitution at the level of Nation.

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of;

a. Thought
b. Behavior
c. Work and
d. Relization
3. What practical steps are you able to visualize for the transition of the society from its present state.
4.
5.
6. Project:
7.
8. Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work

BT-207 ENGINEERING CHEMISTRY LAB

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method
3. Measurement of conductivity of a given sample by conductivity meter.
4. Study of BombCalorimeter.
5. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution.
6. To determine the strength of $CuSO_4$ solution with the help of hypo solution.
7. To determine the strength of NaOH and Na_2CO_3 in a given alkali mixture.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of lubricating oil.

BT 208 COMPUTER PROGRAMMING-II LAB

The programs shall be developed in C language related with the following concepts:

1. Input roll numbers of your friends in an array & print in reverse order.
2. Input names of your friends in an array & print in reverse order.

3. Input two matrices and output third matrix after performing add/subtract the corresponding elements.
4. Four programs using malloc, calloc, free & sscanf()/sprintf() functions.
5. Two programs using macro and online functions.
6. Two programs using structure & union.
7. Two programs using pointers.
8. Three programs belonging to file operations and multi-file handling.
9. Three programs belonging to graphics using C.

BT 209: COMPUTERS AIDED MACHINE DRAWING

1.Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

2.Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems.

3.Sectional view : (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web, rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

4.Fasteners: (1 drawing sheet) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc.

5.Assembly drawing: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc.

6.Free hand sketching: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs.

7.Bearing: Ball, roller, needle, foot step bearing.

8.Coupling: Protected type, flange, and pin type flexible coupling.

9.Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

10.Computer aided drafting: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.

Suggested Readings:

1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers
2. Gill P S, Machine Drawing, Kataria & Sons 2009
3. Basudeb Bhattacharya, Machine Drawing, Oxford University Press 2011
4. Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996
5. Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995
6. Siddeshswar N., P Kannaiah, VVS Shastry, Machine Drawing,Tata McGraw Hill

JAGANNATH UNIVERSITY

THIRD SEMESTER								
THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 301	Advance Engineering Mathematics -I	3	-	-	30	70	100	3
BTCE 302	Technical Communication /Managerial Economics & Financial Accounting	3	-	-	30	70	100	3
BTCE 303	Engineering Mechanics	3	-	-	30	70	100	3
BTCE 304	Surveying	3	-	-	30	70	100	3
BTCE 305	Fluid Mechanics	3	-	-	30	70	100	3
BTCE 306	Building Materials and Construction	3	-	-	30	70	100	3
BTCE 307	Engineering Geology	3	-	-	30	70	100	3
PRACTICALS/VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTCE 308	Surveying Lab	-	-	2	30	20	50	1
BTCE 309	Fluid Mechanics Lab	-	-	2	30	20	50	1
BTCE 310	Computer Aided Civil Engineering Drawing	-	-	2	30	20	50	1
BTCE 311	Civil Engineering Materials Lab	-	-	2	30	20	50	1
BTCE 312	Geology Lab	-	-	2	30	20	50	1
BTCE 313	Industrial Training	-	-	1	30	20	50	0.5
BTCE 314	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	0.5
	TOTAL	21	0	11	390	610	1050	27

BTCE 301: ADVANCE ENGINEERING MATHEMATICS-I

UNIT 1:**Numerical Methods – 1:** Finite differences, Relation between operators,Interpolation using Newton's forward and backward difference formulae. Gauss's forward and backward interpolation formulae. Stirling's Formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange'sformulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

UNIT 2: **Numerical Methods – 2:** Numerical solution of ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Solution of polynomial and transcendental equations-Bisection method, Newton-Raphson method and Regula-Falsi method

UNIT3: **Laplace Transform:** Definition and existence of Laplace transform, Properties of Laplace Transform and formulae, Unit Step function, Dirac Delta function, Heaviside function, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace transforms method.

UNIT 4: **Fourier Transform:** Fourier Complex, Sine and Cosine transform, properties and formulae, inverse Fourier transforms, Convolution theorem, application of Fourier transforms to partial ordinary differential equation (One dimensional heat and wave equations only).

UNIT 5: **Z-Transform:** Definition, properties and formulae, Convolution theorem, inverse Z-transform, application of Z-transform to difference equation.

BTCE 302: **TECHNICAL COMMUNICATION / MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING**

UNIT 1: Basic economic concepts-Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-concepts and measurement.

UNIT 2: **Demand and Supply analysis**-Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting – purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.

UNIT 3: **Production and Cost analysis**-Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation

UNIT 4: **Market structure and pricing theory**-Perfect competition, Monopoly, Monopolistic competition, Oligopoly.

UNIT 5: **Financial statement analysis**-Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.

BTCE 303: ENGINEERING MECHANICS

UNIT 1: Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces (conservative and non conservative), Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem

UNIT 2: **Plane trusses:** Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis (zero force member, tension or compression member), Method of joints, Method of sections. **Centroid & Moment of inertia (M.I.):** Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia, principle axis and principle moment of inertia.

UNIT 3: **Virtual work:** Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium. **Work, Energy and Power:** Work of a force, weight and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservation of energy.

UNIT 4: **Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. **Springs**: Stiffness of springs, springs in series and parallel, Introduction to laminated plate springs, leaf spring, close coiled helical springs, open coiled springs.

UNIT 5: **Simple Stresses and Strains:** Concept of stress and strain in three dimensions and generalized Hooke's law; Young's modulus, Shear stress, Shear strain, Modulus of rigidity, Complementary shear stress; Poisson's ratio, Volumetric strain, Bulk modulus, relation between elastic constants, Stress and strain thin cylinder and spherical cell under internal pressure.

BTCE 304: SURVEYING

UNIT 1: LINEAR AND ANGULAR MEASUREMENTS Method of linear measurements, Correction to length measured with a chain/tape, Ranging a survey line; direct and indirect Angular measurement by compass, Designation of bearing, Traversing with tape And compass, Correction to measured bearing, Angular measurement by theodolite; Temporary adjustments, Method of horizontal angle measurement and vertical angle, Traverse computation, plotting of traverse and determining the closing error, Balancing traverse.

UNIT 2: **LEVELLING** Measurements of elevations methods of levelling; direct/differential, Indirect/Trigonometrical, and Profile/Cross sectional levelling. Digital and Auto level, Errors in levelling, contours and contour lines; methods of contouring; direct and indirect, characteristics, uses, area and vol. measurements.

UNIT 3: **CURVE SURVEYING** Elements of simple and compound curves, Types of curves, Elements of circular, reverse, and transition curves. Method of setting out simple, circular, transition and reverse curves, Types of vertical curves, length of vertical curves, setting out vertical curves. Tangent corrections.

UNIT 4: **TACHEOMETRY AND PHOTOGRAMMETRY SURVEYING** Advantages of tacheometric surveying, different systems of tacheometric measurements, Stadia system of tacheometry, distance elevation formulae for horizontal sights. Determination of tacheometric constants, distance and elevation formulae for inclined sights with staff vertical. Introduction to basic concepts perspective geometry of aerial photographs, relief and tilt displacements, Terrestrial Photogrammetry, flight planning

UNIT 5: **SETTING OUT WORKS & MODERN FIELD SURVEY SYSTEMS**
Instruments and methods for laying out buildings, setting out culverts, setting out sewer lines. Principle of E.D.M. (Electronic Distance Measurements), Modulation,
Types of E.D.M., Distomat, Total station, parts of total station, advantages and application.

BTCE 305: FLUID MECHANICS

UNIT 1: Fluids: Definition, Type of fluids, Ideal fluids, real fluids, Newtonian and non-Newtonian fluids. **Properties of Fluids:** Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

UNIT 2: **Principles of Fluid Statics**: Basic equations, Pascal Law, Type of pressure:- atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, manometers, Bourdon pressure gauge

UNIT 3: **Buoyancy**; Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and analytical determination of meta centric height.
UNIT 4: **Kinematics of Flow**: Visualisation of flow, Types of flow: Steady and unsteady, uniform and non-uniform, rotational and irrotaional flow, Laminar and turbulent flow, streamline, path line, streak line, principle of conservation of mass, equation of continuity, acceleration of fluid particles local and convective, velocity, acceleration, velocity potential and stream function, elementary treatment of flow net, vorticity, circulation, free and forced vortex. Fluid mass subject to horizontal and vertical acceleration and uniform rotation

UNIT 5: **Fluid Dynamics**: Control volume approach, Euler's equation, Bernoulli's equation and its applications, venture-meter, orificemeter, orifices & mouthpieces, time of emptying of tanks by orifices, momentum and angular momentum equations and their applications, pressure on flat plates and nozzles.
Laminar Flow through Pipes: Laminar flow through pipes, Relation between shear & pressure gradient. Flow between plates & pipes. Hagen- Poiseuille equation, Equations for velocity distribution, pressure difference velocity distribution over a flat plate and in a pipe section,
Darcy-Weisbach equation, friction factor , minor losses, pipe networks

BTCE 306: **BUILDING MATERIALS AND CONSTRUCTION**

UNIT1: Basic Civil Engineering Materials (Properties, Types and Uses): Stone: Compressive strength, Water absorption, Durability, Impact value, Tensile strength; Bricks: Water absorption, Compressive strength, Effloresces, Dimension and Tolerance; Tiles: Water absorption, Tolerance, Impact value and Glazing; Light weight concrete blocks.
Lime: classification as per IS, properties, standard tests and uses in construction.
Fly-ash: Properties and Use in manufacturing of bricks & cement;
Miscellaneous: Gypsum, Plaster of Paris, PVC materials, Paints, Varnish and Distemper.

UNIT 2: **Timber & Steel:** Timber: Definitions of related terms, Classifications and Properties, Defects in Conversion of wood, Seasoning wood, Preservation, Fire proofing, Ply woods, Fibre boards;
Steel: Mild steel and HYSD steel, Properties and their use, common tests on steel.
Mortar and Plaster: Mortar preparation methods**:** Functions and tests & their uses in various types of pointing & plastering

UNIT 3: (A) **Brick and Stone Masonry**: Basic principle of masonry work, different types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond.

Comparison between stone and brick masonry. General principles, classification of stone masonry and their relative merits and demerits.
(B): **Building Requirements & Construction System:** Building components, their functions and requirements. Types of construction: load bearing and framed structure construction, RCC beam, column and slab construction, Precast and In-situ construction, Relative merits and demerits. Fire resistance construction, FRC.
Ground & Upper floors: Floor components and their functions, Floor types and Selection of flooring, construction details of ground and upper floors, merits and demerits.

UNIT 4(A): **Foundation & Site Preparation:** Purpose, types of foundation: like shallow, deep, pile, raft, grillage foundation and their suitability. Depth of foundation, Sequence of construction activity and co-ordination, site clearance, layout of foundation plan.
Temporary structures: Types & methods of shoring, underpinning and scaffolding.
(B) **Damp Proofing:** Causes and Effects of dampness, Methods and materials for damp proofing, Methods and materials for anti-termite treatment.
Construction and Expansion Joints: Requirements, Types material used, Construction details.

UNIT 5(A): **Arches and Lintels:** Terms used, types of arches and their construction detail, types of lintels and constructions.
Partition Wall: Types, purpose and use of partition wall.
Stairs: Terms used, requirements of good staircase, classification, construction details and suitability of different types of stairs, Lifts and Ramps.
(B): **Roof and Roof Covering:** Purposes, classification of roofs, terms used. Introduction to Solid slab, Flat slab, Shell Roofs and Pitched roofs, and their constructional features. Types of pitched roofs and Trusses, typical constructional details; Roof covering materials, types and typical constructional details.

BTCE 307: ENGINEERING GEOLOGY

UNIT 1: General Geology: Branches and Scope of Geology, Types of Weathering & Geological work of natural agencies like River & Wind. Geological Time Scale. Physical Properties of Minerals.

UNIT 2: **Petrology:** Formation, Texture, Structure and Classification of Igneous, Sedimentary and Metamorphic Rocks. Engineering Properties of Rocks for Building & Road Material. Laboratory and Field & in-situ Test for Site Construction.

UNIT 3: **Structural Geology:** Causes, Terminology, Classification, Recognition, Effects and Engineering consideration of Fold, Fault, Joints and Unconformities.

UNIT 4: **Engineering Geology:** Geophysical methods as applied to Civil Engineering for Subsurface Analysis (Electrical and Seismic methods). Terminology, Types and Geological consideration for site selection of Dam & Tunnel.

UNIT 5: **Remote Sensing & GIS:** Application of Remote Sensing and GIS in Various fields of Civil Engineering.

BTCE 308: **SURVEYING LAB**

Linear Measurement by Tape:
a. Ranging and Fixing of Survey Station.
b. Plotting Building Block by offset with the help of cross staff.
2. Compass Survey: Using Surveyor's and Prismatic compass
a. Measurement of bearing of lines
b. Adjustment of included angles of compass traverse.
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
a. To determine the reduced levels in closed circuit.
b. To carry out profile levelling and plot longitudinal and cross sections for road.
4. Theodolite Survey: Using Vernier Theodolite
a. To carryout temporary adjustment of Theodolite & Measurement of horizontal and vertical angle: by method of repetition and method of Reiteration.
b. To measure and adjust the angles of a braced quadrilateral.
5. Trigonometric Levelling: To determine the Height of an object by Trigonometric levelling:
a. By using Instruments in same vertical plane.
b. By using Instruments in different vertical planes.
6. Tacheometry Survey:
a. To determine the tachometric constant.
b. To determine the horizontal and vertical distance by tachometric survey.
7. To study the various electronic surveying instruments like EDM, Total Station etc.
One-week Survey Camp for topographic/ project survey/Contouring be arranged before or after Term End Exam.

BTCE 309: FLUID MECHANICS LAB

1.To study the various pressure measuring devices
2. To verify the Bernoulli's theorem.
3. To calibrate the Venturi-meter.
4. To calibrate the Orifice-meter.
5. To determine Metacentric Height.
6. To determine C_c, C_v, C_d of an orifice.
7. To determine C_d of a mouthpiece.
8. To determine C_d of a V-notch.
9. To determine viscosity of a given fluid.
10. To study the velocity distribution in pipes.

BTCE 310: **COMPUTER AIDED CIVIL ENGINEERING DRAWING**

To study and draw the labelled sketch of different Building Components on sheets with exposure to CAD:
1. Drawing of walls

a. Brick and Stone masonry
b. Cross section of external wall from foundation to parapet
c. Partition wall, cavity wall and
2. Pointing, Arches, Lintels and Floors
3. Doors and Windows
4. Stairs, Cross section of Dog legged stairs
5. Roofs: Flat and Pitched roof (Steel truss)
6. Development of Front Elevation and Sectional Elevation from a given plan
7. Development of Plan, Front Elevation and Sectional Elevation from line Diagram

BTCE 311: **CIVIL ENGINEERING MATERIALS LAB**

1. To determine properties of following materials:
A. STONE:
a. Compressive strength,
b. Water absorption,
c. Impact value,
d. Tensile strength;
B. Bricks:
a. Water absorption,
b. Compressive strength,
c. Dimension and Tolerance;
C. Tiles:
a. Water absorption,
b. Tolerance,
c. Impact value
D. Timber: Compressive and Tensile Strength of Timber across and along the Grain
2. To Study the Properties & Utilization of Fly Ash in Construction
3. To Study the Different Aluminum and Steel Sections
4. To Study the Manufacturing and Use of Concrete Hollow Blocks

BTCE 312: **GEOLOGY LAB**

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Identification of Geological features through wooden Models
a. Structural Geological Diagrams
b. Petrological Diagrams
c. Engineering Geological Diagrams
6. Interpretation of Geological Map (10 Nos.)
7. Dip & Strike Problems (8 Nos.)

FOURTH SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 401	**Advance Engineering Mathematics -II**	3	-	-	30	70	100	3
BTCE 402	**Managerial Economics & Financial Accounting/ Technical Communication**	3	-	-	30	70	100	3
BTCE 403	**Basic Electronics For Civil Engineering Applications**	3	-	-	30	70	100	3
BTCE 404	**Strength Of Materials**	3	-	-	30	70	100	3
BTCE 405	**Hydraulics Engineering**	3	-	-	30	70	100	3
BTCE 406	**Building Planning**	3	-	-	30	70	100	3
BTCE 407	**Concrete Technology**	3	-	-	30	70	100	3
PRACTICALS/VIVA-VOCE		No. of Teaching Hours			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 408	**Material Testing Lab**	-	-	2	30	20	50	1
BTCE 409	**Hydraulics Engineering Lab**	-	-	2	30	20	50	1
BTCE 410	**Building Drawing**	-	-	2	30	20	50	1
BTCE 411	**Advanced Surveying Lab**	-	-	2	30	20	50	1
BTCE 412	**Concrete Lab**	-	-	2	30	20	50	1
BTCE 413	**Social Outreach, Discipline & Extra Curricular Activities**	-	-	-	-	-	50	0.5
TOTAL		21	**0**	**10**	**360**	**590**	**1000**	26.5

BTCE 401 ADVANCE ENGINEERING MATHEMATICS-II

UNIT1

Introduction: Objective, scope and outcome of the course.

Probability: Basic concepts of probability, conditional probability,

UNIT 2

Baye's theorem.Random variable: Discrete and Continuous random variables, Joint distribution, Marginal distribution, Probability distribution function, Conditional distribution.

UNIT 3

Mathematical Expectations: Moments,

Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis. Binomial, Poisson and Normal distribution and their properties.

UNIT 4

Applied Statistics: Basic concept of variance, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

UNIT 5

Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviation

BTCE 402: Managerial Economics & Financial Accounting/ Technical Communication

UNIT1 Introduction to Technical Communication- Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.

UNIT 2 Comprehension of Technical Materials/Texts and Information Design & development- Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note-making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.

UNIT 3 Technical Writing, Grammar and Editing- Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.

UNIT4 Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals,

UNIT 5 Advanced Technical Writing- Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.

BTCE403: BASIC ELECTRONICS FOR CIVIL ENGINEERING APPLICATIONS

UNIT1 Basic Electronics: Number systems & Their conversion used in digital electronics, Demorgan's theorem, Logic Gates, half and full adder circuits, R-S flip flop, J-K flip flop.

UNIT 2 Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations.

UNIT 3 Instrumentation: mechanical, electrical, electronic system and their calibration, Use of automatic and digital levels, electronic theodolites, total stations; Control surveys using GNSS, Total station and traversing methods (adjustment and computations of coordinates).

UNIT 4 Measurement errors: Gross error and systematic errors, absolute and relative errors, accuracy, precision, resolution and significant figures. Full-field measurements;

UNIT 5 Data acquisition system and data processing: analog systems, digital systems using personal computers, dynamic measurement, numerical and graphical data processing and archiving.

UNIT 6 Sensors & Transducers: various types of sensors for displacement, velocity, acceleration, pressure, loads, strains, Displacement sensors, Mass &Piezoeletric, strain gauges, Temperature sensors thermocouple, flow sensors : Ultrasonic, electromagnetic, laser and thermal

UNIT 7 Sensor types characteristics: types of resolution, FOV, IFOV, PSF; Geometric and radiometric distortions, Geo-referencing, re-sampling methods; Atmospheric errors and removal; Satellite orbits and characteristics; Applications of optical and microwave remote sensing techniques in Civil Engineering.

UNIT 8 Digital Image Processing: Digital image, introduction to digital image processing, pre-processing, enhancement, classification, accuracy assessment.

BTCE 404: STRENGTH OF MATERIALS

UNIT1 Simple Stresses and Strains in different members: Stresses in prismatic & non prismatic members and in composite members; Thermal stresses; Stresses in composite members, Compatibility condition.
Compound Stress: Two dimensional stress system: stress resultant, principal planes and principal stresses, state of pure shear maximum shear stress, Mohr's circle &its application. Introduction to theories of failures.

UNIT2 Bending of Beams: Bending moment, Shear force and Axial thrust diagrams for statically determinate beams subjected to various types of loads and moments, Point of Contra-flexure, relation between load, SF and BM.

Theory of simple bending: Distribution of bending and shear stresses for simple and composite sections, Combined direct and bending stress,

UNIT3 Torsion: Elementary concepts of torsion, shear stress in solid and hollow circular shafts, angle of twist, power transmitted by a shaft, combined bending and torsion;

UNIT 4Columns: Short and long columns, slenderness ratio, crushing and buckling of column, short column subjected to axial and eccentric loads; Euler's theory and its limitation, concept of effective length of columns; Rankine & Secant formulae, middle third rule, core of a section.

UNIT 5Deflection of Beams: Differential relation between load, shear force, bending moment, slope deflection. Slope & deflection in determinate beams using double integration method, Macaulay's method, area moment method and conjugate beam method and their application to statically determinate prismatic beams.

BTCE 405: HYDRAULICS ENGINEERING

UNIT 1 Dimensional Analysis & Models: Dynamical Similarity and Dimensional Homogeneity Model experiment, geometric, Kinematic and Dynamic similarity. Reynold's, froudes, Weber's, Euler and Mach numbers. Distorted river models and undistorted models, proper choice of scale ratios. Scale effect. Principle of dimensional analysis Rayleigh method, Buckingham theorem.

UNIT 2 Turbulent flow, Reynolds equations, Prandtl's mixing length theory, Equations of velocity distribution and friction coefficient
Boundary Layer Theory: Concept of boundary layer, laminar and turbulent boundary layers, boundary layer thickness, von Karman integral equation, laminar sub-layer, hydro-dynamically smooth and rough boundaries, separation of flow and its control, cavitation.
Open channel Flow Uniform, Non-Uniform and variable flow. Resistance equations of Chezy and Manning. Section factor for uniform flow. Most Efficient rectangular, triangular and trapezoidal sections. Velocity distribution in open channels.

UNIT3 Gradually varied flow in Prismatic channels. Specific energy of flow. Critical depth in prismatic channels. Alternate depths. Rapid, critical and sub critical Flow Mild, steep and Critical Slopes. Classification of surface curves in prismatic channels and elementary computation

Rapidly varied flow: Hydraulic jump or standing wave in rectangular channels. Conjugate or sequent depths Losses in jump, location of jump. velocity distribution in open channels. Energy correction factor. Moment correction factor

UNIT4 Impact of free Jets: Impact of a jet on a flat or a curved vane, moving and stationary vane.
Introduction of Hydraulic machine – Type of pumps and turbine and its brief description. Draft tube and its principle
Hydrology: Definition, Hydrologic cycle, Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method, catchment area formulae, Flood-hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination, Estimation of runoff.

UNIT5 Ground Water: Aquifers and its types, Confined and unconfined aquifer, Darcy's Law, hydraulic conductivity, transmissivity, well hydraulics.
Canal Hydraulics: Types of canals, parts of canal irrigation system, channel alignment,assessment of water requirements, estimation of channel losses, design of channels, regime andsemi theoretical approaches (Kennedy's Theory, Lacey's Theory), cross section of channels,Silt control in canals.

BTCE 406: BUILDING PLANNING

UNIT1 Introduction: Types of buildings, criteria for location and site selection, site plan and its detail. **Sun Consideration :** Different methods of drawing sun chart, sun shading devices, design of louvers.

UNIT 2 Climatic and comfort Consideration: Elements of climate, global climate, climatic zones of India, thermal comfort, biclimatic chart,
Orientation: Meaning, factors affecting orientation, orientation criteria for tropical climate.

UNIT3 Building Bye Laws and NBC Regulations: Objective of by-laws, regulation regarding; means of access, lines of building frontages, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation.
Principles of Planning: Different factors affecting planning viz-aspect, prospect, furniture requirement,roominess, grouping, circulation, elegance, privacy etc.

UNIT4 Vastu Shastra In Modern Building planning: Factors considered in Vastu, site selection, orientation, planning and design of residential buildings, school/hospital

UNIT5 Functional Design And Accommodation Requirements Of Non
Residential Buildings: viz-school buildings, rest house, primary health centers, post office etc.
Services in Buildings
(A) Lighting and ventilation, doors and windows, lifts.
(B) Acoustics, sound insulation and noise control.

(C) Fire fighting provisions

BTCE407: CONCRETE TECHNOLOGY

UNIT1 Ingredients of concrete: Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gel-space ratio etc.
Aggregates: types, physical properties and standard methods for their determination, including Grading of aggregates as per IS. Manufactured sand- properties and IS Specifications for use in concrete.

UNIT2 Concrete: Grade of concrete, proportioning of ingredients, water content and its quality, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. Factors affecting, methods of determination. Properties of hardened concrete such as strengths, permeability, creep, shrinkage,factors influencing, Standard tests on fresh and hardened concrete as per IS code. Aggregate- cement interface, its effect on properties of concrete. Concrete mix deign (IS method)- with and without water reducing admixtures

Unit 3 NDT: Introduction and their importance. Application & use of Rebound Hammer, Ultra-sonic pulse velocity meter, Rebar & Cover meter, half-cell potential meter, corrosion resistivity meter, core sampling. Interpretation of their results,

UNIT 4 Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipments for material handling, various methods their suitability and precautions. Compaction of concrete: methods &equipments. Curing of concrete: various methods their suitability.
Durability of concrete. Causes of deterioration, Carbonation, Tests for durability assessment
Admixture in concrete: Chemical and mineral admixtures, their types and uses: accelerator, retarders, water-proofing, plasticisers, super plasticizers-types, their suitability. Fly ash- properties for use in concrete, specifications of flyash as per IS 3812, and effect on properties of concrete. GGBFS, Microsilica and metakaolin- propertie, specifications and utility in concrete.

UNIT5 Form work: Requirements, their types. Typical formworks and shuttering/centering for Columns, beams, slabs, walls, etc. Slip and moving formwork.
Special types of concrete: Sulphate resisting concrete, under water concreting, pumpable concrete: methods and issues in making, salient properties and applications.Concretes with tailored properties- including high performance concrete, with specific properties in fresh and hardened states, self-compacting concrete-materials, mix proportioning, test methods, use and applications with case studies.

BTCE 408: MATERIAL TESTING LAB

1. Tests on Mild steel and HYSD Bar –To determine compressive and tensile

strength, yield strength, percentage elongation etc.
2. Tests on Cement and concrete cubes/ core to establish their strength
3. Hardness Test – Rockwell Hardness and Brinell Hardness
4. Impact Test – Izod and Charpy
5. Modulus of Rupture of Wooden Beam
6. Fatigue Test
7. Spring Test
8. Torsion Test

BTCE 409: HYDRAULICS ENGINEERING LAB

1. To determine the minor losses.
2. To determine the friction factor.
3. To determine Cd of Broad crested weir.
4. To verify the momentum equation.
5. To determine the discharge of venturimeter.
6. To determine Manning's & Chezy's coefficient of roughness for the bed of a given Channel.
7. To study and plot characteristics curve of hydraulic jump.
8. To study velocity distribution in open channel flow.

BTCE 410: BUILDING DRAWING

1- To plan and draw working drawing of a Residential building with following detail.
(a) Site plan
(b) Foundation plan
(c) Plan
(d) Two sectional elevations
(e) Front elevation
(f) Furniture plan
(g) Water supply and sanitary plan
(h) Electric fitting plan
2- To design and draw a Primary Health Center
3- To design and draw a Primary School
4- To design and draw a Rest House
5- To design and draw a Post Office
6- To design and draw a Bank
7- To design and draw a College Library
8- To design and draw a Cinema Theatre

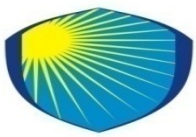
BTCE 411: ADVANCED SURVEYING LAB

1. To measure the horizontal and vertical angles by Theodolite.
2. To determine the Height of an object by trigonometric leveling (Instruments in same vertical plane).

3. To determine the Height of an object by trigonometric leveling (Instruments in different vertical planes).
4. Measurement of angles, length of survey line using Total Station, finding the coordinate of station
5. To measure and adjust the angles of a braced quadrilateral.
6. To prepare the map of given area by plane tabling.
7. Measurement of area of a traverse by Total Station

BTCE 412: CONCRETE LAB

1. To determine the fineness of Cement by Blaine's air permeability test.
2. To determine the flexural strength of Concrete.
3. To determine Soundness of cement by Le-chatelier apparatus.
4. To determine the specific gravity of fine aggregate (sand) by Pycnometer.
5. To determine the bulking of fine aggregate and to draw curve between water content and bulking.
6. Sieve analysis of coarse aggregates and fine aggregates.
7. To determine the workability of given concrete mix by slump test.
8. To determine the optimum dose of super plastsizers by Flow table test.
9. To design concrete mix of M-20 grade in accordance with I S 10262.
10. To design concrete mix of M-40 grade with super plasticizer in accordance with I S 10262.
11. To determine the Permeability of Concrete.
12. Study of Core cutter, UPV & Rebound Hammer equipment.



JAGANNATH UNIVERSITY

FIFTH SEMESTER			
THEORY PAPERS		**No. of Teaching Hours**	**Marks Allocation**

Code	Subject/Paper	L	T	P	IA	EA	Total	Credits
BTCE 501	Construction Technology And Equipment	3	-	-	30	70	100	3
BTCE 502	Structure Analysis-I	3	-	-	30	70	100	3
BTCE 503	Design Of Concrete Structures	3	1	-	30	70	100	4
BTCE 504	Geotechnical Engineering	3	1	-	30	70	100	4
BTCE 505	Water Resource Engineering	3	-	-	30	70	100	3
ELECTIVE –I(Choose any one)								
BTCE 506A	Air & Noise Pollution And Control	3	-	-	30	70	100	3
BTCE 506B	Disaster Management	3	-	-	30	70	100	3
BTCE 506C	Town Planning	3	-	-	30	70	100	3
ELECTIVE –II(Choose any one)								
BTCE 507A	Repair And Rehabilitation Of Structures	3	-	-	30	70	100	3
BTCE 507B	Ground Improvement Techniques	3	-	-	30	70	100	3
BTCE 507C	Energy Science And Engineering	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 508	Concrete Structures Design Lab	-	-	2	30	20	50	1
BTCE509	Geotechnical Engineerding Lab	-	-	2	30	20	50	1
BTCE 510	Water Resources Engineering Design Lab	-	-	2	30	20	50	1
BTCE 511	Industrial Training	-	-	2	30	20	50	1
BTCE 512	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	21	2	8	330	570	950	28

BTCE 501CONSTRUCTION TECHNOLOGY AND EQUIPMENT

Unit- I

Introduction: Objective, scope and outcome of the course.

Engineering Economy: Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion

Unit- II

Safety in construction: Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report,

Unit- III

Safety measure: (a) For storage and handling of building materials.(b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.

Unit- IV

Construction Planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control;
Materials Management: Objective and functions of material management

Unit- V

Construction Equipment and Management: Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunnelling Equipment; Pile Driving Equipment

BTCE 502 STRUCTURE ANALYSIS-I

Unit- I

Introduction: Objective, scope and outcome of the course.

Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem.

Unit- II

Analysis of prop cantilever structures, Analysis of Indeterminate Structure (fixed and continues beams) using Area moment method.

Unit- III

Analysis of Indeterminate Structure (fixed and continues beams) using Conjugate beam method, Three moments Theorem.

Unit- IV

Analysis of Statically Indeterminate Structures using Slope deflection method and Moment distribution method applied to continuous beams and portal frames with and without inclined members

Unit- V

Vibrations: Elementary concepts of structural vibration, Mathematical models, basic elements of vibratory system. Degree of freedom. Equivalent Spring stiffness of springs in parallel and in series.
Simple Harmonic Motion: vector representation, characteristic, addition of harmonic motions, Angular oscillation.
Undamped free vibration of SDOF system: Newton's law of motion, D Almbert's principle, deriving equation of motions, solution of differential equation of motion, frequency & period of vibration, amplitude of motion; Introduction to damped and forced vibration.

BTCE 503 DESIGN OF CONCRETE STRUCTURES

Unit- I

Introduction: Objective, scope and outcome of the course.

Fundamental concepts of design of RC members, assumptions. Types and function of reinforcement. Introduction to various related IS codes, Characteristic load and characteristic strength.
Working Stress Method: Working stress design philosophy. Analysis and Design of singly reinforced rectangular beam section for flexure.

Limit State Design: Limit state design philosophy. Assumptions, Analysis and design of singly reinforced, doubly reinforced rectangular beams and flanged beams for flexure using codal provisions for simply supported, cantilever, fixed and continuous beams.

Unit- II

Limit state of serviceability for deflection: control of deflection as per codal provisions of empirical coefficients.

Limit state of collapse in shear: Types of shear reinforcement and its detailing, analysis and design of shear reinforcement for prismatic sections.

Limit state of collapse in bond: concept of bond stress, anchorage length and development length. Detailing and curtailment of reinforcement as per codal provisions.

Unit- III

Slabs: Analysis and design of one way and two way slabs using LSM, Detailing of reinforcement. Check for shear and deflection.

Unit- IV

Columns: Short and long columns, their structural behaviour. Analysis and design of axially loaded short columns, using LSM. Analysis of eccentrically loaded short columns. Introduction to Pu- Mu interaction curves and their use for eccentrically loaded columns.

Unit- V

Footings: Analysis and design of Isolated column footing for axial load. Introduction to combined footing for two columns (without central beam) for axial loads using LSM.

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

BTCE504 GEOTECHNICAL ENGINEERING

Unit- I

Introduction: Objective, scope and outcome of the course.

Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter-relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, sieve and sedimentation analysis, consistency limits, void ratio and density index. Mineral structures, structures of Illite Montmorillonites and kaolinite and their characteristics. Darcy's law of permeability of soil and its determination in laboratory.
Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quicksand phenomenon. Classification of soil for general engineering purposes : particle size and I.S. Classification systems.

Unit- II

Mohr's circle of stress, shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses. Principles of soil compaction, laboratory compaction tests;

Proctor's test, Stresses in Soil under surface loading: Bossinesq's and Westergaard's analysis for vertical pressure and its distribution in a soil mass. Vertical stresses due to concentrated loads, Isobar diagram, Vertical stress distribution on a horizontal plane. Influence diagram, Vertical stresses at a point under circular and rectangular loaded area. Approximate methods of obtaining vertical pressure due to surface loading. Newmark's chart,

Unit- III

Compressibility and Consolidation: Introduction to consolidation, comparison of compaction and consolidation, Spring Analogy Terzaghis one dimensional consolidation theory, Degree of consolidation, consolidation test, Compressibility parameters, coefficient of consolidation. Pre-consolidation pressure and its determination. Normally, over and under consolidated soils. Methods of predicting Settlement and its rate. Total and differential Settlement.

Unit- IV

Stability of Slopes: Classifications of slopes, Stability analysis of infinite slopes. Stability of finite slopes by Swedish and Friction circle method. Stability analysis by Taylor's stability number , Taylor's stability number curves. . Bishop's method of stability analysis. Earth Pressure: Active, passive and earth pressure at rest. Rankine's and Coulomb's theories. Rebhann's and Culman's graphical methods for active earth pressure for vertical and inclined back retaining walls, horizontal and inclined cohesion less back fill.

Unit- V

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

BTCE505 WATER RESOURCE ENGINEERING

Unit- I

Introduction: Objective, scope and outcome of the course.

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

Unit- II

Canal Irrigation: Types of canals, design of channels, regime and semi theoretical approaches (Kennedy's Theory, Lacey's Theory) Diversion Head works: Design for surface and subsurface flows, Bligh's and Khosla's methods.

Unit- III

Embankment Dams: Suitable sites, causes of failures, stability and seepage analysis, flow net, principles of design of earth dams.
Gravity Dams: Force acting on a gravity dam, stability requirements.

Unit- IV

Well Irrigation: Open wells and tube wells, types of tube wells, duty of tube well water. Cross-Drainage Structure: Necessity of Cross drainage structures, their types and selection, comparative merits and demerits.

Unit- V

Hydrology: Definition, Hydrologic cycle, measurement of rainfall, Flood hydrograph, Rainfall analysis, Infiltration, Run off, Unit hydrograph and its determination.

BTCE506A AIR & NOISE POLLUTION AND CONTROL

Unit- I

Introduction: Objective, scope and outcome of the course.

Air Pollution: Air pollutants, Sources, classification, Combustion Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects-Smoke, smog and ozone layer disturbance, Greenhouse effect.

Unit- II

Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations, control principles.

Unit- III

Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.

Unit- IV

Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria,

Unit- V

Effects of noise on health, annoyance rating schemes; special noise environments: Infrasound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices. Noise control methods.

BTCE506B DISASTER MANAGEMENT

Unit- I

Introduction: Objective, scope and outcome of the course.
Introduction: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Natural and Manmade Disasters, Disaster and Development, and Climate Change.
Types of Disasters, their occurrence/ causes, impact and preventive measures:

Unit- II

Geological Disasters: earthquakes, landslides, tsunami, mining;

Hydro-Meteorological Disasters: floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves.

Unit- III

Biological Disasters: epidemics, pest attacks, forest fire.;

Technological Disasters: chemical, industrial, radiological, nuclear.

Unit- IV

Manmade Disasters: building collapse, rural and urban fire, road and rail accidents.

Disaster profile of Indian continent, Mega Disasters of India and Lessons Learnt. Risk mapping.

Unit- V

Disaster Management Cycle: Disaster Management Cycle and its components: Pre disaster and post disaster, Paradigm Shift in Disaster Management. Safety tips for various types of disasters.

Disaster management system in India: Disaster Management Act 2005, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter- Governmental Agencies.

BTCE506C TOWN PLANNING

Unit- I

Introduction: Objective, scope and outcome of the course.
Introduction: Definition of town planning, Evolution of towns, Objects of town planning, Economic Justification for town planning, Principles of town planning, Necessity of town planning, Origin, Growth and patterns of town development, distribution of land use, site for ideal town, powers required to enforce T.P. scheme

Unit- II

Civic Surveys: Definition, Necessity, collection of data, Types of surveys, methods adopted to collect data, Drawings, reports.

Zoning: Definition, Use of land, Objects of zoning, Principles of zoning, Aspects, Advantages & Importance zoning, Transition zone, Zoning powers, Maps for zoning

Unit- III

Importance and Demand of housing, Classification, requirements and design of residential building, Housing agencies, Housing problems in India.

Slums: Causes, characteristics and effects of slums, Slum clearance.

Unit- IV

Industries: Classification of industry, Concentration of industry, requirements of the industry, Industrial townships.

Public Buildings: Location, classification principle of design, town center, grouping of public buildings. Town Planning, CL-SPP/CL-DDU/Nadiad, Gujarat, INDIA 4

Unit- V

Re-planning of existing towns: Objects of re-planning, defects of existing town, data required for re- planning, Urban Renewal projects, De-centralization and Re-centralized, Garden city concept overview.

BTCE507A REPAIR AND REHABILITATION OF STRUCTURES

Unit- I

Introduction: Objective, scope and outcome of the course.
Deterioration of Concrete Structures: Penetrability of concrete permeability, sorptivity, diffusion. Physical processes- abrasion, erosion. Chemical- carbonation, chloride and sulfate attack. Alkali – Aggregate Reaction. Corrosion- mechanism.

Unit- II

Factors affecting and Preventive measures :for all the above, including water – proofing techniques for various conditions, sacrificial anode, corrosion resistant steel, corrosion inhibitors, protective coatings etc.
Cracks in Concrete and Masonry Structures- Types, patterns, measurement and preventive measures

Unit- III

Assessment of Risk/Damage in Structures: Preliminary investigation- visual, history collection etc. Detailed Investigation: core cutting, rebar locator, corrosion meter, penetration resistance, pull out tests, half–cell potential, concrete resistivity etc. Interpretation of non destructive test data from all the above tests as well as rebound hammer number and ultra sonic pulse velocity. Destructive and chemical tests- on material samples from site.

Unit- IV

Materials for Repair: polymers and resins, self curing compounds, FRP, ferro-cement-properties, selection criterion, cement based and polymer modified mortars etc
Repair Techniques: Grouting, Jacketing, External bonded plates processes, limitations, design computations etc. including numerical problems.

Unit- V

Under Water Repair: Processes
Case Studies: related to rehabilitation of bridge piers, heritage structures, masonry structures etc.

BTCE507B GROUND IMPROVEMENT TECHNIQUES

Unit- I

Introduction: Objective, scope and outcome of the course.

Introduction: Formation of soil- Mechanical Weathering, Chemical weathering, types of soil- Residual soil, Transported soil, Regional soil Deposit in India, Difficult soils- Expansive soil, Collapsible soil, organic soil etc. Purpose and Principles of Ground Improvements.

Unit- II

Densification by Compaction Near Surface: Theory of compaction, Laboratory compaction tests; compaction in field, Effect of compaction on different soil properties, Factor affecting compaction in field, Measurement of density in field.

Densification by Deep Compaction:

(a) Vibration methods- Vibro compaction, Vibro floatation, Vibratory probes method, Blasting.

(b) Displacement methods- Sand compaction piles; Dynamic compaction.

Unit- III

Modification Using Stone Columns:

Introduction- Failure mechanism, load carrying capacity, settlement analysis, installation technique, Geo-synthetic -encased stone columns, Mechanism of encasement, field control of stone columns

Pre-Compression and Vertical Drain: Applicability and types of pre compression. Purpose and mechanism of pre-compression by pre loading. Design procedure of pre-compression by preloading.

Pre-compression by preloading with vertical drains- Principles, Advantages, and disadvantages of Vertical drains, Type of Vertical drains, Installation, Monitoring and Instrumentation of Vertical drains.

Unit- IV

Modification by Grouting: Purpose, principles and classification of grouts and their properties. Desirable characteristics of grout, Grouting methods, Planning and
operation of grouting, control of grouting operations and monitoring.

Unit- V

Modification by Soil Reinforcement: Purpose of reinforced earth, Mechanism of reinforced soil, Failure mechanism of reinforced earth, Advantages of reinforced earth. Application of Reinforced Earth,

Design methods of reinforced earth wall-

(a) Check for External stability.

Check for Internal stability.

Miscellaneous Methods of Soil stabilization: Lime stabilization, cement stabilization, bituminous stabilization, chemical stabilization.

BTCE507C ENERGY SCIENCE AND ENGINEERING

Unit- I

Introduction: Objective, scope and outcome of the course.
Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment

Unit- II

Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar,
nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems

Unit- III

Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability

Unit- IV

Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.

Unit- V

Engineering for Energy conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings; Identification of energy related enterprises

BTCE 508 CONCRETE STRUCTURES DESIGN LAB

1. Revision of Typical problems of BMD and SFD

2 .Analysis and Design of singly reinforced rectangular beam section for flexure, based on Working stress design philosophy.

3. Analysis and Design of singly reinforced rectangular beam section for flexure, based on Limit State design philosophy
4 .Analysis and Design of doubly reinforced rectangular beam section for flexure, based on Limit State design philosophy

5. Analysis and Design of flanged beam section for flexure, based on Limit State design philosophy

6. Problems on Limit state of serviceability for deflection as per codal provisions of empirical coefficients.

7. Analysis and design of prismatic sections for shear using LSD

8. Problems on limit state of collapse in bond

9. Analysis and design of one way slabs using LSM,

10. Analysis and design of two way slabs using LSM,

11. Analysis and design of short axially loaded columns

12. Analysis and design of footing

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

BTCE 509 GEOTECHNICAL ENGINEERDING LAB

1. Grain size distribution by sieve Analysis and Hydrometer

2 .Determination of specific Gravity by Pycnometer.

3. Determination of liquid limit by Casagrande's apparatus and cone penetrometer.

4. Determination of plastic limit and shrinkage limit

5. Determination of field density by core-cutter and sand replacement method

6. Determination of compaction properties by standard Proctor Test Apparatus

7. Determination of C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.

8. To determine the differential free swell index of soil and swelling pressure of soil.

9. To determine the CBR of soil.

10. To determine the compressibility parameters of soil by consolidation test.
11. To determine the permeability of soil by constant and falling head methods. Design as per syllabus of theory.

BTCE510 WATER RESOURCES ENGINEERING DESIGN LAB

Design as per syllabus of theory.

BTCE 511 INDUSTRIAL TRAINING

BTCE512 SOCIAL OUTREACH, DISCIPLINE & EXTRA CURRICULAR ACTIVITIES

SIXTH SEMESTER								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE 601	Wind & Seismic Analysis	3	-	-	30	70	100	3
BTCE 602	Structural Analysis-Ii	3	1	-	30	70	100	4
BTCE 603	Environmental Engineering	3	-	-	30	70	100	3
BTCE 604	Design Of Steel Structures	3	-	-	30	70	100	3
BTCE 605	Estimating & Costing	3	1	-	30	70	100	4
ELECTIVE –I(Choose any one)								
BTCE 606A	Pre-Stressed Concrete	3	-	-	30	70	100	3
BTCE 606B	Solid And Hazardous Waste Management	3	-	-	30	70	100	3
BTCE 606C	Traffic Engineering And Management	3	-	-	30	70	100	3
ELECTIVE –II(Choose any one)								
BTCE 607A	Bridge Engineering	3	-	-	30	70	100	3
BTCE 607B	Rock Engineering	3	-	-	30	70	100	3
BTCE 607C	Geographic Information System & Remote Sensing	3	-	-	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE 608	Environmental Engineering Design And Lab	-	-	2	30	20	50	1
BTCE 609	Steel Structure Design Lab	-	-	2	30	20	50	1
BTCE 610	Quantity Surveying And Valuation Lab	-	-	2	30	20	50	1
BTCE 611	Water And Earth Retaining Structures Design Lab	-	-	2	30	20	50	1
BTCE 612	Foundation Design Lab	-	-	2	30	20	50	1
BTCE 613	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	21	2	10	360	590	1000	29

BTCE601 WIND AND SEISMIC ANALYSIS

Unit-I

Introduction: Objective, scope and outcome of the course.
Structural Systems: Types of structures and Structure's forms, Symmetry and Asymmetry in building forms, Vertical and lateral load resting elements, shear walls, framed tubes and various multistory configurations.

Unit-II

Design Loads: various types of loads and relevant codes. Design loads for different types of buildings. (IS-875 part 1 & 2) & Load Flow Concept

Unit-III

Wind Loads Analysis: Wind loads & calculation of wind load on flat roof, pitched roof and single sloped roof buildings (IS: 875-Part 3).

Unit-IV

Earthquake Load Analysis: Earthquake loads & calculations of earthquake loads on framed structures. (IS: 1893 – Part 1).

Unit-V

Earthquake Resistant Construction: Typical seismic failure of masonry and RCC structures. Earthquake resistant construction of buildings, and various provisions as per IS codes; IS 4326,IS-13827, IS-13828, IS-13920, IS-13935.

BTCE602 STRUCTURAL ANALYSIS-II

Unit-I

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

of redundancy and trussed beams; Stresses due to temperature & lack of fit in redundant frames; deflection of determinate beams, frames using energy methods.

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

BTCE603 ENVIRONMENTAL ENGINEERING

Unit-I

Introduction: Objective, scope and outcome of the course.
Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices. Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.

Unit-II

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Unit-III

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water.
Sewage characteristics: Quality parameters: BOD, COD, TOC, Solids, DO, Nitrogen, Phosphorus, Standards of disposal into natural watercourses and on land, Indian standards.

Unit-IV
Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.
Wastewater Disposal and Refuse: Disposal of sewage by dilution, Self purification of streams, sewage disposal by irrigation sewage farming, waste water reuse.

Unit-V

Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air quality standards, Control measures for Air pollution

Noise- Basic concept, measurement and various control methods

BTCE 604 DESIGN OF STEEL STRUCTURES

Unit-I

Introduction: Objective, scope and outcome of the course.
Types of Steels and their broad specifications. Structural steel forms- hot rolled, tubular, light gauge etc and their applicability. Classification of cross sections as per IS 800-2007- Plastic, compact, semi compact and slender- characteristics
Plastic analysis of steel structures, fundamentals, shape factor, static and mechanism method of analysis, bending of beams of uniform cross sections (any shape)

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

Unit-II

Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded members.
Compression Members: Types of buckling, Imperfection factor, Buckling curves for different cross sections as per IS. Design of compression members: Axially loaded members including made up of
angle section: single and in pair; built up columns including design of lacings and battens as per IS.

Unit-III

Beams: Design of beams: simple and compound sections. Design of laterally supported and unsupported beams including for web buckling, web crippling, lateral torsional buckling.
Member design under combined forces: Compressive load and uniaxial moment. tension and uniaxial moment
Column Bases: Design of column bases for axial and eccentric compressive loads: Slab and gusseted base.

Unit-IV

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

Unit-V

Design of gantry girder .
Design of roof trusses members for combined forces, wind loading etc. Purlin design. Introduction to Pre Engineered Buildings , characteristics and their applications.
Introduction of truss girder bridges-its members including portal and sway bracings etc. Design aspects of foot over bridges.

BTCE605 ESTIMATING & COSTING

UNIT 1 :

INTRODUCTION : Objective, scope and outcome of the course.

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.

UNIT 2 :

Estimating: Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

UNIT 3 :

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 4 :

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 5 :

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

BTCE606A PRE-STRESSED CONCRETE

Unit-I
Introduction: Objective, scope and outcome of the course.
Introduction: Basic concepts of Pre-stressing and its advantages. Materials for pre-stressed concrete. Tensioning devices. Pretensioning and post tensioning systems.

Unit-II

Analysis of Pre-stress and Bending Stresses: Assumptions, Flexural analysis of pre-stressed rectangular and unsymmetrical T section. Concept of load balancing.

Unit-III

Losses of Pre-stress: Losses due to - elastic deformation of concrete, successive tensioning of curved cable, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip.

Unit-IV

Deflection of Pre-stressed Concrete Members: Effect of tendon profile and associated factors incontinuous members. Computation of deflection in pre-stressed concrete members.

Unit-V

Design of Pre-stressed Concrete Sections: Flexural Shear and Torsional strength using simplified code procedure (IS-1343-2012). Design of simply supported Pre-stressed Concrete Sections for flexure.

BTCE606B SOLID AND HAZARDOUS WASTE MANAGEMENT

Unit-I

Introduction: Objective, scope and outcome of the course.

Introduction to SWM: Definition of waste and solid waste, classification solid waste, sources of solid waste, its composition, factors affecting waste generation, traditional methods of waste collection and disposal

Unit-II

Waste Collection: Components of waste collection, waste collection containers, their characteristics, types, waste collection vehicles, collection frequency, collection route, transfer stations

Unit-III

Solid Waste Characterization: Physical characteristics, chemical characteristics and biological characteristics of solid wastes

Waste Processing: Size reduction, factors affecting size reduction, size reducing equipment, volume reduction, equipment for volume reduction, waste minimization, waste hierarchy, 3 R principle

Unit-IV

Hazardous Waste: Definition, sources, classification, collection, segregation, treatment and disposal methods

Radioactive Waste, E-Waste, Biomedical Waste: Definition, sources, classification, segregation, management and disposal methods

Unit-V

Treatment and Disposal of Solid Waste: Composting, vermicomposting, biogas production, thermal treatment, incineration, pyrolysis, gasification, biological treatment, Sanitary land filling, land fill leachate and gas management
Latest Advances and Rules related to SWM, Hazardous Waste, Plastic Waste and E-Waste Management

BTCE606C TRAFFIC ENGINEERING AND MANAGEMENT

Unit-I
Introduction: Objective, scope and outcome of the course.
Traffic Planning and Characteristics: Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow .

Unit-II
Traffic Surveys: Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including nonmotorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation –Level of service – Concept, applications and significance

Unit-III
Traffic Design and Visual Aids: Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Networking pedestrian facilities & cycle tracks.

Unit-IV
Traffic Safety and Environment: Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards –

Unit-V
Traffic Management: Area Traffic Management System – Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods-Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.

BTCE607A BRIDGE ENGINEERING

Unit-I
Introduction: Objective, scope and outcome of the course.

Introduction: Type of bridges & classification of road & railways bridges. IRC & Railway loadings for bridges, wind load & Earthquake forces. : Expansion joints.

Unit-II
Steel bridges: Introduction to Design of through type &deck type steel bridges for IRC loading. Design of through type truss bridges for railway loadings.

Unit-III
Reinforced concrete culverts: Reinforced concrete slab culvert

Unit-IV
Reinforced concrete bridges: T-beam bridges-courbons & Hendry-Jaegar methods.

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

BTCE607B ROCK ENGINEERING

Unit-I
Introduction: Objective, scope and outcome of the course.
Engineering Classification of Rocks: Objectives, Intact rock classification, Rock mass Classification. Terzaghi's, Rock load classification, Austrian classification, Deere's rock quality classification, rock structure rating concept, RMR classification, Q classification. Inter relation between Q and RMR.
Unit-II
Engineering Properties and Laboratory Tests on Rocks: Porosity, Density, Moisture content, Degree of saturation, Co-efficient of permeability, Durability, Compressive strength, Tensile strength, Shear strength, elasticity, Plasticity Deformability. Sampling and Samples Preparations, Uniaxial Compressive strength, Tensile Strength – Brazilian test, Shear strength test – Direct Shear test and Punch shear test, Triaxial Test, Flexural strength.
Unit-III
In-situ Tests on Rocks: Necessity of Insitu test, Plate load test for deformability, Field Shear test
Jointed Rocks: Rocks Joint properties, Joint properties, Joint Roughness Co-efficient, Scale effects, Dilation, Orientation of Joints, Gouge, Joint Intensity, Uniaxial Compressive strength of Jointed Rocks.
Unit-IV
Strength of Rocks in Unconfined Condition: Ramamurthy Strength Criteria, Singh and Rao Strength Criteria, Kulatilake Methodology, Barton Methodology.

Unit-V

Strength of Rocks in Confined Condition: History of Hoek and Brown Failure Criterions, Parabolic Strength Criteria.
Bearing Capacity of Rocks: Bearing capacity of intact rocks, jointed rocks,IS Code methodology, Singh and Rao Method and latest methodologies.

BTCE607C GEOGRAPHIC INFORMATION SYSTEM & REMOTE SENSING

Unit-I
Introduction: Objective, scope and outcome of the course.
Photogrammetry: Definition of Photogrammetric Terms, Geometry of aerial and terrestrial photographs,Aerial camera and phototheodolite, Scale of a Photograph, Tilt and Height displacements, Stereoscopicvision and stereoscopes, Height determination from
parallax measurements, Flight planning, Maps and Map substitutes and their uses.

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

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

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

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

BTCE608 ENVIRONMENTAL ENGINEERING DESIGN AND LAB

Design:

1. Population forecasting and water demand
2. Water Quality parameters
3. Design of Sedimentation tanks, coagulation and flocculation tanks
4. Design of rapid and slow sand filters

5. Design of disinfection units and transmission systems
6. Design of Sewer lines and storm water systems
7. Design of aerobic and anaerobic treatment units
8. Design of suspended and attached growth systems

Lab:

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Optimum coagulant dose
5. Chemical Oxygen Demand (COD)
6. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
7. Break point Chlorination
8. Bacteriological quality measurement: MPN,

BTCE609 STEEL STRUCTURES DESIGN LAB

Analysis and design Problems as per different topics of syllabus of theory BTCE604, with latest version of IS 800 and other relevant IS codes. In addition to numerical problems, following exercises:
1. Case study of foot over bridges/truss- girder bridge in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names and section details of different members in it (maximum limit of words :1000).
2. Case study of a structure using tubular sections or light gauge sections in vicinity /home town of the students, preferably in groups of 8-10 students. A report including photographs marked with names, size and section details of different members in it (maximum limit of words: 1000).

BTCE610 QUANTITY SURVEYING AND VALUATION LAB

1. Preliminary Estimate (Plinth Area and Cubic Content)
2. Detailed Estimate of buildings (Long wall-Short wall and Centre line method)
3. Rate Analysis of different Items of Works (Earthwork, Concrete Work, DPC, Stone masonry, Brickwork, RCC, Roofing, Flooring, and Finishing etc.)
4. Earthwork Calculation for Roads, Irrigation Canals and Channels (cutting and filling)
5. Valuation of Buildings and Properties

BTCE611 WATER AND EARTH RETAINING STRUCTURES DESIGN LAB

1.Continuous Beams: Analysis and Design of continuous beams using coefficients (IS Code), concept of moment redistribution

2 Curved Beams: Analysis and design of beams curved in plan.

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

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

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

BTCE612 FOUNDATION ENGINEERING LAB

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

BTCE613 SOCIAL OUTREACH, DISCIPLINE & EXTRA CURRICULAR ACTIVITIES

SEVENTH SEMESTER (NEW JUNE2020)								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE701	Transportation Engineering	3	0	0	30	70	100	3
Open Elective (Choose any one)								
BTCE702A	Human Engineering and safety	3	0	0	30	70	100	3
BTCE702B	Environmental Engineering and Disaster management	3	0	0	30	70	100	3
BTCE702C	Non Destructive Testing	3	0	0	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTCE703	Road Material Testing Lab	0	0	2	30	20	50	1
BTCE704	Professional Practices & Field Engineering Lab	0	0	2	30	20	50	1
BTCE705	Soft Skill Lab	0	0	2	30	20	50	1
BTCE706	Environmental Monitoring And Design Lab	0	0	2	30	20	50	1
BTCE707	Seminar	2	0	0	60	40	100	2
BTCE708	SODECA	0	0	0	0	50	50	1
	total	**8**	**0**	**8**	**240**	**310**	**550**	**13**

BTCE701: Transportation Engineering

Syllabus

Unit- I

Introduction: Objective, scope and outcome of the course Highway planning and alignment : Different modes of transportation – historical Development of road construction- Highway Development in India –Classification of roads- Road pattern – Highway planning in India-

Highway alignment - Engineering Surveys for alignment – Highway Project- Important Transport/Highway related agencies in India. PMGSY project. Introduction about IRC, NRRDA

Unit- II

Geometric Design of highways: The highway crosses sectional elements- Camber-Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves- Recommendations of IRC Codes of Practice.
Highway Materials: Desirable Properties, Testing Procedures, Standards and standard values relating to Soil, Stone Aggregates, Bitumen and Tar, fly- ash/pond-ash. Role of filler in bituminous mix, materials of filler. Specifications of DLC and PQC for rigid pavement

Unit- III

Highway Construction and Equipments: Methods of constructing different types of roads viz. Earth roads, Stabilized roads, WBM, WMM roads, earthen embankments, DLC and embankments with fly ash. Bituminous roads and Concrete roads. Berms and Shoulders, Features of rural roads including those in PMGSY. Hot mix plant for Bituminous roads- components, layout, control panel, quality assurance. Highway construction of rigid and flexible pavements including types of road rollers, specifications of compaction of different layers of bituminous roads, modern pavers for CC roads. Roller compacted concrete road construction

Unit- IV

Design of flexible and rigid pavements as per IRC: IRC provisions including those of IRC 37, IRC 58
Introduction of Railway Engineering: Types and Selection of Gauges, Selection of Alignment, Ideal Permanent Ways and Cross- sections in different conditions, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings

Unit- V

Introduction of Airports and Harbours: **Airport Engineering**: - Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size. Planning of Airport: Requirements of Airport- Terminal Area, Runway Length etc. Harbours: history of water transportation, modern trends in water transportation, components of harbour, classification of harbours. Ports and docks

Text / Reference Books:

1. Highway Engineering by Khanna SK & CG Justo, Nem Chand & Brothers, Roorkee.
2. Highway Engg. By LR Kadyali, Khanna Tech Publications, Delhi.
3. Railway Engineering by Saxena SC and Arora SP, Dhanpat Rai Publishers, Delhi.

4. S C Rangwala, airport engineering, Charotar publication house. 7 Gautam H. Oza, Dock &Harbour Engineering, Charotar publication House.

BTCE702A: Human Engineering and safety

Syllabus

Unit- I

Introduction: Objective, scope and outcome of the course , Human factors in system development – concept of systems Basic processes in system development, performance reliability, human performance. Information input process

Unit- II

Visual displays, major types and use of displays, auditory and factual displays.

Unit- III

Measurement of energy, direct and indirect methods. Energy cost of different activities and Acceptable work load. Noise and vibration, its measurement and control.

Unit- IV

Anthropometry: arrangement and utilization of work space, atmospheric conditions, heat exchange process and performance.

Unit- V

Dangerous machine (Regulation) act, Rehabilitation and compensation to accident victims, Safety gadgets for spraying, threshing, Chaff cutting and tractor & trailer operation etc.

BTCE702B: Environmental Engineering and Disaster management

Syllabus

Unit- I

Introduction: Objective, scope and outcome of the course. Importance of safe water supply system. Domestic water requirements for urban and rural areas

Unit- II

Sources of Water supply : Intakes and transportation of water. Drinking water quality. Indian Standards of drinking water.

Unit- III

Introduction to water treatment for safe drinking, Importance of sanitation. Domestic waste water: quantity, characteristics, disposal in urban and rural areas.

Unit- IV

Sewer: types, design discharge and hydraulic design. Introduction to domestic wastewater treatment. Solid waste: quantity, characteristics and disposal for urban and rural areas.

Unit- V

Introduction to air pollution.: Types of pollutants, properties and their effects on living beings. BIS standards for pollutants in air and their abetments. Introduction to various disaster, Importance of disaster management**.**

BTCE702C: Non Destructive Testing

Syllabus

Unit- I

Introduction: Objective, scope and outcome of the course.

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

Unit- II

Surface Non Destructive Evaluation (NDE) Methods: Liquid Penetrant Testing, Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods. Testing Procedure, Magnetic Particle Testing, Theory of magnetism, inspection materials. Magnetisation methods, Interpretation and evaluation, Principles and methods of demagnetization, Residual magnetism

Unit- III

Thermography and Eddy Current Testing (ET): Thermography, Principles, Contact and non contact inspection methods, Advantages and limitation, Instrumentations and methods, applications. Eddy Current Testing, Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

Unit- IV

Ultrasonic Testing (UT) and Acoustic Emission (AE): Ultrasonic Testing, Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A-Scan, B-scan, C-scan. Acoustic Emission Technique, Principle, AE parameters, Applications.

Unit- V

Radiography (RT): Principle, Interaction of X-Ray with matter, imaging, film and film less techniques, Types and use of filters and screens, Geometric factors, Inverse square, law, characteristics of films, Interpretation/ Evaluation, Fluoroscopy, Xero Radiography, Computed Radiography, Computed Tomography.

Special Techniques and Applications: Phased array ultrasonics time of flight diffractions, Automated and remote ultrasonic testing, Acoustic pulse reflectometry, Alternative current field method, Case studies on NDT techniques used in aircrafts.

PRACTICALS /VIVA VOCE

BTCE703: Road Material Testing Lab

Syllabus

1. Aggregate Impact Test

2. To determine the Angularity Number, Flakiness Index & Elongation Index of aggregates

3. Los Angeles Abrasion Test

4. Aggregate Crushing Value Test

5. Standard Tar Viscometer Test for given bitumen sample

6. Ductility Test for a given bitumen sample

7. To determine the softening point for given sample of bitumen.

8. Marshall Stability Test

9. Float Test

10. Preparation of Dry lean concrete mix and testing of its strength

BTCE704: Professional Practices & Field Engineering Lab

Syllabus

1. Different types of Knots

2. Site plan, index plan, layout plan, plinth area, and floor area of buildings

3. Foundation plan layout infield

4. Bar bending schedule

5. Specifications- For different classes of building and Civil Engineering works

6. Specifications of building components

7. Valuation of buildings and properties

8. Work at heights – scaffolding and ladders use, type of scaffolds, safety requirements, design and load factors, defects and inspection norms, type of
ladders, upkeep, defects and good maintenance tips

BTCE705: Soft Skill Lab

Syllabus

SOFT SKILLS- Introduction to Soft Skills, Aspects of Soft Skills, Identifying your Soft Skills, Negotiation skills, Importance of Soft Skills, Concept of effective Communication. SELF-DISCOVERY- Self-Assessment, Process, Identifying Strengths and limitations, SWOT Analysis Grid.

PREPARING CV/RESUME – Introduction, meaning, difference among bio-data, CV and resume, CV writing tips. Do's and don'ts of resume preparation, Vocabulary for resume, common resume mistakes, cover letters, tips for writing cover letters.

INTERVIEW SKILLS - Introduction. Types of interview, Types of question asked, Reasons for rejections, Post-interview etiquette, Telephonic interview, Dress code at interview, Mistakes during interview, Tips to crack on interview, Contextual questions in interview skills, Emotional crack an interview, Emotional intelligence and critical thinking during interview process.

DEVELOPING POSITIVE ATTITUDE – Introduction, Formation of attitude, Attitude in workplace, Power of positive attitude, Examples of positive attitudes, Negative attitudes, overcoming negative attitude and its consequences,

IMPROVING PERCEPTION- Introduction, Understanding perception, perception and its application in organizations.

CAREER PLANNING – Introduction, Tips for successful career planning, Goal Setting immediate, short term and long term, Strategies to achieve goals, Myths About choosing career.

TEAM BUILDING AND TEAM WORK - Introduction, Meaning, Characteristics of an effective team, Role of a Team Leader, Role of Team Members, inter group Collaboration Advantages, Difficulties faced, Group Exercises-Team Tasks and Role-Play, Importance of Group Dynamics.

TIME MANAGEMENT: The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say "no" to time wasters, develop your own individualized plan of action.

STRESS MANAGEMENT – Introduction, meaning, positive and negative stress, Sources of stress, Case studies, signs of stress, Stress management tips, Teenage stress. Group discussion practice on current topics, Quantitative aptitude and reasoning preparation.

Text / Reference Books:

1 Butterfield, Jeff, 'Soft Skills for Everyone', Cengage Learning, New Delhi, 2010.
2 G.S. Chauhan and Sangeeta Sharma, 'Soft Skills', Wiley, New Delhi, 2016.
3 Klaus, Peggy, Jane Rohman & Molly Hamaker, 'The Hard Truth About Soft Skills', Harper Collins E-books, London, 2007.
4 S.J. Petes, Francis, 'Soft Skills and Professional Communication', Tata McGraw Hill Education, New Delhi, 2011.
5 Dr. R. S. Aggarwal, Quantitave aptitude & reasoning, S Chand & company ltd.
6 Dr. R. S. Aggarwal, A modern approach to Verbal & Non-verbal reasoning, S Chand & company ltd.

BTCE706: Environmental Monitoring And Design Lab

Syllabus

Design:

1. Sewer design and estimation of Waste/Storm water by software.
2. Design of Water Treatment Plant and Sewage Treatment Plant
3. Design of Oxidation pond, stabilization pond and aerated lagoons.
4. Design of aerobic and anaerobic digester.

Lab:

1. Demonstration of air pollution monitoring instruments namely, High volume sampler

2. Determination of SPM, PM10andPM2.5.

3. Demonstration of noise pollution monitoring equipment namely, modular precision sound level meter.

4. Air quality monitoring for Traffic/Residential locality and its effect on the environment.

5. Noise quality monitoring for Traffic/Residential locality and its effect on the environment.

6. Latest technology for management of municipal solid waste

Recommended Texts:

1 Manual on Sewerage and Sewage Treatment Systems – 2013, CPHEEO, New Delhi
2 Compendium of sewage treatment technologies Published by NRCD, MoEF, GOI, 2009
3 Storm Water Management Model (SWMM) and Manual, Published by US EPA
4 IS 5182-23 (2006) published by Bureau of Indian Standards
5 IS 4758: 1968 published by Bureau of Indian Standards
6 MoEF Guidelines and amendments as updated onhttp://moef.gov.in

7 CPCB Guidelines and amendments as updated onhttps://cpcb.nic.in

BTCE707: Seminar

BTCE708: Social Outreach, Discipline & Extra Curricular Activities

EIGHT SEMESTER (NEW JUNE2020)								
THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCE801	Project Planning and Construction Management	3	0	0	30	70	100	3
Open Elective								
BTCE802A	Energy Management	3	0	0	30	70	100	3
BTCE802B	Waste And By Product Utilization	3	0	0	30	70	100	3
BTCE802C	Disaster Management	3	0	0	30	70	100	3
	PRACTICALS/VIVA VOCE	**No. of**			**Sessional**	**Practical**	**Total**	**Credits**

		Teaching Hours						
BTCE803	Project Planning and Construction Management lab	0	0	2	30	20	50	1
BTCE804	Pavement design	0	0	2	30	20	50	1
BTCE805	Project	3	0	0	0	50	50	1
BTCE806	SODECA	0	0	0	0	50	50	1
	total	**9**	**0**	**4**	**120**	**280**	**400**	**10**

BTCE801 Project Planning and Construction Management

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

Safety and Other Aspects of Construction Management: Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.

Recommended Texts:

1. Construction Planning & management By P S Gahlot & B M Dhir, New Age International Limited Publishers.
2. Construction Project planning & Scheduling by Charles Patrick, Pearson, 2012..
3. Construction Project Management Theory & practice --- Kumar Neeraj Jha, Pearson, 2012
4. Modern construction management--Harris, Wiley India.
5. Construction Management & Planning by Sengupta and Guha-Tata McGraw Hill publication.
6. Project Management – K Nagrajan – New age International Ltd. Professional Construction Institute Edition.
7. Construction Project Management Planning, Scheduling and Controlling- Chitakara- Tata McGraw Hill, New Delhi
8. Construction Planning, Equipment and Methods by R. L. Peurify.

BTCE802A Energy Management

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course.

Unit-II

Energy Basics; Energy Demand Management, Conservation & Resource Development, Energy for Sustainable Development.

Unit-III

Need for Energy Management by Sector- Industry, Buildings & Houses, Transport, Electric Power.

Unit-IV

Need for Energy Management by Sector- Agriculture, Domestic; Energy forecasting techniques; Energy Integration, Energy Matrix.

Unit-V

Energy Auditing; Energy management for cleaner production, application of renewable energy, appropriate technologies.

BTCE802B Waste and By-product Utilization

Syllabus

Unit-I

Introduction: Objective, scope and outcome of the course.

Unit-II

Types and formation of byproducts and waste; magnitude of waste generation in different agro- processing industries; concept scope and maintenance of waste management and effluent treatment, basics pf Waste Recycling & Resources Recovery System (WRRRS), Temperature, pH, Oxygen demands (BOD, COD), fat, oil and grease content, metal content, forms of phosphorous and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues.

Unit-III

Waste utilization in various industries, furnaces and boilers run on agricultural wastes and byproducts, briquetting of biomass as fuel, production of charcoal briquette, generation of electricity using surplus biomass, producer gas generation and utilization.

Unit-IV

Waste treatment and disposal, design, construction, operation and management of institutional community and family size biogas plants, concept of vermi-composting, Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation, Secondary treatments: Biological and chemical oxygen demand for different food plant waste– trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons.

Unit-V

Tertiary treatments: Advanced waste water treatment process-sand, coal and activated carbon filters, phosphorous, sulphur, nitrogen and heavy metals removal, Assessment, treatment and disposal of solid waste.

BTCE802C DISASTER MANAGEMENT

Syllabus

Unit-I
Introduction: Objective, scope and outcome of the course.
Unit-II
Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, impact and preventive measures.
Unit-III
Natural. Disasters- Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions.
Unit-IV
Man made Disasters: Textile Processing Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards.
Unit-V
Management roll in mitigating Disaster in Indian Textile Industries. Roll of production people in Disaster Management.

BTCE803 Project Planning and Construction Management Lab

Syllabus

1. Assignments on net present value, benefit cost ratio, internal rate of return.
2. Types of contracts – Tenders, tender form, submission and opening of tenders, measurement book, muster roll, piecework agreement and work order.
3. Drafting of tender documents, special terms and conditions.
4. Drafting of tender notices for different types of works
5. Different models of PPP like BOT, BOOT etc.
6. Arbitration.
7. Preparation of bar diagram.
8. Network Analysis using PERT and CPM.

BTCE804 Pavement Design

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Syllabus

1. **Pavement Mix Analysis:** Aggregate blending, bituminous mix design – Marshall Stability approach, concrete mix design for DLC and PQC with IS code provisions.
2. **Pavement Basics:** Types & comparison, vehicular loading pattern, factors affecting design and performance of pavements, sub grade requirements.
3. **Design of Flexible Pavements:** Analytical approach, flexible pavement layers, ESWL, repetitions of load, techniques of design methods, wheel load analysis, traffic analysis, stress distribution in sub-grade soil, Burmister's theories, group index method, CBR approach, IRC 37 and other guidelines.
4. **Design of Concrete Pavements:** Westergaard's approach, temperature & frictional stresses, design of expansion & longitudinal joints, design of dowel & tie bars, IRC 58 and other guidelines.
5. **Specifications for rural roads:** Important aspects of IRC SP 020, Rural Road Manual. NRRDA publications

BTCE805: Project

BTCE 806: Social Outreach, Discipline & Extra