Scheme & Syllabus

(Choice Based Credit System)

For

B. Tech. Programme in Civil Engineering (Regular & Honors)

Specializations: Environmental Engineering, Highways & Transportation Engineering, Infrastructure Development & Management, Soil & Foundation Engineering, Structural Engineering

(w.e.f. Session 2017-18)

Program Code: CIV 301

DEPARTMENT OF CIVIL ENGINEERING

SCHOOL OF ENGINEERING

RIMT UNIVERSITY, MANDIGOBINDGARH, PUNJAB

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SECTION 1

Vision & Mission of the University

VISION

- To become one of the most preferred learning places and a centre of excellence to promote and nurture future leaders who would facilitate the desired change in the society.

MISSION

- To impart teaching and learning through cutting-edge technologies supported by the world class infrastructure
- To empower and transform young minds into capable leaders and responsible citizens of India instilled with high ethical and moral values.
- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their social responsibilities.

SECTION 2

Vision and Mission of the Department

VISION

- Through excellence in technical education, research, and innovation become an internationally renowned technical department for human resource development.

MISSION

- Providing a scholarly atmosphere for Undergraduate, Post Graduate and Doctoral programmes while dissemination knowledge through leading edge research.
- Designing academic programmes and methods with dynamism, innovation, and flexibility.
- Engaging in joint initiatives with industry for the advancement and benefit of society.
- Creating morally competent, compassionate, and innovative world leaders.

SECTION 3

About the Program

B. Tech – Civil Engineering is an undergraduate programme. It is one of the oldest professional engineering disciplines that deal with the design, construction, and maintenance of the physical and naturally built environment, including works like bridges, roads, canals, dams, and buildings. It is traditionally broken into several sub-disciplines including environmental engineering, geotechnical engineering, structural engineering, transportation engineering, municipal or urban engineering, water resources engineering, materials engineering, coastal engineering, surveying, and construction engineering. Civil engineering takes place on all levels in the public sector, and in the private sector.

SECTION 4

Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

PROGRAMME EDUCATION OBJECTIVES (PEOs)

PEO1 Graduates will be actively engaged in a professional profession as a civil engineer or pursuing advanced study

PEO2 Graduates will understand professional practice issues and demonstrate a commitment to professional licensure and continuing education.

PEO3 Develop technical and management flair to take responsibility for engineering projects and research programs significantly

Program Outcome (POs)

PO 1 Generic and Domain Knowledge -An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization for the solution of complex engineering problems in engineering

PO 2 Problem Solving & Innovation - An ability to identify, formulate, research literature, analyze complex engineering problems in mechanical engineering using first principles of mathematics, natural sciences and engineering science

PO 3 Design/ development of solutions :An ability to design solutions for complex engineering problems and system component or processes that meet the specified needs considering public health & safety and cultural, societal & environment.

PO 04 Conduct investigations of complex problems :An ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to obtain solutions to engineering problems.

PO 05 Modern tool usage: Ability to create, select and apply appropriate techniques, resources and modern engineering activities, with an understanding of the limitations

PO 06 The Engineer and Society: Ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO 07 Environment and sustainability: Ability to demonstrate the knowledge of engineering solutions, contemporary issues understanding their impacts on societal and environmental contexts, leading towards sustainable development

PO 08 Ethics: An ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO 09 Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams and in multi- disciplinary settings

PO 10 Communication: Ability to communicate effectively oral, written reports and graphical forms on complex engineering activities

PO 11 Project management and finance : Ability to demonstrate knowledge and understanding of the engineering and management principles and apply those one's own work, as a member and leader in team, to manage projects and in multi-disciplinary environments.

PO 12 Lifelong learning: An ability to recognize the need for and having the preparation and ability to engage independent and life-long learning in broadest context of technological change

Program Specific Outcome (PSOs)

PSO 01: Development of professional skills in the area of Structural Engineering, Water Resources Engineering, Transportation Engineering, Environmental Engineering, Geotechnical Engineering, Geo-informatics & Remote sensing, and Construction techniques & management

PSO 02: Application of relevant aspects of mathematics in engineering analysis and design.

PSO 03: Refurbishing of technical communication skills

PSO 04: Application of these principles and practices to problems related to Civil Engineering and other allied technical & industrial fields.

PSO 05: Work as design consultants in construction industry for the design of civil engineering structures.

SECTION-5

Curriculum / Scheme with Examination Grading Scheme

SEMESTER WISE SUMMARY OF THE PROGRAMME B.TECH (CIVIL ENGINEERING)

Sem.	Fundamental (F)		Core (C)		AEC Corse	Deptt. Elective (E)	Open Elective (O)	Training	Project/ Thesis	Total Contact Hrs	Total Credits
	Th.	Lab	Th.	Lab							
I	4/5	3/4	-	-	1/2	-	-	-	-	31	25
II	4/5	3/4	-	-	1/2	-	-	-	-	31	25
III	-	-	5	2/3	-	-	-	1	-	28	24
IV	-	-	5	2/3	-	-	-	-	-	30	23
V	-	-	5	2/3	-	-	-	1	-	31	26
VI	-	-	4	2/3	-	1	-	-	1	30	24
VII	-	-	3	2/3	-	1	1		1	29	23
VIII	-	-	-	-	-	-	-	1	-	-	16
Total	10	07	22	10-15	02	02	01	03	02	-	186

EXAMINATION GRADING SYSTEM

Marks Percentage Range	Grade	Grade Point	Qualitative Meaning
80-100	O	10	Outstanding
70-79	A^+	9	Excellent
60-69	A	8	Very Good
55-59	B^+	7	Good
50-54	B	6	Above Average
45-49	C	5	Average
40-44	P	4	Fail
0-39	F	0	Fail
ABSENT	AB	0	Fail

Percentage Calculation: CGPA *10

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 2nd Year / 3rd Semester

Total Credits: 24
Contact Hours: 28

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-2301	Strength of Materials		4	3	2	-	3	-	16	-	24	60	-	100
2	BTCE-2302	Fluid Mechanics		4	3	2	-	3	-	16	-	24	60	-	100
3	BTCE-2303	Surveying & leveling		4	3	1	-	3	-	16	-	24	60	-	100
4	BTCE-2304	Building Material & Construction		4	4	-	-	3	-	16	-	24	60	-	100
5	BTCE-2305	Rock Mechanics & Engineering		3	3	-	-	3	-	16	-	24	60	-	100
6	BTCE-2306	Surveying Lab		1	-	-	3	-	-	-	60	-	-	40	100
7	BTCE-2307	Strength of Materials lab		1	-	-	2	-	-	-	60	-	-	40	100
8	BTCE-2308	Fluid Mechanics Lab		1	-	-	2	-	-	-	60	-	-	40	100
9	BTCE-2309	Institutional Training		2	-	-		-	-	-	100	-	-	-	100
Total				24	16	5	7	-	-		-	-	-	-	900

L	T	P	CWA	LWA	MTE	ETE	EPE
Lecture	Tutorial	Practical	Class work Assessment	Lab work Assessment	Mid Term Exam	End Term Exam	End Practical Exam

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 2nd Year / 4th Semester

Total Credits: 23
Contact Hours: 30

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-2401	Environment Engineering-I		4	3	2	-	3	-	16	-	24	60	-	100
2	BTCE-2402	Structural Analysis-I		4	3	2	-	3	-	16	-	24	60	-	100
3	BTCE-2403	Advanced Surveying		4	3	1	-	3	-	16	-	24	60	-	100
4	BTCE-2404	Design of Concrete Structure-I		4	3	2	-	3	-	16	-	24	60	-	100
5	BTCE-2405	Irrigation Engineering-I		4	4	-	-	3	-	16	-	24	60	-	100
6	BTCE-2406	Surveying Lab		1	-	-	3	-	-	-	60	-	-	40	100
7	BTCE-2407	Concrete Lab		1	-	-	2	-	-	-	60	-	-	40	100
8	BTCE-2408	Structural Analysis Lab		1	-	-	2	-	-	-	60	-	-	40	100
Total				23	16	7	7	-	-		-	-	-	-	800

L	T	P	CWA	LWA	MTE	ETE	EPE
Lecture	Tutorial	Practical	Class work Assessment	Lab work Assessment	Mid Term Exam	End Term Exam	End Practical Exam

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 3rd Year / 5th Semester

Total Credits: 26
Contact Hours: 31

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-3501	Geotechnical Engineering		4	3	2	-	3	-	16	-	24	60	-	100
2	BTCE-3502	Const. Machinery and Works Mgt.		4	3	1	-	3	-	16	-	24	60	-	100
3	BTCE-3503	Transportation Engineering-I		4	3	1	-	3	-	16	-	24	60	-	100
4	BTCE-3504	Structural Analysis-II		4	3	2	-	3	-	16	-	24	60	-	100
5	BTCE-3505	Design of Steel Structure-I		4	3	2	-	3	-	16	-	24	60	-	100
6	BTCE-3506	Transportation Engineering Lab		1	-	-	2	-	-	-	60	-	-	40	100
7	BTCE-3507	CAD Lab-I (Steel Structures)		1	-	-	2	-	-	-	60	-	-	40	100
8	BTCE-3508	Geotechnical Engineering Lab		1	-	-	2	-	-	-	60	-	-	40	100
9	BTPD-3521	Personality Development-I		1	-	-	2	-	-	-	100	-	-	-	100
10	BTCE-3509	Survey Camp		2	-	-		-	-	-	60	-	-	40	100
Total				26	15	8	8	-	-	-	-	-	-	-	1000

L	T	P	CWA	LWA	MTE	ETE	EPE
Lecture	Tutorial	Practical	Class work Assessment	Lab work Assessment	Mid Term Exam	End Term Exam	End Practical Exam

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 3rd Year / 6th Semester

Total Credits: 24
Contact Hours: 30

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-3601	Design of Steel Structures-II		4	3	2	-	3	-	16	-	24	60	-	100
2	BTCE-3602	Design of Concrete Structure-II		4	3	2	-	3	-	16	-	24	60	-	100
3	BTCE-3603	Transportation Engineering-II		4	3	1	-	3	-	16	-	24	60	-	100
4	BTCE-3604	Environment Engineering-II		4	3	2	-	3	-	16	-	24	60	-	100
5	BTCE-36xx	Elective-I		3	3	-	-	3	-	16	-	24	60	-	100
6	BTCE-3605	Environment Engineering Lab		1	-	-	2	-	-	-	60	-	-	40	100
7	BTCE-3606	CAD Lab -II (Concrete Structures)		1	-	-	2	-	-	-	60	-	-	40	100
8	BTCE-3607	Software Lab-I		1	-	-	2	-	-	-	60	-	-	40	100
9	BTPD-3621	Personality Development-II		1	-	-	2	-	-	-	100	-	-	-	100
10	BTCE-3608	Project Synopsis Seminar		1	-	-		-	-	-	100	-	-	-	100
Total				24	15	7	8	-	-	-	-	-	-	-	1000

L	T	P	CWA	LWA	MTE	ETE	EPE
Lecture	Tutorial	Practical	Class work Assessment	Lab work Assessment	Mid Term Exam	End Term Exam	End Practical Exam

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 4th Year / 7th Semester

Total Credits: 23
Contact Hours: 29

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-4701	Irrigation Engineering-II		4	3	2	-	3	-	16	-	24	60	-	100
2	BTCE-4702	Professional Practice		4	3	2	-	3	-	16	-	24	60	-	100
3	BTCE-4703	Foundation Engineering		4	3	2	-	3	-	16	-	24	60	-	100
4	BTCE-47XX	Elective-II		3	3	-	-	3	-	16	-	24	60	-	100
5	BTCE-47XX	Open Elective		3	3	-	-	3	-	16	-	24	60	-	100
6	BTCE-4704	Software Lab-II		1	-	-	2	-	-	-	60	-	-	40	100
7	BTCE-4705	CAD Lab -III (Building Drawing)		1	-	-	2	-	-	-	60	-	-	40	100
8	BTCE-4706	Major Project		3	-	-	4	-	-	-	60	-	-	40	100
Total				23	15	6	8	-	-	-	-	-	-	-	800

L	T	P	CWA	LWA	MTE	ETE	EPE
Lecture	Tutorial	Practical	Class work Assessment	Lab work Assessment	Mid Term Exam	End Term Exam	End Practical Exam

Program: B. Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : 4th Year / 8th Semester

Total Credits: 16
Contact Hours: 00

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs)		Relative Weights (%)					Total
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWA	LWA	MTE	ETE	EPE	
1	BTCE-4801	Industrial Training		16	-	-	-	-	-	-	500	-	-	500	500
Total				16	-	-	-	-	-	-	-	-	-	-	500

CWA: Class Work Assessment LWA: Lab Work Assessment MTE: Mid Term Examination
ETE: End Term Examination EPE: End Practical Examination

Semester	Credits	Contact Hours
1st	25	31
2nd	25	31
3rd	24	28
4th	23	30
5th	26	31
6th	24	30
7th	23	29
8th	16	00

ELECTIVE SUBJECTS

Electives	Specialization				
	Structures	**Environmental Engineering**	**Highways & Transportation**	**Soil & Foundation**	**Infrastructure Development and Management**
Elective-I	BTCE-3611 Bridge Engineering	BTCE 3612 Environmental Impact Assessment	BTCE 3613 Pavement Design	BTCE 3614 Ground Improvement Techniques	BTCE 3615 Infrastructure Development and Management
Elective-II	BTCE-4711 Pre-Stressed Concrete Structures	BTCE-4712 Advanced Environmental Engineering	BTCE-4713 Traffic Planning and Design	BTCE-4714 Sub surface Geophysical Methods	BTCE-4715 Project Management System and Techniques
Open Electives offered by Civil Engineering Department	BTCE-4716 Disaster Management BTCE-4717 Infrastructure Systems Planning BTCE-4718 Planning for Sustainable Development				

NOTE:

For B.Tech Civil Engineering Elective-I and Elective-II subjects will be selected by students from different specializations.

For B.Tech Civil Engineering with Specialization Elective-I and Elective-II subjects will be selected by students from the same specialization.

SUBJECT TITLE: STRENGTH OF MATERIALS
SUBJECT CODE: BTCE-2301
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam: 3 Hrs

Objective
To know the concepts of strain energy, principal stress, Bending moment, shear force and learn the analysis of thin cylinders and theory of torsion and stresses.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Concept of Equilibrium: Load, reaction; General equilibrium equations; Equilibrium of a point in space; Equilibrium of a member; Concept of free body diagrams; Displacements; Concept of displacement constraints/supports; Statical-determinacy of a problem. Simple Stress and Strains: Introduction; Concept of stress and strain; Stress-strain curves for ductile, brittle materials; Generalized Hooke's law, Stress-strain diagram of ductile and brittle material, statically determinate and indeterminate problems, compound and composite bars, thermal stresses. Elastic constants, relations between various elastic constants and its use; Lateral strain, volumetric strain, poisons ratio; Stress and strains in thin cylinders, spherical shells; Thin vassals subjected to internal pressures.	**10**
SECTION-II	Complex stress and strains: Introduction; Normal stress, tangential stress; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress; Concept of principal stress and its computation; Mohr circle; Principal strains, computation of principal stresses from the principal strains. Shear force and Bending moment diagrams: Introduction to the concept of reaction diagrams—shear force and bending moment; Role of sign conventions; Types of load, beams, supports; Shear force and bending moment diagrams: simply supported, overhang and cantilever beams subjected to any combination of point loads, uniformly distributed and varying load, and moment; Relationship between load, shear force and bending moment; Different methods for plotting a bending moment and shear force diagrams.	**10**

SECTION-III	Bending and Shear Stresses: Introduction; Assumptions and derivation of flexural formula for straight beams; Centroid of simple and built up section, second moment of area; Bending stress calculation for beams of simple and built up section, composite sections (flitched sections); Shear stress; Variation of bending and shear stress along the depth of section. Columns and Struts: Stability of Columns; Buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.	**10**
SECTION-IV	Torsion of Circular shafts: Torsion, basic assumptions, derivation of torsion equation; Power transmitted by shafts; analysis and design of solid and Hollow shafts based on strength and stiffness; Sections under combined bending and torsion, equivalent bending and torsion. Failure theories: Maximum principal stress theory, Maximum shear stress theory, Distortion Energy theory, Strain Energy theory, Constant Analysis of Thin Cylinder.	**10**

Course Outcome:

CO1	Apply the linear laws of elasticity as related to stress and strain
CO2	Analyze the bending stress on different types of sections
CO3	Students are able to calculate the deflection of beam for different loading
CO4	Students are able to understand the behavior of material under different loading
CO5	Differentiate between properties of a material.

Recommended Books:

1. Strength of Material by S. Ramamrutham (2011)
2. Strength of Material : Rajput (2007)
3. Strength of Materials : Sadhu Singh (1999)
4. Strength of Materials : R.S Khurmi (2005)

SUBJECT TITLE: FLUID MECHANICS
SUBJECT CODE: BTCE-2302
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam: 3 Hrs

Objective:
To understand the properties of fluids and fluid statics and to derive the equation of conservation of mass, Bernoulli's equation and turbulence. Also to solve kinematic problems such as finding particle paths.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Fluid and their Properties: Ideal and real fluids, Continuum concept of fluid: density, specific weight and relative density, viscosity and its dependence on temperature, surface tension and capillarity, vapour pressure and cavitation, compressibility band bulk modulus, Newtonian and non-Newtonian fluids	**8**
SECTION-II	Fluid Statics: Concept of pressure, Pascal's law, Action of fluid pressure on plane (horizontal, vertical and inclined) submerged surface, resultant force and centre of pressure, force on a curved surface due to hydrostatic pressure, Buoyancy and flotation, stability of floating and submerged bodies, Meta centric height and its determination	**10**
SECTION-III	Fluid Kinematics: Classification of fluid flows, velocity and acceleration of fluid particle, local and convective acceleration, , path line and streak line, flow rate and discharge mean velocity continuity equation in Cartesian coordinates.	**8**
SECTION-IV	Fluid Dynamics: Euler's equation, Bernoulli's equation and steady flow energy equation Uniform flow in open Channels: Flow classifications, basic resistance equation for open channel flow. Chezy, Manning, Bazin and Kutter formulae Energy and specific energy in an open channel, critical depth for rectangular and trapezoidal channels.	**10**

Course Outcomes:

CO1	State the Newton's law of viscosity and Explain the mechanics of fluids at rest and in motion by observing the fluid phenomena
CO2	Compute force of buoyancy on a partially or fully submerged body and analyze the stability of a floating body
CO3	Derive Euler's Equation of motion and Deduce Bernoulli's equation.
CO4	Distinguish the types of flows
CO5	Calibrate various flow measuring devices in pipe and open channel flow

Recommended Books:
1.P.N. Modi and S.M. Seth, 'Hydraulics & Fluid Mechanics', Standard Publication. (2013)
2.S. Subraminayam, 'Flow in Open Channels', Tata McGraw Hill. (2009)
3.Robert N. Fox & Alan T. Macnold, 'Introduction to Fluid Mechanics'(2009)

SUBJECT TITLE: SURVEYING & LEVELLING
SUBJECT CODE: BTCE-2303
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To study the basics of linear/angular measurement, chain surveying, compass surveying, levelling, theodolite and tachometric surveying.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: -Definition, Basic Principle of surveying, Scale, Map, Errors. Chain and Compass Survey: Principle of chain surveying, Measurement of distance with chain and tape,Direct & Indirect Ranging, offsets, selection of base line and stations, Tape corrections, obstacles in chaining, Bearing and its measurement with Prismatic & surveyors compass, Calculation of angels from bearings, local attractions and its elimination, adjustment of closing error by graphical method.	**10**
SECTION-II	Leveling & Contouring: - Types of levels, methods of levelling, Sensitivity of bubble tube, setting out grade lines, Temporary & permanent Adjustment, different method of contouring, Setting out contour gradient, Simple earthwork, calculations of areas and volumes	**8**
SECTION-III	Theodolite & Plane Table survey: - Temporary & permanent Adjustment, Measurement of horizontal and vertical angel, Adjustment of closing error by Bowditch and Transit rules, different equipment in plane tabling, different methods of plane tabling, Strength of Fix, Two and three point problems	**8**
SECTION-IV	Minor Instruments: - Box sextant, Hand level, Abney level, Plane meter, Ghat tracer, Tangent, Clinometers, etc.	**8**

Course Outcome:

CO1	Plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse.
CO2	Use various conventional instruments involved in surveying with respect to utility and precision.
CO3	Plan a survey for applications such as road alignment and height of the building.
CO4	Undertake measurement and plotting in civil engineering.

Recommended Books:
1. S.K. Duggal, 'Surveying', Vol. I & II, Tata McGraw Hill. (2004)
2. B.C. Punmia, Ashok Kumar Jain and Arum Kumar Jain, Surveying Vol. I and II, Laxmi Publications. (2005)
3. R. Agor, 'Surveying', Khanna Publishers. (2012)
4. S.S. Bhavi Katti, 'Surveying & Levelling', Volume I & II.(2008)

SUBJECT TITLE: BUILDING MATERIALS & CONSTRUCTION
SUBJECT CODE: BTCE-2304
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
4	0	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To impart fundamental concepts of different material used in construction industry and to understand the property, use, advantages & disadvantages of different materials.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Building Stones & Bricks: General, Characteristics of a good building stone, Deterioration and preservation of stones, Artificial Stones, Composition of good brick earth, Qualities of good bricks, Classification of bricks, Tests on bricks, Varieties of fire bricks. Cement: Composition of cement, Raw Materials, Manufacturing process, Varieties of cement, Hydration of cement, Properties, testing of cement.	**10**
SECTION-II	Concrete: Introduction, Constituents of concrete, Batching of materials, Manufacturing process of cement concrete, workability and factors affecting it, Methods to determine workability, segregation and bleeding of concrete, Strength of concrete and factors affecting it. Timber: Structure of a tree , classification of trees, Defects in timber, Qualities of good a timber, Seasoning of timber , Decay of timber, Preservation of timber.	**10**
SECTION-III	Foundation and Walls: Definition, types of foundations, causes of failures of foundation and remedial measures, Types of walls and thickness considerations. Brick and stone masonry: Terms used, Types of bonds & their merits and demerits, rubble and ashlar joints in stone masonry, cement concrete hollow blocks and their advantages and disadvantage. Damp Proofing: Sources, causes and bad effects of dampness, preventive measures for dampness in buildings.	**10**
SECTION-IV	Roofs: Terms used, Classification of roofs and roof trusses, Different roof covering materials. Plastering and pointing: Objects ,Methods of plastering , Materials and types, Defects in plastering, Special material for plastered surface, Distempering white washing and color washing. Floors: General, Types of floors used in building & and their suitability, Factors for selecting suitable floor for building.	**8**

Course Outcome:

CO1	Student will able to understand the component of building with their function.
CO2	Student will know about the Risk involvement.
CO3	Student will understand the construction procedure of different components

Recommended Books:

1 Rangawala “Building Materials"(2013)
2 B. C. Punmia “Building Construction”(2005) 3 Sushil Kumar " Building
3 Construction"(2010) 4 M. S. Shetty “Concrete Technology” (2008)

SUBJECT TITLE: ROCK MECHANICS & ENGINEERING
SUBJECT CODE: BTCE-2305
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam: 60
Duration of exams: 3hrs

Objectives:

To make the students knowledgeable to understand, apply and explore Geological parameters, Rock and other materials and activity related to earth science.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	General Geology: Importance of engineering Geology applied to Civil engineering. Practices. Weathering, definition, types and effect. Geological works of rivers, wind, glaciers as agents of erosion, transportation and deposition. Rocks & Minerals: Minerals, their identification, igneous, sedimentary & metamorphic rocks. Classification of rocks for engineering purposes. Rock quality designation (RQD)	**10**
SECTION-II	Structural Geology: Brief idea about stratification, apparent dip, true dip, strike and in conformities. Folds, faults & joints: definition, classification relation to engineering operations. Engineering Geology: Geological considerations in the engineering Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake : Definition, terminology, earthquake waves, intensity, recording of earthquake	**10**
SECTION-III	Engineering properties of rocks and laboratory measurement: Uniaxial compression test, tensile tests, permeability test, shear tests, size and shape of specimen rate of testing. Confining pressure, stress strain curves of typical rocks. Strength of intact and fissured rocks, effect of anisotropy, effect of saturation and temperature.	**8**
SECTION-IV	In-situ determination of engineering Properties of Rock masses: Necessity of in-situ tests, Uniaxial load tests in tunnels and open excavations, cable tests, flat jack test, shear test, pressure tunnel test. Simple methods of determining in situ stresses, bore hole test. Improvement in properties of Rock masses: Pressure grouting for dams and tunnels, rock reinforcement rock bolting.	**8**

Course Outcome:

CO1	Students will have knowledge about Engineering properties of Rocks and their Minerals.
CO2	Student will understand about Earthquake phenomena.
CO3	Student will able to estimate various geological parameters by use of modern tools & techniques
CO4	Student will understand about Earthquake phenomena

Recommended Books:

1. Richard E. Goodman “Introduction to Rock Mechanics" (2010)
2. C. Jaeger “Rock Mechanics and Engg."(2012)
3. D. S. Arora" Engineering Geology " (2014)

SUBJECT TITLE: SURVEYING LAB
SUBJECT CODE: BTCE-2306
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	3	1

Internal Assessment: 60
End Term Exam: 40
Duration of Exam: NA

Objective:
To impart knowledge about the art of determining the relative positions of points, measurement of angles and distances To familiarize the students with instruments like chain, compass, dumpy level, plane table and theodolite and digital theodolites some special instruments.

Contents of Syllabus:

Contents	Contact Hours
1. Measurement of distance, ranging a line. 2. Measurement of bearing and angles with compass, adjustment of traverse by graphical method. 3. Different methods of leveling, height of instrument, rise & fall methods. 4. Measurement of horizontal and vertical angle by theodolite. 5.Plane table survey, different methods of plotting, two point & three point problem	**36**

Course Outcome:

CO1	Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling
CO2	Apply the procedures involved in field work and to work as a surveying team
CO3	Plan a survey appropriately with the skill to understand the surroundings
CO4	Take accurate measurements, field booking, plotting and adjustment of errors can be understood

Recommended Books: N.A

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: STRENGTH OF MATERIALS LAB
SUBJECT CODE: BTCE-2307
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40
Duration of Exam: NA

Objective:

To impart knowledge about behavior of materials under the action of loads and various kinds of stress and strain measuring machinery that is used in laboratory.

Contents of Syllabus:

Contents	Contact Hours
Draw Stress Strain curve for Ductile and Brittle material in tension. Draw Stress Strain curve for Ductile and Brittle material in compression. Draw shear stress, shear strain curve for ductile and brittle material in torsion strength testing Draw load deflection curve for spring in loading and unloading conditions. To determine the hardness of the given material by Rockwell and Brinell hardness testing machine. To determine the fatigue strength of the material. To determine the impact strength by Izod and Charpy test. To determine the load carrying capacity of the leaf spring. To test a mild steel and cast iron specimen in double shear.	**18**

Course Outcome:

CO1	Apply the linear laws of elasticity as related to stress and strain.
CO2	Understand deflection of different sections at different loading conditions.
CO3	Differentiate between properties of a material.
CO4	Analyse the bending stress on different types of sections

Recommended Books: N.A

SUBJECT TITLE: FLUID MECHANICS LAB
SUBJECT CODE: BTCE-2308
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40
Duration of Exam: NA

Objective:

To impart knowledge in measuring pressure, discharge and velocity of fluid flow and understand the flow measurement in tanks, metacentric height of a floating body and flow measurement in pipe flow.

Contents of Syllabus

Contents	Contact Hours
1. To determine the meta-centric height of a floating vessel under loaded and unloaded conditions. 2. To study the flow through a variable area duct and verify Bernoulii's energy equation. 3.To determine the coefficient of discharge for an obstruction flow meter (venturimeter /orifice meter) 4.To determine the discharge coefficient for a Vee notch or rectangular notch. 5.To determine the coefficient of discharge for Broad crested weir. 6.To determine the hydraulic coefficients for flow through an orifice. 7.To determine the friction coefficient for pipes of different diameter. 8. To determine the head loss in a pipe line due to sudden expansion / sudden contraction/ bend. 9. To determine the velocity distribution for pipe line flow with a pitot static probe	**24**

Course Outcome:

CO1	Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
CO2	Analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design.
CO3	Provide exposure to modern computational techniques in fluid mechanics.

Recommended Books: N.A

SUBJECT TITLE: INSITUTIONAL TRAINING
SUBJECT CODE: BTCE-2309
SEMESTER: III
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	0	2

Internal Assessment: 60 End Term Exam: 40 Duration of Exam: NA

Objective and Course Outcome:

Allow students to develop specific training oriented towards practicality and hands on exposure.
To Increase self-confidence of students and helps in finding their own proficiency

Contents of Syllabus:

Contents	Contact Hours
Auto CAD: Structural Drawings of Reinforced Concrete Elements Beams. Structural Drawings of Reinforced Concrete Elements Slabs. Drawing of Connections Drawing of Tension Members. Drawing of Compression Members. Drawing of Beams, Column Base. Drawing of Roof Trusses. Basic Know how of civil engineering labs i.e. survey lab, concrete lab, transportation lab, structures lab, geotech lab etc.	**04 Weeks**

Recommended Books:
NA

SUBJECT TITLE: ENVIRONMENT ENGINEERING -I
SUBJECT CODE: BTCE-2401
SEMESTER: IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To identify various water demands and select suitable source of water and demonstrate a firm understanding of various water quality parameters.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	Introduction: Beneficial uses of water, water demand, per capita demand, variations in demand, water demand for fire fighting, population forecasting and water demand estimation. Water sources and development: Surface and ground water sources; Selection and development of sources; Assessment of potential; Flow measurement in closed pipes, intakes and transmission systems.	**12**
SECTION -II	Pumps and pumping stations: Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; pumping stations Quality and Examination of Water: Impurities in water, sampling of water, physical ,chemical and bacteriological water quality parameters, drinking water quality standards and criteria..	**12**
SECTION -III	Water treatment: Water treatment schemes; Basic principles of water treatment; Design of plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure; Disinfection units; Fundamentals of water softening, fluoridation and deflouridation, and water desalination and demineralization, taste and odor removal	**12**
SECTION -IV	Transportation of Water: Pipes for transporting water and their design, water distribution systems and appurtenances; Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems Rural water supply: Principles, selection of source, rain water harvesting, quantitative requirements, low cost treatment techniques.	**12**

Course Outcome:

CO1	Student will be able to apply appropriate treatment to raw water i.e. surface water/ground water useful for domestic as well as drinking purpose, industries liquid waste and reuse of water
CO2	Student may clarify and identify the impurities present in water used for domestic, different types of industrial as well as construction works
CO3	Student will be able to calculate and recommend the pipe- network for water supply
CO4	Students will be able to describe various types of process units used for preliminary, primary and secondary treatment and explain how they achieve the target level of treatment

Recommended Books:

1. Water Supply Engineering- Environmental Engg. (Vol. – I) by B.C. Punmia, Ashok Jain, Arun Jain, 2nd Edition(1995)
2. Water Supply Engineering- Environmental Engg. (Vol. – I) by S.K. Garg,28th Edition(2010)
3. Water Supply and Sewerage by Steel EW and McGhee, Terence J.; McGraw Hill 6thEdition(1991)

SUBJECT TITLE: STRUCTURAL ANALYSIS –I
SUBJECT CODE: BTCE-2402
SEMESTER: IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To provide knowledge about determinate and indeterminate structures and how to calculate degree of indeterminacy of a structure, applications and analysis of determinate and indeterminate structures in various aspects.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	Displacements: Concept; Governing differential equation for deflection of straight beams; Following methods for determination of structural displacements Geometric Methods: Double integration; Macaulay's method; Moment area method; Conjugate beam method. Energy Methods: Strain energy, Betti's and Maxwell's Laws of reciprocal deflections, Concept of Virtual work and its applications, Castigliano's theorems, unit load method, deflections of trusses and 2D-frames	**12**
SECTION -II	Determinate Structures: Concept of determinacy; Analysis of determinate structural elements :-truss, arch, beam, frame, cables; Internal forces in determinate structures; Reaction diagram-- Bending moment, shear force, radial shear, normal thrust diagrams for the determinant structures. Analysis of three-hinged arch under different loading conditions	**12**
SECTION -III	Moving Loads and Influence Line Diagrams: Concept of influence line diagram, rolling loads; Bending moment and shear force diagrams due to single and multiple concentrated rolling loads, uniformly distributed moving loads; Equivalent UDL; Muller Breslau principle; Influence lines for beams, girders with floor beams and frames; calculation of the maximum and absolute maximum shear force and bending moment; Concept of envelopes; Influence line for displacements; Influence line for bar force in trusses	**12**
SECTION -IV	Analysis of Cables and Suspension Bridges: General cable theorem, shape, elastic stretch of cable,maximum tension in cable and back-stays, pressure on supporting towers, suspension bridges, three hinged stiffening girders. Analysis of Dams, Chimneys and Retaining Walls: Introduction, loadings for the dames, chimneys, and retaining walls; limit of eccentricity for no-tension criteria; Concept of core; Middle-third rule; maximum/minimum base pressures.	**12**

Course Outcome:

CO1	Student will also be able to analyze three hinge arches and three hinge suspension bridges
CO2	Learn about determinate and indeterminate structures and determination of degree of static and kinematic indeterminacy for any type of structures
CO3	After completion of this subject student will be able to analyze fixed, continuous beams, dams, retaining walls.
CO4	Analysis of any structure by strain energy method

Recommended Books:

1 Basic structural Analysis C.S.Reddy; Tata McGraw-Hill Education, 3RD Edition (2010)
2 Theory of Structures, Vol. I, S.P. Gupta &G.S.Pandit, Tata McGraw Hill, New Delhi.(1999)
3 Theory of Structures, Ramamurtham, 9th Edition (2015)
4. Analysis of Structures Vol- I and Vol.-II Vazirani & Ratwani; Khanna Publishers, Editon(2003)

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: ADVANCE SURVEYING
SUBJECT CODE: BTCE-2403
SEMESTER:IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

The objective of this course is appreciate of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment and also have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in surveying

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	Tachometric Survey : Different types of tachometer, calculation of vertical and horizontal distances, substance bar. Tachometric Survey: Tachometric leveling with both angle of depression and elevation, errors due to curvature & refraction. Triangulation : Measurement of baseline, corrections for the baseline, selection of stations	**12**
SECTION -II	Triangulation: Measurement of baseline, corrections for the baseline, selection of stations Trigonometric Levelling: Height & distance of inaccessible objects. Trigonometric Levelling: Height & distance of inaccessible objects.	**12**
SECTION -III	Curves: Different types of curves, their degree and calculation of ordinates, and angles, their layout obstacles in curves. GIS : Introduction, concepts and terminology, Utility of GIS, Essential components of a GIS.GIS Data acquisition through scanners and digitizers, Data storage, Data manipulation and analysis Applications of GIS.	**12**
SECTION -IV	GPS: Introduction, working principle, Various application of GPS related to Civil Engg., components of GPS – Point positioning and differential positioning. Remote Sensing : Introduction, interaction of EMR with Earth Surface Working Principles and Instrumentation.	**12**

Course Outcome:

CO1	Students are able to do trigonometric and Geodetic Survey.
CO2	Students are able to understand the surveying with advance instrument like remote sensing, GPS, and GIS.
CO3	Students are able to understand the hydrographic survey.
CO4	Students are able to understand the triangulation adjustment.
CO5	To apply the concept of Tachometry in surveying difficult and hilly terrains to obtain the topographical map of area.

Recommended Books:

1 Surveying, By C.L. Kochher – Danpat Rai& Sons (2014).
2 Duggal, S.K., Surveying Vol I & II, Tata McGraw Hill (2006).
3 Punmia, B.C., Jain, Ashok Kumar and Jain, Arun Kumar, Surveying Vol. I and II, (2005)
4 Agor, R., Surveying, Khanna Publishers (1982)
5 Bhavikatti,S.S. Surveying & Levelling Volume I&II (2009)

SUBJECT TITLE: DESIGN OF CONCRETE STRUCTURE-I
SUBJECT CODE: BTCE-2404
SEMESTER:IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To become familiar with professional and contemporary issues in the design and construction of reinforced concrete members

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	CEMENTS & ADMIXTURES Portland cement. Different types of cement. Chemical composition –Hydration, Setting of cement, Structure of hydrate cement. Test on physical properties. Different grades of cement. Admixture. Mineral and chemical admixtures. Classification of aggregate. Particle shape & texture. Bond, strength & other mechanical properties of aggregate. Specific gravity, Bulk density, porosity. Adsorption & moisture content of aggregate Bulking of sand. Deleterious substance in aggregate. Soundness of aggregate. Alkali aggregate reaction. Thermal properties. Sieve analysis. Fineness modulus. Grading curves .Grading of fine &coarse. Aggregates. Gap graded aggregate. Maximum aggregate size.	**12**
SECTION -II	Workability. Factors affecting workability. Measurement of workability by different tests. Setting times of concrete Effect of time and temperature on workability. Segregation & bleeding. Mixing and vibration of concrete Steps in manufacture of concrete. Quality of mixing water, Abram's Law ,Factors affecting strength; Characteristics strength of concrete, Target strength, Modulus of elasticity, Modulus of rupture Objectives and Methods of Analysis and Design. Properties of Concrete and Steel. Design Philosophies of Working Stress Method and Limit State Method. Flexure. Computation of Parameters of Governing Equations. Determination of Neutral Axis Depth and Computation of Moment of Resistance	**12**
SECTION -III	Design examples of Neutral axis and Moment of resistance of beams. Design examples of singly reinforced beam. Numerical examples to find out the moment of resistance and depth of neutral axis in doubly reinforced beam. Flanged Beams – Theory and Numerical Problems	**12**
SECTION -IV	Numerical problems of flanged beams. Numerical problems of bond, shear and anchorage and development length. Design examples of one way and two slab. Stairs: Types and Design of Stairs.	**12**

Course Outcomes:

CO1	Exhibit the knowledge of concrete design philosophies, by working and limit state methodology.
CO2	Design the structural details of beam and slab
CO3	Students are competent to Design the structures for Limit Sate of Serviceability for Deflection and Cracking
CO4	Students are able to understand the durability of concrete, assessment and inspection of hardened concrete.

Recommended Books:

1 Limit State Design of Reinforced Concrete P.C. Vergese 2nd edition (2009)
2 Limit State Design A.K. Jain1st Edition (2012)
3 Concrete Technology by M.S.Shetty Edition (2006)
4 Advanced Design of Structures N. Krishna Raju3rd Edition (2015-16)
5 Advanced RCC Design Pillai &Mennon 3rd Edition (2009)

SUBJECT TITLE: IRRIGATION ENGINEERING-I
SUBJECT CODE: BTCE-2405
SEMESTER:IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
4	0	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To gain knowledge on the hydrologic cycle, rainfall Calculation and measurement and frequency analysis of rainfall intensity curve. Students will also be familiar with direct and indirect method of stream flow measurement to acquire the basic engineering technique of calculating hydrograph S curve flood routing. students will gain knowledge on irrigation methods duty, delta and crop seasons.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	INTRODUCTION: Importance of Irrigation Engineering, purposes of Irrigation, objectives of Irrigation,Benefits of Irrigation, Advantages of various techniques of irrigation-Furrow Irrigation, Boarder strip,Irrigation, Basin Irrigation, Sprinkler Irrigation , Drip Irrigation. METHODS OF IRRIGATION: Advantages and disadvantages of irrigation, water requirements of crops,factors affecting water requirement, consumptive use of water, water depth or delta , Duty of water, Base Period, relation between delta, duty and base period, Soil crop relation-ship and soil fertility..	**12**
SECTION-II	CANAL IRRIGATION: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories-Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's & Lacey's theories, comparison of Lacey's and Kennedy'stheories, Design of unlined canals based on Kennedy &Lacey'stheories.LINED CANALS: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks, measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.	**12**
SECTION-III	LOSSES IN CANALS, WATER LOGGING AND DRAINAGE: Losses in canals- Evaporation and seepage, water logging, causes and ill effects of water logging anti water logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains. INVESTIGATION AND PREPARATION OF IRRIGATION PROJECTS: Classification of project, Project preparation-investigations, Design of works and drawings, concept of multi - purpose projects, Major, Medium and miner projects, planning of an irrigation project, Economics & financing of irrigation works. Documentation of project report.	**12**

SECTION-IV	TUBE - WELL IRRIGATION :Types of tube wells - strainer type, cavity type and slotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield & specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions ,Theim's & Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tube wells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tubewell. RIVER TRAINING WORKS: Objectives, classification of river-training works, Design of Guide Banks. Groynes or spurs - Their design and classification ISI. Recommendations of Approach embankments and afflux embankments, pitched Islands, Natural cut-offs and Artificial cut-offs and design Considerations.	**12**

Course Outcome:

CO1	Student will know the different terminologies related with hydrology.
CO2	Students will analyze hydrological parameters required for water resource management.
CO3	Student will assess ground water potential.
CO4	Students will identify suitable method of irrigation and drainage of waterlogged area.

Recommended Books:

1. Principles & practice of Irrigation Engg. S.K.Sharma; S. Chand, Limited (1987)
2. Fundamentals of Irrigation Engg. Dr. Bharat Singh; Nem Chand & Bros 6thEdition(1979)
3. Irrigation Engg. & Hydraulic Structure S.R.Sahasrabudhe; S. K. Kataria& Sons,3rd Edition(2011)
4. Irrigation Engg. & Hydraulic Structure Varshney, Gupta & Gupta; Nem Chand (2006)

SUBJECT TITLE: SURVEYING LAB
SUBJECT CODE: BTCE-2406
SEMESTER: IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	3	1

Internal Assessment: 60
End Term Practical: 40
Duration of Exam; NA

Objective:

Student will be able to function as a member of a team and have the ability to use techniques, skills, and modern engineering tools necessary for Surveying practice.

Contents of Syllabus:

Contents	Contact Hours
1. Setting up temporary and permanent adjustment of a theodolite. 2. Measurement of vertical angle by theodolite. 3. Determination of tocheometric constants. 4. Determination of reduced levels by techeometric observations. 5. Determination of height of an inaccessible object with instrument axis in the same plane as the object and in different planes. 6. Setting out a transition curve. Setting out of circular curves in the field using different methods.	**36**

Course Outcome:

CO1	Able to find the horizontal and vertical angels by using Theodolite
CO2	Apply the different Adjustments of tachometry and find the distances and reduced Level
CO3	estimate vertical measurement with the help of Leveling in the field.
CO4	apply indirect methods& demonstration of minor instruments.

Recommended Books: NA

SUBJECT TITLE: CONCRETE LAB
SUBJECT CODE: BTCE-2407
SEMESTER:IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Practical: 40
Duration of Exam; NA

Objective:

The objective of this course is to understand the characteristics and behavior of civil engineering materials used in buildings and infrastructure. Students will learn standard principles and procedure to design prepare and/or test materials such as concrete mix design including field test methods for fresh concrete.

Contents of Syllabus:

Contents	Contact Hours
1. To Determine the Specific Gravity of and Soundness of cement 2. To Determine the Standard Consistency, Initial and Final Setting Times of Cement and Compressive Strength of Cement. 3. To Determine the Fineness Modulus, Bulk Density, Water Absorption and Specific gravity of Fine and Coarse Aggregates. 4. To Determine the Slump, Compaction Factor and Vee-Bee Time of Concrete. 5. Mix Design of Concrete by IS methods 6. To Determine the Compressive Strength of Concrete by Cube and Cylinder. 7. To carry out the Split Tensile and Flexural strength of Concrete. 8. Compressive strength of Brick and Tile as IS standard	**26**

Course Outcome:

CO1	Identify the functional role of ingredients of concrete
CO2	Apply this knowledge to mix design philosophy to get different grade of concrete
CO3	Student should be able to test of different concrete property to specify quality of concrete
CO4	Student shall learn to work in a team to achieve the objective

Recommended Books:

1. Concrete Manual By Dr. M.L. Gambhir, DhanpatRai& Sons, 4th Edition(1992)
2. Concrete Lab Manual by TTTI Chandigarh
3. Concrete Technology, Theory and Practice by M.S.Shetty. S.Chand&Company(2006)

SUBJECT TITLE: STRUCTURAL ANALYSIS LAB
SUBJECT CODE: BTCE-2408
SEMESTER:IV
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Practical: 40
Duration of Exam; NA

Objective:

To determine the forces, stresses, deflections and behavior of various structural members like beams, columns, arches, trusses and frames when subjected to different types of loadings.

Contents of Syllabus:

Contents	Contact Hours
1. Deflection of a simply supported beam and verification of Clark-Maxwell's theorem. 2. To determine the Flexural Rigidity of a given beam. 3. To verify the Moment- area theorem for slope and deflection of a given beam. 4. Study of behavior of columns and struts with different end conditions. 5. Experiment on three-hinged arch. 6. Experiment on two-hinged arch. 7. Experiment on curved beams.	26

Course Outcome:

CO1	Students will apply the theoretical formulas by conducting experiments.
CO2	Students will calculate the diferent forces and displacements
CO3	Students will be able to analyze arch structures
CO4	Students will able to know the different end conditions of column & Strut

Recommended Books:

A Laboratory Manual on Structural Mechanics by Dr. HarwinderSongh; New Academic Publishing Comp. Ltd(1991)

SUBJECT TITLE: GEOTECHNICAL ENGINEERING
SUBJECT CODE: BTCE-3501
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behavior and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Basic Concepts**:** Definition of soil and soil mechanics, common soil mechanics problems in Civil Engineering. Principal types of soils. Important properties of very fine soil. Characteristics of main Clay mineral groups. Weight volume relationship and determination of specific gravity from pycnometer test. Field density from sand replacement method and other methods. Index Properties: Grain size analysis. Stokes's law and Hydrometer analysis. Consistency and sensitivity of Clay, Atterbeg Limits, Flow Index and Toughness Index. Underlying theory of shrinkage limit determination. Classification of coarse and fine grained soils as per Indian Standard.	**12**
SECTION-II	**Compaction:** Definition and object of compaction and concept of O.M.C. and zero Air Void Line. Modified proctor Test. Factors affecting compaction Effect of compaction on soil properties and their discussion. Field compaction methods- their comparison of performance and relative suitability. Field compacative effort, Field control of compaction by proctor. Permeability and Seepage: Concept of effective stress principal, seepage pressure, critical hydraulic gradient and quick sand condition. Capillary phenomenon in soil. Darcy's Law and its validity, seepage velocity, co-efficient of permeability (k) and its determination in the laboratory. Average permeability of stratified soil mass, factors affecting 'k' and brief discussion.	**10**
SECTION-III	Consolidation: Definition and object of consolidation, Difference between compaction and consolidation. Concept of various consolidation characteristics i.e. av, mv and cv, primary and secondary consolidation. Terzaghi's Differential equation and its derivation. Boundary conditions for Terzaghi's solution for one dimensional consolidation concept of cv, tv & U. consolidation test determination of cv from curve fitting methods, 6consolidation pressure determination. Normally consolidated and over consolidated clays. Causes of over-consolidation. Effect of disturbance on e-Logσ curves of normally consolidated clays, importance of consolidation settlement in the design of structures.	**6**

SECTION-IV	Shear Strength: Stress analysis of a two dimensional stress system by Mohr circle. Concept of pole. Coulomb's law of shear strength coulomb - Mohr strength theory. Relation between principal stresses at failure. Direct, triaxial and unconfined shear strength tests. Triaxial shear tests based on drainage conditions typical strength envelopes for clay obtained from these tests. Derivation of skempton's pore pressure parameters. Stress strain and volume change characteristics of sands. Stability of Slopes: slope failure, base failure and toe failure - Swedish circle method - φ=0 analysis and c=0 analysis - friction circle method- Taylor's stability number - stability charts - sliding block analysis.	**10**

Course Outcome:

CO1	Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils
CO2	Determination of Index Properties and engineering characteristics of soil
CO3	Evaluate shear strength and permeability parameters of different soils
CO4	Determine settlements due to consolidation of soil

Recommended Books:

1. K.R.Arora. "Soil Mech. & Foundation Engg 2009
2. V.N.S.Murthy "Soil Mech. & Foundation Engg, 2010
3. Gopal Ranjan & A.S.R. Rao "Basic and applied Soil Mechanics, 2016

SUBJECT TITLE: CONSTRUCTION MACHINERY AND WORKS MANAGEMENT
SUBJECT CODE: BTCE-3502
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Students will gain knowledge on planning, Regulation and by laws for construction. students will be familiar with fire protection, construction plant and equipments. students will be able to plan and schedule construction project by CPM and CEAT. some knowledge on management and departmental procedures of PWD, EMD and SD and familiarity Cost Analysis, project cost, cost slopes and time optimization.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	INTRODUCTION: Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.	**8**
SECTION-II	PERT :Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project, numerical problems. CPM: Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, numerical problems.	**12**
SECTION-III	COST ANALYSIS AND CONTRACT: Type of costs, cost time relationships, cost slopes, conducting a crash programme, determining the minimum total cost of project, numerical problems. Updating a project, when to update, time grid diagram, resource scheduling. planning of different components of civil engineering projects such as a house,workshop, dam, tunnel.	**10**
SECTION-IV	CONSTRUCTION EQUIPMENT AND MACHINERY: Tractors, bull dozers, rippers, scrappers, power shovels, dragline, hoes. Line diagram of each, sizes, output, uses, factors affecting selection of each equipment economic life of equipment, maintenance and repair cost. Hoisting & Transporting Equipments: Hosts, Winches, Cranes, Belt conveyors, Ropeways, trucks & Wagons. Plants for grading, batching, mixing, types of mixers, concrete pumps, bitumen plants.	**10**

Course Outcome:

CO1	Students will be able to successfully apply business and Management skills in positions within the construction industry.
CO2	Use industry resources including associations and organizations
CO3	Practice informed decision- making in personal and professional endovers
CO4	Manage a quality construction project from start to completion while maintaining budget, schedule, and safety requirements

Recommended Books:

1. Pert And Cpm Principles And Applications by L.S. Srinath 2008
2. Project Planning and Control with PERT and CPM by B.C.Punmia 2016
3. Construction Planning and Equipment – R.L.Peurifoy - Tata McGraw Hill, 2015

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SUBJECT TITLE: TRANSPORTATION ENGINEERING-I
SUBJECT CODE: BTCE-3503
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To provide a coherent development to the students for the courses in sector of Engineering like Transportation & Traffic Engineering etc.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Importance of Transportation, Different Modes of Transportation, Characteristics of Road Transport. Highway Development & Planning: Principles of Highway Planning, Road Development in India, Classification of Roads, Road Patterns, Planning Surveys. Highway Alignment: Requirements, Alignment of Hill Roads, Engineering Surveys.	**8**
SECTION-II	Highway Geometric Design: Cross Section Elements, Carriageway, Camber, Sight Distances, Horizontal Curves, Extra-widening, Super-elevation, Vertical Curves. Highway Materials: Properties of Sub-grade and Pavement Component Materials, Tests on Sub-grade Soil, Aggregates and Bituminous Materials. Highway Construction: Earthen/Gravel Road, Water Bound Macadam, Wet Mix Macadam, Bituminous Pavements, Cement Concrete Pavements.	**10**
SECTION-III	Highway Drainage and Maintenance: Importance of drainage and maintenance, Surface Drainage and Subsoil Drainage, Construction in Water-logged areas, Pavement Failures, Pavement Evaluation, Maintenance and Strengthening Measures. Highway Economics & Financing: Total Transportation Cost, Economic Analysis, Sources of Highway Financing.	**12**
SECTION-IV	Traffic Characteristics: Road User Characteristics, Driver Characteristics, Vehicular Characteristics. Traffic Studies: Volume Studies, Speed Studies, O-D Survey, Parking Study. Traffic Safety and Control Measures: Traffic Signs, Markings, Islands, Signals, Cause and Type of Accidents, Use of Intelligent Transport System. Traffic Environment Interaction: Noise Pollution, Vehicular Emission, Pollution Mitigation Measures.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Appreciate the importance of different modes of transportation and characterize the road transportation.
CO2	Alignment and geometry of pavement as per Indian Standards according to topography.
CO3	gain an experience in the implementation of Transportation Engineering on engineering concepts which are applied in field Highway Engineering
CO4	learn to understand the theoretical and practical aspects of highway engineering along with the design and management applications

Recommended Books:

1. Khanna S.K., and Justo, C.E.G. "Highway Engineering", Nem Chand and Brothers,2015
2. Kadiyali, L.R. "Principles and Practice of Highway Engineering", Khanna Publishers, 2015
3. Sharma, S.K. Principles, Practice & Design of Highway Engineering S. Chand & Company Ltd,2016

SUBJECT TITLE: STRUCTURAL ANALYSIS-II
SUBJECT CODE: BTCE-3504
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To understand the principles of energy methods and their applications to indeterminate beams and plane frames To know the principles of different slope-deflection and moment distribution methods and matrix methods and their applications to beams and frames.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Indeterminate Structures: Concept of indeterminate /redundant structures; Static and kinematic indeterminacies; stability of structures; internal forces; Conditions of stress- strain relationships, equilibrium and compatibility of displacements; Solution of simultaneous algebraic equations	**8**
SECTION-II	Indeterminate Structural Systems: Pin-jointed and rigid-jointed structural systems; sway and non-sway frames, elastic curve; Static equilibrium and deformation compatibility checks; Effects of support settlement and lack of fit; sinking of supports, temperature; Analysis of redundant beams, frames, using following methods: Slope deflection method Moment distribution method; Rotation contribution method (Kani's Method).	**10**
SECTION-III	Classical Methods: Methods of consistent deformation; Theorem of three moments. Approximate Methods: Portal method; Cantilever method	**12**
SECTION-IV	Influence Line Diagrams: Concept and application in the analysis of statically indeterminate structures; Influence line for bar forces in the statically indeterminate trusses, beams and frames	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Distinguish statically determinate and redundant structural systems.
CO2	Identify the suitable method of analysis for the analysis of indeterminate structures.
CO3	Utilize the concept of influence lines for deciding the critical forces and sections while designing.
CO4	Students are able to do the analysis of beam by using advance method of analysis.

Recommended Books:

1. Basic structural Analysis C.S.Reddy; Tata McGraw-Hill Education, 2010
2. Theory of Structures, Vol. II, S.S. Bhavikatti, 2013
3. Advanced Structural Analysis, A.K. Jain, Nem Chand & Bros., Roorkee, 2016
4. Theory of Structures,S. Ramamurtham, 2014

SUBJECT TITLE: DESIGN OF STEEL STRUCTURE-I
SUBJECT CODE: BTCE-3505
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To learn about various Bolted connections and Welded connections and to learn about the design of compression members, built-up columns, tension members, simple slab base and gusseted base etc.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Properties of structural steel, I.S. rolled sections, I.S. specifications, Connections: Riveted, bolted and welded connections for axial and eccentric loads.	**8**
SECTION-II	Tension members: Design of members subjected to axial tension.	**10**
SECTION-III	Compression members: Design of axially loaded members, built-up columns, laced and battened columns including the design of lacing and battens, Column bases: Design of slab base, gusseted base and grillage foundation	**12**
SECTION-IV	Flexural members: Design of laterally restrained and un-restrained rolled and built-up sections, encased beams. Roof truss: Design loads, combination of loads, design of members (including purlins) and joints, detailed working drawings.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Design the connection of steel structure
CO2	Design the tension and compression members
CO3	Design various types of steel connections using rivets, bolts and weld.
CO4	Design basic elements of a steel building like beam, column, and column bases etc. for given conditions and loading

Recommended Books:

1. Limit state design of steel structures: S K Duggal, 2014
2. Design of steel structures (by limit state method as per IS: 800-2007): S S Bhavikatti,2009
3. Design of steel structures (Vol. 2): Ram Chandra, 2016
4. IS 800: 2007 (General construction in steel-Code of practice)
5. SP: 6(1) (Handbook for structural engineers-Structural steel sections)

SUBJECT TITLE: TRANSPORTATION ENGINEERING LAB
SUBJECT CODE: BTCE-3506
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40

Objective:

To evaluate the strength of sub grade soil by CBR test and also to perform different tests on aggregate and bitumen.

Contents of Syllabus:

Contents	Contact Hours
Tests on soil subgrade California Bearing Ratio Test **Tests on Road Aggregates** Crushing Value Test Los Angles Abrasion Value Test Impact Value Test Shape Test (Flakiness and Elongation Index) **Tests on Bituminous Materials and Mixes** Penetration Test Ductility Test Softening Point Test Flash & Fire Point Test Bitumen Extraction Test **Field Tests** Roughness Measurements Test by Roughometer Benkelman Beam Pavement Deflection Test.	**24**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Characterize the pavement materials as per the Indian Standard guidelines.
CO2	Evaluate the strength of sub grade soil by CBR test.
CO3	Conduct experiments to evaluate aggregate properties.
CO4	Determine properties of bitumen material and mixes

Recommended Books:

Khanna S.K., and Justo, C.E.G. “Highway Material & Pavement Testing”, NemChand andBrothers, Roorkee., International Student Edition, Mc Graw Hill

SUBJECT TITLE: CAD Lab-I (Steel Structures)
SUBJECT CODE: BTCE-3507
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40

Objective:

To understand the various connections details and how to draw the connections of steel structure by using CAD software.

Contents of Syllabus:

Contents	Contact Hours
Preparation of Structural Drawings of following Steel Elements such as: Connections, Tension Members, Compression Members, Beams, Column Base Roof Trusses.	**24**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Produce structural drawing of Reinforced Concrete Elements such as Beams, slabs
CO2	Understand various connection details
CO3	Develop Structural Drawings of steel elements such as Connections, Tension Members, Compression Members, Beams, Column Base, and Roof Trusses

Recommended Books:

Auto Cad (2017) book.

SUBJECT TITLE: GEOTECHNICAL ENGINEERING LAB
SUBJECT CODE: BTCE-3508
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40

Objective and Course Outcome:

Contents of Syllabus:

Contents	Contact Hours
Determination of in-situ density by core cutter method and Sand replacement method. Determination of Liquid Limit & Plastic Limit. Determination of specific gravity of soil solids by pyconometer method Grain size analysis of sand and determination of uniformity coefficient (Cu) and coefficient of curvature (Cc). Compaction test of soil. Determination of Relative Density of soil. Determination of permeability by Constant Head Method. Unconfined Compression Test for fine grained soil. Direct Shear Test Triaxial Test	24

Course Outcomes:

On completion of the course, the student will have the ability to:

CO1	Comprehend the procedure for classifying coarse grained and fine-grained soils
CO2	Evaluate the index properties of soil
CO3	Determine the engineering properties of soil
CO4	Interpret the results of compaction test for relative compaction in the field

Recommended Books:

Soil Mechanics and Foundation Engg.- Punmia B.C. (2005), 16th Edition Laxmi Publications Co., New Delhi.
BIS Codes of Practice: IS 2720 (Part 2, 3, 4, 5, 7, 10, 13, 14, 17) – Methods of test for soils
Manual of Soil Laboratory Testing- Head K.H., (1986)- Vol. I, II, III, Princeton Press, London

SUBJECT TITLE: SURVEY CAMP
SUBJECT CODE: BTCE-3509
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Exam: 40

Objective:

To develop a skill to use the different instruments on the hill site so that they able to draw the contours, levels, etc.

Contents of Syllabus:

Contents	Contact Hours
The students are required to go to hilly area for 2 weeks and prepare the Topographical Map of the area by traditional method.	NA

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	An ability to function in multidisciplinary teams
CO2	Ability to concepts of surveying and plotting topographical maps of various terrains as well as to analyze and interpret data from these maps.
CO3	Recognition of the need for, and ability to engage in life-long learning.

Recommended Books:

Survey Lab Manual Aurora's Technological and research institute

SUBJECT TITLE: ENVIRONMENTAL ENGINEERING-II
SUBJECT CODE: BTCE-3510
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena in the sewage

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Terms & definitions, systems of sanitation and their merits and demerits, system of sewerage, choice of sewerage system and suitability to Indian conditions. Sewerage Systems: Generation and estimation of community Sewage, flow variations, storm water flow, types of sewers. Design of sewers and storm water sewers, Construction & maintenance of sewers, sewer appurtenances, sewage pumping and pumping stations.	8
SECTION-II	House Drainage: Principles of house drainage, traps, sanitary fittings, systems of plumbing, drainage lay out for residences. Characteristics of Sewage: Composition of domestic and industrial sewage, sampling, physical, chemical and microbiological analysis of sewage, biological decomposition of sewage, BOD and BOD kinetics, Effluent disposal limits.	10
SECTION-III	Treatment of Sewage: Introduction to unit operations and processes - Primary treatment; screening (theory), grit chamber (theory and design), floatation units, sedimentation tanks(theory and design), Secondary treatment units; ASP (theory and design), Sequencing batch reactors (theory and design), Trickling filters (theory and design) Anaerobic systems; Anaerobic filters (theory), UASB (theory), Anaerobic lagoons, Sludge Handling and disposal; thickening, stabilization, dewatering, drying and disposal.Introduction to Solid Waste Management Systems: Objective, Types and sources, Functional elements, Methods of solid waste management with their limitations.	12
SECTION-IV	Low Cost Sanitation Systems: Imhoff tanks (theory and design), septic tank (theory and design), soakage pit/soil absorption systems; stabilization ponds (theory and design); macrophyte ponds; oxidation ponds (theory and design); and constructed wetland systems.	10

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water
CO2	Design sewer and drainage systems layout for communities
CO3	Visualize waste water quality parameters and their characteristics.
CO4	Make decisions regarding the treatment plant site selection, operation and maintenance and the need of advanced treatment.
CO5	Demonstrate a firm understanding of various sewerage systems and their suitability

Recommended Books:

1. B.C. Punmia, Ashok Jain, 'Waste Water Engg. (Environmental Engg.-II)', Laxmi Pub, 2015
2. Metcalf & Eddy, 'Waste Water Engineering - Treatment and Reuse', TMH, New Delhi, 2010
3. S.K. Garg, 'Environmental Engineering (Vol. II)', Khanna Publishers, 2010

SUBJECT TITLE: PERSONALITY DEVELOPMENT-I
SUBJECT CODE: BTPD-3521
SEMESTER: V
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 100
End Term Exam: NA
Duration of Exam; NA

Objective and Course Outcome:

Students are able to understand the functioning of different civil engineering related Industries / firms
Students are able to understand insight of code of ethics, duties and responsibilities as a Civil Engineer
Students would develop Presentation Skills
Students would understand the concept, process and importance of Professional Communication
Students are able to understand the functioning of different civil engineering related Industries / firms

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	INTERPERSONAL SKILLS Gratitude Understanding the relationship between Leadership Networking & Team work. Assessing Interpersonal Skills Situation description of Interpersonal Skill. Team Work: Necessity of Team Work Personally, Socially and Educationally	**8**
SECTION-II	LEADERSHIP Skills for a good Leader, Assessment of Leadership Skills. CONFLICT RESOLUTION Conflicts in Human Relations – Reasons Case Studies, Approaches to Conflict resolution.	**7**
SECTION-III	PSTRESS MANAGEMENT Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters. Emotional Intelligence What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.	**8**
SECTION-IV	DECISION MAKING Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives	**7**

Recommended Books:

1. Covey Sean, Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 2014
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row, 2003
4. Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
5. SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.

Instruction of Question Paper setter

The question paper will be of three sections. Section A will contain ten questions of two marks each, Section B will contain six questions of five marks each & student have to attempt any four questions and Section C will contain three questions of ten marks each & student have to attempt any two questions. Each unit of syllabus has to be given equal weight age in all sections.

SUBJECT TITLE: DESIGN OF STEEL STRUCTURE-II
SUBJECT CODE: BTCE-3601
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To introduce the design of eccentric connections, plate girders, foot bridge, gantry girder etc.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Elements of a plate girder, design of a plate girder, curtailment of flanges, various type of stiffeners	10
SECTION-II	Design of steel foot bridge with parallel booms and carrying wooden decking, using welded joints.	10
SECTION-III	Complete design of an industrial shed including: i) Gantry girder ii) Column bracket iii) Mill bent with constant moment of inertia iv) Lateral and longitudinal bracing for column bent	14
SECTION-IV	Design of single track railway bridge with lattice girders having parallel chords (for B.G.) i) Stringer ii) Cross girder iii) Main girders with welded joints iv) Portal sway bracings v) Bearing rocker and rollers.	14

Course Outcome:

On completion of the course, the student will have the ability to

CO1	Understand the design criteria, design philosophy and behavior of structural steel
CO2	Determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling
CO3	Analyze railway bridge, footbridge and industrial sheds
CO4	Design complicated structures like plate girder, gantry girder, Industrial structures etc
CO5	Use relevant IS codes for steel structural design.

Recommended Books:

1. Limit state design of steel structures: S K Duggal (2014)
2. Design of steel structures (by limit state method as per IS: 800-2007): S S Bhavikatti (2009)
3. Design of steel structures (Vol. 2): Ram Chandra (2011)

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: DESIGN OF CONCRETE STRUCTURES-II
SUBJECT CODE: BTCE-3602
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To understand the design of columns, footings, domes, Retaining walls & Water tanks.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Foundations - Theory and Design: Isolated Footing (Square, Rectangular), Combined Footing(Rectangular, Trapezoidal, Strap), Raft Footing.	**12**
SECTION-II	Compression Members: Definitions, Classifications, Guidelines and Assumptions, Design of Short Axially Loaded Compression Members, Design of Short Compression Members under Axial Load with Uniaxial and biaxial Bending, Preparation of Design Charts, Design of Slender Columns.	**12**
SECTION-III	Design of Continuous beams and curved beams Design of Domes.	**12**
SECTION-IV	Design of Retaining walls: Cantilever type retaining wall, Counterfort type retaining wall. Introduction to water retaining structures. Design of circular and rectangular water tanks resting on ground.	**12**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Design various super-structure components like stairs, columns, continuous beams, along with relevant IS code requirements.
CO2	Understand mechanics of flooring system, footing and retaining wall.
CO3	Apply the concepts of structure design to special structural elements like curved beams, domes, water retaining structures, along with relevant IS code requirements
CO4	Apply the concepts to design the water tanks below & above ground.

Recommended Books:

1. Reinforced Concrete Design; Pillai & Menon; Tata McGraw-Hill Education (2003)
2. Limit state Design of Reinforced Concrete; Varghese P C; Prentice-Hall of India Pvt. Ltd" (2008)

SUBJECT TITLE: TRANSPORTATION ENGINEERING-II
SUBJECT CODE: BTCE-3603
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To impart knowledge about the components and functions of a railway track

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction to Railway Engineering: History of Railways, Development of Indian Railway, Organization of Indian Railway, Important Statistics of Indian Railways. Railway Gauges: Definition, Gauges on World Railways, Choice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge. Railway Track: Requirements of a Good Track, Track Specifications on Indian Railways, Detailed CrossSection of Single/Double Track on Indian Railways. Components of Railway Track: Rails, Sleepers, Ballast, Subgrade and Formation, Track Fixtures & Fastenings, Coning of Wheels, Tilting of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails	**10**
SECTION-II	Geometric Design of Railway Track: Alignment, Gradients, Horizontal Curve, Super elevation, Equilibrium Cant, Cant Deficiency, Transition Curves.Points and Crossings: Functions, Working of Turnout, Various types of Track Junctions andtheir layouts, Level-crossing. Railway Stations & Yards: Site Selection, Classification & Layout of Stations, Marshalling Yard, Locomotive Yard, Equipment at Railway Stations & Yards Signaling and Interlocking: Objectives, Classification of Signals, Types of Signals in Stations and Yards, Automatic Signaling, Principal of Interlocking.	**10**
SECTION-III	Introduction to Airport Engineering: Air Transport Scenario in India and Stages of Development, National and International Organizations. Airport Planning: Aircraft Characteristics, Factors for Site Selection, Airport Classification, General Layout of an Airport. Obstructions and Zoning Laws, Imaginary Surfaces, Approach Zones and Turning Zones. Runway Orientation and Design: Head Wind, Cross Wind, Wind Rose Diagram, Basic Runway Length, Corrections, Geometric Design Elements, Runway Configuration.	**10**
SECTION-IV	Taxiway and Aircraft Parking: Aircraft Parking System. Main Taxiway, Exit Taxiway, Separation Clearance, Holding Aprons. Visual Aids: Marking and Lighting of Runway and Taxiway, Landing Direction Indicator, and Wind Direction Indicator, IFR/VFR.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Apply existing technology to the design, construction, and maintenance of railway physical facilities
CO2	Aware of the current international technology relative to Railway Engineering
CO3	Students will get the feel of fundamentals of railway engineering from the syllabus. under railway Engineering students get knowledge of railway geometrics, Signaling & interlocking Points, crossing and turnouts etc
CO4	Develop an awareness of major issues and problems of current interest to the Airport Engineering.

Recommended Books:

1. Chandra S., and Aggarwal,"Railway Engineering" (2013)
2. Saxena, S.C., and Arora, S.P., " Railway Engineering", Dhanpat Rai and Sons, Delhi, (2010)
3. J. S. Mundrey, "Railway Track Engineering", McGraw Hill Publishing Co.(2009)
4. Khanna, S.K., Arora, M.G., and Jain, S.S., "Airport Planning and Design", (1999)
5. Norman J. Ashford, Saleh Mumayiz, Paul H. Wright, "Airport Engineering: Planning, Design and Development (2011)

SUBJECT TITLE: ENVIRONMENTAL ENGINEERING-II
SUBJECT CODE: BTCE-3604
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
To make students familiar with sewage and drainage and will be able to design sewer. Students will be acquainted with wastewater characteristics, pollution and wastewater treatment.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Terms & definitions, systems of sanitation and their merits and demerits, system of sewerage, choice of sewerage system and suitability to Indian conditions. Sewerage Systems: Generation and estimation of community Sewage, flow variations, storm water flow, types of sewers. Design of sewers and storm water sewers, construction & maintenance of sewers, sewer appurtenances, sewage pumping and pumping stations.	**10**
SECTION-II	House Drainage: Principles of house drainage, traps, sanitary fittings, systems of plumbing, drainage lay out for residences. Characteristics of Sewage: Composition of domestic and industrial sewage, sampling, physical, chemical and microbiological analysis of sewage, biological decomposition of sewage, BOD and BOD kinetics, effluent disposal limits.	**10**
SECTION-III	Treatment of Sewage: Introduction to unit operations and processes - Primary treatment; screening (theory), grit chamber (theory and design), floatation units, sedimentation tanks(theory and design), Secondary treatment units; ASP (theory and design), Sequencing batch reactors (theory and design), Trickling filters (theory and design) Anaerobic systems; Anaerobic filters (theory), UASB (theory), Anaerobic lagoons, Sludge Handling and disposal; thickening, stabilization, dewatering, drying and disposal. Introduction to Solid Waste Management Systems: Objective, Types and sources, Functional elements, Methods of solid waste management with their limitations.	**14**
SECTION-IV	Low Cost Sanitation Systems: Imhoff tanks (theory and design), septic tank (theory and design), soakage pit/soil absorption systems; stabilization ponds (theory and design); macrophyte ponds; oxidation ponds (theory and design); and constructed wetland systems.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water
CO2	Design sewer and drainage systems layout for communities
CO3	Visualize waste water quality parameters and their characteristics.
CO4	Make decisions regarding the treatment plant site selection, operation and maintenance and the need of advanced treatment.
CO5	Demonstrate a firm understanding of various sewerage systems and their suitability

Recommended Books:

1. B.C. Punmia, Ashok Jain, 'Waste Water Engg. (Environmental Engg.-II)', Laxmi Publications, New Delhi. (2005)
2. Arcadio P. Sincero and Gregoria P. Sincero, 'Environmental Engg. - A Design Approach', Prentice Hall of India, New Delhi (1995)
3. Metcalf & Eddy, 'Waste Water Engineering - Treatment and Reuse', TMH, New Delhi (2013)
4. Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, 'Environmental Engg.', International Edition, McGraw Hill (2013)
5. S.K. Garg, 'Environmental Engineering (Vol. II)', Khanna Publishers, Delhi (2010)

SUBJECT TITLE: ENVIRONMENT ENGINEERING LAB
SUBJECT CODE: BTCE-3605
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Practical Exam: 40
Duration of Exam; NA

Objective:

Students will gain hands on knowledge on different test of water like total solids, turbidity, chloride, carbonate, hardness, fluoride, Iron, residual chlorine demand, BOD, COD, DO, organic matter, nitrate, phosphate and bacteriological quantity of water

Contents of Syllabus:

Contents	Contact Hours
1. To measure the pH value of a water/waste water sample. 2. To find the turbidity of a given waste water/water sample 3. To find B.O.D. of a given waste water sample. 4. To measure D.O. of a given sample of water. 5. To determine of Hardness of a given water sample 6. To determine of total solids, dissolved solids, suspended solids of a given water sample. 7. To determine the concentration of sulphates in water/wastewater sample. 8. To find chlorides in a given sample of water/waste water.	24

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Make students proficient in the analysis of water and the wastewater by following the standard methods of sampling and testing.
CO2	Statistically analyze and interpret laboratorial results
CO3	Understand and use of water and wastewater sampling procedures and sample preservations
CO4	Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions

Recommended Books:

1. Chemistry for Environmental Engg. and Science by Sawyer & McCarty (2002)
2. Standard Methods for the examination of water & wastewater, APHA, AWWA, WE
3. Environmental Engineering, Environmental Engineering, McGraw Hill International Edition / Tata McGraw Hill Indian Edition

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: CAD LAB –II Lab
SUBJECT CODE: BTCE-3606
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Practical Exam: 40
Duration of Exam; NA

Objective:

To make students understand and make the various structures design with the help of Auto Cadd software

Contents of Syllabus:

Contents	Contact Hours
1 Stairs : Types and Design of Stairs 2 Design of Domes 3 Design of Dams 4 Design of Retaining walls Cantilever & Counterfort type retaining wall. 5 Design of curved beams 6 Design of water retaining structures 7 Foundations:- Isolated Footing (Square, Rectangular), Combined Footing(Rectangular, Trapezoidal, Strap), Raft Footing	26

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	learn basic fundamentals of groundwater flow
CO2	learn the hydraulics of different kinds of wells
CO3	Conjunctive use of ground water along with other fresh water sources
CO4	Various components of hydrologic cycle that affect the movement of water in the earth

Recommended Books:

1. Book of Auto-Cad 2D

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: SOFTWARE LAB-I
SUBJECT CODE: BTCE-3607
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Practical Exam: 40
Duration of Exam; NA

Objective:

Students will learn the complex commands of Auto CAD and plot the different structural members.

Contents of Syllabus:

Contents	Contact Hours
1 Plotting of structural members of Civil Engineering buildings in Auto CAD.	26

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Apply basic concepts to develop construction (drawing) techniques
CO2	Ability to manipulate drawings through editing and plotting techniques
CO3	Understand geometric construction
CO4	Produce template drawing

Recommended Books:

1. Book of Auto-Cad 2D

SUBJECT TITLE: PROJECT SYNOPSIS SEMINAR
SUBJECT CODE: BTCE-3608
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	0	1

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:

Student will implement his knowledge about design and try to produce a project which will help in future.

Contents of Syllabus:

Contents	Contact Hours
The student has to give Project Synopsis Seminar on the selected Project and submit a brief report (5-10Pages) under the following headings: Introduction: Introduce the problem , its significance to the civil engineering community and society at large and purpose of the study. Literature review Give a brief account of the earlier research findings in the last 10 years relevant to the topic. Try to highlight the shortcomings in these studies Objectives :Identify and state the objectives of the project (based upon the literature review) that summarize what is to be achieved at the end of the study/project. Try to closely relate these to the research problem. It is possible (and advisable) to break down a general objective into smaller, logically connected parts in the form of bullet points Methodology Give a detailed description of methods and approaches that you are going to plan/use to achieve the identified objectives References Give a list of earlier research papers, books, and manuals etc that are referred to formulate the problem NOTE: For B.Tech with specilization the Project must of selected specilization field (Structures, Environment, Highways & Transportation, Soil and Foundation & IDM)	**NA**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Student will learn to prepare project proposal.
CO2	Function as a member of the design team.
CO3	Solve design problems related to structure, highway, water supply, and irrigation, etc

Recommended Books: NA

SUBJECT TITLE: BRIDGE ENGINEERING
SUBJECT CODE: BTCE-3611
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:
Student will be able to know about the bridges and perform analysis of different types of bridges and also able to design of reinforced concrete and steel bridges of different types.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	General:-Bridge System, Considerations in alignment, Planning, Economic consideration, Aesthetics and selection of type of bridge (Review). Loading Standards:- Standards followed in India, U.K., U.S.A. and Europe.	**10**
SECTION-II	Super Structure Analysis: Bridge deck analysis using different methods, Load distribution theories – Courbon specifications for loading, Geometrical proportioning etc. of road, rail-cum-road bridges. Indian Road Congress (IRC) and Indian Railway Loading standards and their comparison with loading, Hendry- Jaegar, Morris-Little (Orthotropic plate theories) methods, Stiffness method, Finite difference method, Folded Plate method, Finite strip method and Finite Element method (General treatment), Limit analysis, Design of bridge decks	**10**
SECTION-III	Connections: Design of different connections, Bearings and joints. Substructure Analysis and Design: Piers, Abutments, Wing walls and other appurtenant structures. Foundations: Well foundations and pile foundation, Design and construction and field problems	**10**
SECTION-IV	Construction & Maintenance: Erection of bridge super structure, Maintenance, Rating and Strengthening of existing bridges. Dynamics Behaviour: Behaviour of bridges under dynamic loads, Discussion of code provisions for design of bridges for wind and earthquake forces. Long Span Bridges: General discussion of suspension and cable stayed bridges	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Exhibit the knowledge of the history of bridges and know about the IRC guidelines
CO2	Design the Balanced Cantilever Bridges
CO3	Design the steel bridges of different type. schedule, and safety requirements
CO4	Design the RCC bridges of different type.
CO5	Exhibit the knowledge of Composite Bridges and Cable Stayed Bridges

Recommended Books:

1. Elements of Bridge Engineering " D. Johnson victor (2015)
2. Raina, V.K., Analysis, Design and Construction of Bridges, Tata McGraw Hill(2010)
3. Raju, N. Krishna, Design of Bridges, Oxford and IBH (2004)

SUBJECT TITLE: ENVIRONMENT IMPACT ASSESMENT AND MANAGEMENT
SUBJECT CODE: BTCE-3612
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:

Identifying, predicting, and evaluating economic, environmental, and social impacts of development activities. Providing information on the environmental consequences for decision making.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	Introduction- Components of Environment- Man and Environment – Health and Environment – Environmental Ethics – Interdisciplinary nature of Environment -Sustainable development – Social, economical and environmental dimensions	**8**
SECTION -II	Elements of EIA – Purpose – Screening – Scoping - Terms of Reference - Public Consultation - Environmental Clearance process followed in India - Key Elements in 1994 & 2006 EIA (Govt. of India) Notification	**8**
SECTION -III	Socio-economic impacts - Impact types- Identification- Impact assessment Methodologies Overlays, Checklist, Matrices, Fault Tree Analysis, Event Tree Analysis- Role of an Environmental Engineer- Public Participation- Introduction to latest softwares in water and air quality Modeling	**8**
SECTION -IV	Water Quality Analysis- Standards for Water, Air and Noise Quality - Impact of development on vegetation and wild life-Environmental Management Plan- EIA- Case study related to Hydro electric Project.	**8**

Course Outcome:

On completion of the course, the student will have the ability to

CO1	Explicate the concept of EIA
CO2	Illustrate the necessity of public participation in EIA studies
CO3	Summarize the importance of environment attributes
CO4	Quantify impacts for various developmental projects

Recommended Books:

1. Larry W Canter, Environmental Impact Assessment, McGraw Hill Inc.(1996)
2. EIA Notification, Ministry of Environment & Forests, Govt. of India,(2006)
3. .Rau G J and Wooten C.D, EIA Analysis Hand Book, McGraw Hill.(1980)
4. Robert A Corbett, Standard Handbook of Environmental Engineering, McGraw Hill.(1989)
5. John Glasson, Riki Therivel and S. Andrew Chadwick, Introduction to EIA, University College London Press Limited (2005)

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: PAVEMENT ANALYSIS AND DESIGN
SUBJECT CODE: BTCE-3613
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:
The ultimate aim is to ensure that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade. Two types of pavements are generally recognized as serving this purpose, namely flexible pavements and rigid pavements

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Pavement Types: Definition, highway and airport pavement comparison, wheel loads, tyre pressure, Contact pressure, design factors. Type of distresses structural and functional, serviceability	**8**
SECTION-II	Stresses in Flexible: Layered system concept, multilayered solutions. Burmister's method, Fundamental design concepts. Stresses in Rigid Pavements: Relative stiffness of slabs. Modulus of subgrade reaction. Stresses due to warping, stresses due to friction, effect of warping, contraction and expansion. Plain versus reinforced pavements, stresses in dowel bar, tie bar, combined stresses.	**8**
SECTION-III	Design of Flexible Pavements: Design factors. Design wheel load. Equivalent single wheel load. Difference between airport and highway design concept. Different design methods. CBR, GI, Triaxial method, McLeod method. Design of Rigid Pavement: General design considerations. Design of joints in cement concrete pavements, spacing of expansion joint, spacing of contraction joints. Design of dowel bar. Design of tie bar. IRC recommendations for design of concrete pavements.	**8**
SECTION-IV	Pavement Evaluation and Rehabilitation: Pavement distresses in flexible and rigid pavements, condition and evaluation survey. Present serviceability index. Methods of measuring condition, skid resistance. Principles of maintenance. Methods of structural evaluation	**8**

Course Outcome:

On completion of the course, the student will have the ability to

CO1	Design of flexible pavement
CO2	Design of rigid pavements
CO3	Understand the factors that affect pavement designing
CO4	Understand the important features of pavement designing

Recommended Books:

1. Principles of Transportation Engineering by Chakroborty & Das.(2003)
2. Highway Engg by S. K. Khanna & C.E.G. Justo, New Chand Bros., Roorkee.(2015)
3. Principles of Pavement Design, by Yoder E.J. and Witczak M.W. John Wiley & Sons,INC.(2008)
4. Principles and Practice of Highway Engg. By L.R.Kadiyali, Khanna Publishers, Delhi.(2005)

SUBJECT TITLE: GROUND IMPROVEMENT TECHNIQUES
SUBJECT CODE: BTCE-3614
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:

To study the need and importance of ground improvement techniques and to understand various methods adopted for stabilizing different types of soils, grouting techniques etc.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Need of ground improvement, different methods of ground improvement.	**8**
SECTION-II	Ground improvement in granular soils: In place densification by (i) Vibro – flotation (ii) Compaction pile (iii) Vibro-compaction piles (iv) Dynamic compaction (v) Blasting	**8**
SECTION-III	Ground improvement in cohesive soils: Compressibility, vertical and radial consolidation, preloading methods. Types of drains, construction techniques. Stone column: Function, design principals, load carrying capacity, construction techniques.	**8**
SECTION-IV	Ground improvement by Grouting and Soil Reinforcement: Grouting in soil, types of grout, characteristics, grouting methods. Soil Reinforcement: Mechanism, types of reinforcing elements, reinforcement of soil beneath the road, foundation. Geosynthetics and applications. Soil stabilization: Mechanical, Lime, Cement, Fly ash, Resins & Other Chemicals.	**8**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Identify the problem and suggest suitable method to improve soil characteristics
CO2	Understand the effectiveness of radial consolidation in densification of clays
CO3	Illustrate the construction methods for stabilizing soils using lime and cement
CO4	Perform analysis and design reinforced earth retaining walls
CO5	Design suitable ground improvement system in weak soils

Recommended Books:

1. M.P. Moasley " Ground Improvement" (2004)
2. P. Purushothama Raj " Ground Improvement" (2005)
3. Das Braja M. " Principal of foundation Engineering" (2010)

SUBJECT TITLE: INFRASTRUCTURE DEVELOPMENT AND MANANGEMENT
SUBJECT CODE: BTCE-3615
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam : 60
Duration of Exam : NA

Objective:

To understand theories and practices in the rural development model and analyze rural life and rural economy.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Impact of Infrastructure development on economic development, standard of living and environment. Reasons for rise of public sector and government in infrastructural activities. Changed socio-economic scenario and current problems and related issues.. Policies on Infrastructure Development: A historical review of the Government policies on infrastructure. Current public policies on transportations, power and telecom sectors. Plans for infrastructure development. Legal framework for regulating private participation in roads and highways, Ports & Airports, Power and Telecom.	8
SECTION-II	Construction and Infrastructure: Construction component of various infrastructure sectors. Highway, ports and aviation, oil and gas, power, telecom, railways, irrigation. Current scenario, future needs, investment needed, regulatory framework, government policies and future plans. Technological and methodological demands on construction management in infrastructure development projects	8
SECTION-III	Infrastructure Management: Importance, scope and role in different sectors of construction. • Highway Sector: Repayment of Funds, Toll Collection Strategy, Shadow tolling, and direct tolls, Maintenance strategy, Review of toll rates & structuring to suit the traffic demand, Irrigation Projects: Large / Small Dams - Instrumentation, monitoring of water levels, catchments area, rainfall data management, prediction, land irrigation planning & policies, processes Barrages, Canals. • Power Projects: Power scenario in India, Estimated requirement, Generation of Power distribution strategies, national grid, load calculation & factors, Hydropower - day to day operations, management structures, maintenance, Thermal Power, Nuclear Power. • Airports: Requisites of domestic & International airports & cargo & military airports, facilities available, Terminal management, ATC. • Railways: Mass Rapid Transport System MRTS, LRT, Multi-modal Transport System.	8

SECTION-IV	Drilling, Blasting and Tunneling Equipment : Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors	**8**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Achieve Knowledge of Planning and development of problem solving skills in management.
CO2	Understand the principles of financial fundamentals.
CO3	Develop analytical skills.
CO4	Summarize the solution of economic evaluation techniques.

Recommended Books:

1. Chandra, Prassanna, "Projects, Planning, Analysis, Selection, Financing, Implementation and Review", Tata McGraw-Hill, New Delhi (2014)
2. Raghuram, G. & Jain, R., "Infrastructure Development & Financing Towards a Public-Private Partnership", Macmillan India Ltd., New Delhi(1999)
3. NICMAR, "Construction Business Opportunities in Infrastructure Development in India", NICMAR, Mumbai, (2001)
4. India Infrastructure Report 2001 & 2002, Oxford University Press, New Delhi, (2001/02)
5. Parikh Kirit S., "India Development Report, 1999-2000", Oxford University Press, New Delhi, (2002)

SUBJECT TITLE: PERSONALITY DEVELOPMENT -II
SUBJECT CODE: BTPD-3621
SEMESTER: VI
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment: 60
End Term Practical : 40
Duration of Exam : NA

Objective and Course Outcome:

Students are able to understand the functioning of different civil engineering related Industries / firms
Students are able to understand insight of code of ethics, duties and responsibilities as a Civil Engineer
Students would develop Presentation Skills
Students would understand the concept, process and importance of Professional Communication

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION -I	INTERPERSONAL SKILLS Gratitude Understanding the relationship between Leadership Networking & Team work. Assessing Interpersonal Skills Situation description of Interpersonal Skill. Team Work: Necessity of Team Work Personally, Socially and Educationally	**24**
SECTION -II	LEADERSHIP Skills for a good Leader, Assessment of Leadership Skills. CONFLICT RESOLUTION Conflicts in Human Relations – Reasons Case Studies, Approaches to conflict resolution..	
SECTION -III	PSTRESS MANAGEMENT Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters. Emotional Intelligence What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions...	
SECTION -IV	DECISION MAKING Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives	

Recommended Books:

1. Covey Sean, Seven Habit of Highly Effective Teens. (1998)
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, (1998)
3. Thomas A Harris, I am ok, You are ok , New York-Harper and Row (1972)
4. Daniel Coleman, Emotional Intelligence, Bantam Book (2006)
5. SOFT SKILLS, , Career Development Centre, Green Pearl Publications (2015)

Instruction of Question Paper setter: NA

SUBJECT TITLE: IRRIGATION ENGINEERING-II
SUBJECT CODE: BTCE-4701
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Ensure enough moisture essential for plant growth. Provide crop insurance against short duration drought. Cool the soil and atmosphere to provide a suitable surrounding.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Head Works: Types of head works, Functions and investigations of a diversion head work: component parts of a diversion head work and their design considerations, silt control devices. Theories of Seepage: Seepage force and exit gradient, assumptions and salient features of Bligh's Creep theory, Limitations of Bligh's Creep theory, salient features of Lane's weighted Creep theory and Khosla's theory, Comparison of Bligh's Creep theory and Khosla's theory.	**12**
SECTION-II	Cross-Drainage works: Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons Canal Out-lets: Essential requirements, classifications, criteria for outlet behaviors, flexibility, proportionality, sensitivity, sensitiveness, etc. Details and design of non modular, semi-modular and modular outlets.	**12**
SECTION-III	Design of Weirs: Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow. Design of barrage or weir. Canal Falls: Necessity and location, types of falls and their description, selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls and level crossing.	**12**
SECTION-IV	Canal Regulators: Off take alignment, cross- regulators – their functions and design, Distributary head regulators, their design, canal escape. Energy Dissipation Devices: Use of hydraulic jump in energy dissipation, Factors affecting design, Types of energy dissipaters and their hydraulic design.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Take up the basic concepts of irrigation and construction of various hydraulic structures
CO2	Introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management.
CO3	The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
CO4	Develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects.

Recommended Books:

1. Santosh Kumar Garg, 'Irrigation Engineering & Hydraulic Structure', Khanna Publishers(2015).
2. R.K. Sharma, 'Design of Irrigation Structures', Oxford IBH Publishers (1984).

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: PROFESSIONAL PRACTICE
SUBJECT CODE: BTCE-4702
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:
Quantity estimation for different civil engineering works like single storey residential building, BT road, canal etc.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Estimates: Rules and measurement of different types of works, Introduction of estimates, types of estimates and important definition, methods of estimates. Numerical regarding estimate of a building, road , R.C.C works .	**12**
SECTION-II	Analysis of Rates: Calculations of quantities and rates of earthwork, D.P.C, Concrete, plastering, roadwork etc.	**10**
SECTION-III	Specification: General and detailed specifications of all the technical works (theory portion) Contracts: Definition of all the documents used in Govt. sector (muster roll, measurement book, tender form etc., types of contracts.	**11**
SECTION-IV	Accounts: Division of accounts, cash, receipt of money, cash book, temporary advance, imprest , accounting procedure Definitions: Technical sanction, administrative approval. Work charge establishment, valuation, Arbitration: Acts and legal decision making process.	**15**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Estimate quantities required for different civil engineering works like single storey residential buildings, bt road, canal etc.
CO2	Finding the unit rate for different items of work.
CO3	Prepare schedule of reinforcement bars and scheduling a project
CO4	Analyzing a project and finding critical activities and hence allocate resources as per the schedule of project.

Recommended Books:

1. Dutta , B.“Estimating and Costing (2016)”.
2. Birdie, G.”Estimating and Costing”, Dhanpat Rai Publication (2014).
3. V N Vaziran. “Estimating and Costing”(2013) .

SUBJECT TITLE: FOUNDATION ENGINEERING
SUBJECT CODE: BTCE 4703
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	2	0	4

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To understand methods of explorations for assessing subsoil characteristics and different methods to Design of shallow and deep foundation systems and their suitability depending on type of soil and loading conditions.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Soil Investigation: Object of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Design features of sampler affecting sample disturbance. Essential features and application of the following types of samples-Open Drive samples, Stationery piston sampler, Rotary sampler, Geophysical exploration by seismic and resistivity methods. Bore Hole log for S.P.T. Caissons and Wells: Major areas of use of caissons, advantages and disadvantages of open box and pneumatic caissons. Essential part of a pneumatic caisson. Components of a well foundation. Calculation of allowable bearing pressure. Conditions for stability of a well, Forces actingon a well foundation. Computation of scour depth.	**10**
SECTION-II	Hallow Foundation: Type of shallow foundations, Depth and factors affecting it. Definition of ultimate bearing capacity, safe bearing capacity and allowable bearing capacity. Rankine's analysis and Terzaghi's analysis. Types of failures. Factors affecting bearing capacity. Skemptons equation. B.I.S. recommendations for shape, depth and inclination factors. Plate Load test and standard penetration Test. Bosussinesq equation for a point load, uniformly loaded circular and rectangular area, pressure distribution diagrams. Newmarks chart and its construction. 2:1 method of load distribution. Comparison of Bosussinesq and Westerguard analysis for a point load. Causes of settlement of structures, Comparison of immediate and consolidation settlement, calculation of settlement by plate load Test and Static Cone penetration test data. Allowable settlement of various structures according to I.S. Code.	**10**

SECTION-III	Earth Pressure: Terms and symbols used for a retaining wall. Movement of all and the lateral earth pressure. Earth pressure at rest. Rankine states of plastic equilibrium, Ka and Kp for horizontal backfills. Rankine's theory both for active and passive earth pressure for Cohesionless backfill with surcharge and fully submerged case. Cohesive backfill condition. Coulomb's method for cohesion less backfill. Merits and demerits of Ranking and Coulomb's theories, Culmann's graphical construction (without surcharge load).	**10**
SECTION-IV	Pile Foundations: Necessity and uses of piles, Classification of piles, Merits and demerits of different types based on composition. Types of pile driving hammers & their comparison. Effect of pile driving on adjacent ground.. Limitations of pile driving formulae. Cyclic Pile Load Test, Separation of skin friction and point resistance using cyclic pile load test. Determination of point resistance and frictional resistance of a single pile by Static formulas. Piles in Clay, Safe load on a Friction and point Bearing pile. Pile in sand, Spacing of piles in a group, Factors affecting capacity of a pile group, Bearing capacity of a pile group in clay by block failure and individual action approach. Calculation of settlement of friction pile group in clay. Related Numerical problems. Settlement of pile groups in sand, Negative skin friction. Related numerical problem.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Plan soil exploration programme and prepare a detailed soil investigation report
CO2	Estimate allowable bearing pressure and settlement of soils
CO3	Evaluate stability of various earth retaining structures.
CO4	Gain diverse knowledge on various shallow and deep foundations adopted in field

Recommended Books:

1. Soil Mech. & Foundation Engg, by K.R. Arora, Standard Publishers Distributors (2011).
2. Geotechnical Engineering, by P. Purshotama Raj (2007).
3. Soil Mech. & Foundation Engg., by V.N.S. Murthy (2009).

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: SOFTWARE LAB-II
SUBJECT CODE: BTCE-4704
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment:60
End Term Exam: 40
Duration of Exam; NA

Objective:

To make student understand how to use different software for the design of structures and managing the work**.**

Contents of Syllabus:

Contents	Contact Hours
Student can learnt any one of the following software in lab . STAAD Pro software. Primavera Revit Structure ETABS Sap	**45**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Student will be able to complete object-oriented instinctive 2D/3D graphic model generation
CO2	Student will learn how to achieve user-specified design parameters to customize a design.
CO3	Student will be able to design concrete beams/columns/slabs/footings as per all major
CO4	Student will know to perform code check, member selection and optimized member selection consisting of analysis/design cycles

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: BUILDING DRAWING
SUBJECT CODE: BTCE 4705
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	2	1

Internal Assessment:60
End Term Exam: 40
Duration of Exam; NA

Objective:

To familiarize building components, principles, methods, software, and codes of practices for planning and design of the building.

Contents of Syllabus:

Contents	Contact Hours
Foundations Spread foundation for walls and columns; Footing for a RCC column, raft and pile foundations; Doors and Windows Glazed and paneled doors of standard sizes; Glazed and paneled windows of standard sizes; Stair case Plan and elevation of straight run, quarter turn, dog-legged and open well stair cases. Building To draw the line diagram, plan, elevation and section of the Residential Buildings (flat, pitched and combined roofs), Office Buildings (flat roof)..	**45**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Analyze the various types of residential buildings
CO2	Draw the complete drawing of plan of a residential building
CO3	Analyze the various types of residential buildings.
CO4	Draw the plan, elevation, and sectional view of the building with functional requirements

Recommended Books:

1.Building Construction B C Punima (2008).
2.Building Drawing V B Sikka (2015).

SUBJECT TITLE: MAJOR PROJECT
SUBJECT CODE: BTCE 4706
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	4	3

Internal Assessment:60
End Term Exam: 40
Duration of Exam; NA

Objective and Course Outcome:

Solve design problems related to structure, highway, water supply, and irrigation
Function as a member of the design team
Use design codes
Apply principles of geotechnical investigations in designing super structures

Contents of Syllabus:

Contents	Contact Hours
The student has to give Project Synopsis Seminar on the selected Project and submit a brief report (at least 70 Pages) under the following headings: Introduction Introduce the problem , its significance to the civil engineering community and society at large and purpose of the study. Literature review Give a brief account of the earlier research findings in the last 10 years relevant to the topic. Try to highlight the shortcomings in these studies Objectives Identify and state the objectives of the project (based upon the literature review) that summarize what is to be achieved at the end of the study/project. Try to closely relate these to the research problem. It is possible (and advisable) to break down a general objective into smaller, logically connected parts in the form of bullet points Methodology Give a detailed description of methods and approaches that you are going to plan/use to achieve the identified objectives References Give a list of earlier research papers, books, and manuals etc that are referred to formulate the problem NOTE: For B.Tech with specialization the Project must of selected specialization field (Structures, Environment, Highways & Transportation, Soil and Foundation & IDM)	**40**

Recommended Books: N.A

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: PRE-STRESSED CONCRETE STRUCTURES
SUBJECT CODE: BTCE-4711
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To familiarize with different methods of Prestressing and Pretensioning and their practical applications and analyze and design flexural members under service and ultimate load.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Materials for pre stressed concrete and pre stressing systems High strength concrete and high tensile steel – tensioning devices – pre tensioning systems – post tensioning systems.	**12**
SECTION-II	Analysis of prestress and bending stresses Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.	**12**
SECTION-III	Strength of prestressed concrete sections in flexure, shear and torsion Types of flexural failure – strain compatibility method – IS:1343 code procedure – design for limit state of shear and torsion	**12**
SECTION-IV	Design of prestressed concrete beams and slabs Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.	**12**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Understand the concept of pre tensioning and post tensioning and different systems used in pre tensioning
CO2	Analysis and design the simple prestressed beams
CO3	Design deep beams and corbel as per IS 456
CO4	Analyze uncracked and cracked prestressed concrete sections.

Recommended Books:

1. N. Krishna Raju, Prestressed concrete, Tata McGraw Hill (2012).
2. P. Dayaratnam, Prestressed Concrete, Oxford & IBH (2016).
3. R. Rajagopalan, Prestressed Concrete(2014).

SUBJECT TITLE: ADVANCED ENVIRONMENTAL ENGG.
SUBJECT CODE: BTCE-4712
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Environmental engineering applies scientific and engineering principles to improve and maintain the Environment to protect human health, protect nature's beneficial ecosystems.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Environment, Biosphere, Ecosystems; their interrelationships and pollution. Air Pollution & Control: Air pollution, Physical & chemical fundamentals, Air pollution standards, Effects of air pollution; climate change, Air pollution meteorology	**10**
SECTION-II	Atmospheric dispersion of pollutants, Indoor air quality models, Air pollution control of stationary & mobile sources Noise Pollution & Control: Introduction, Rating Systems, Sources & Criteria, Noise prediction and Control	**10**
SECTION-III	Solid Waste Management: Perspectives & properties, collection, transfer & transport, Life cycle assessment, Disposal in a landfill, Waste to energy, Composting, Resource conservation & recovery for sustainability .	**10**
SECTION-IV	Hazardous Waste Management: The hazard, risk, definition & classification RCRA &HSWA, CERCLA & SARA, Hazardous waste management, Treatment technologies, Land disposal, Groundwater contamination & remediation	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Understand the concept of pre tensioning and post tensioning and different systems used in pre tensioning
CO2	Analysis and design the simple prestressed beams
CO3	Design deep beams and corbel as per IS 456
CO4	Analyze uncracked and cracked prestressed concrete sections.

Recommended Books:

1..Davis& Cornwell, Environmental Engineering, McGraw Hill Int Edition (2012).
2..Peavy, H.S, Rowe, D.R, Tchobanoglous, G, Environmental Engineering, McGraw Hill(1985).
3..E.P. Odum, Fundamentals of Ecology, Oxford and IBH Pub(2008).
4. Rao and Rao, Air Pollution, Tata McGraw Hill Pub(2004).

SUBJECT TITLE: TRAFFIC PLANNING & DESIGN
SUBJECT CODE: BTCE-4713
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Students will acquire knowledge on traffic engineering administration and function, traffic survey parking Survey. Students will be familiar with statistical method of traffic engineering, geometric design traffic signals and transport planning. Some knowledge on economic evaluation of transportation, been cost ratio method, Growth of town -present difficulties in urban traffic condition

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Design of highways, design of at-grade intersections, design of signalized intersection, design of grade separated intersection, terminal design, and design of facilities for non-motorized transport.	**12**
SECTION-II	Terminal Planning & Design: Terminal functions, analysis of terminals, process flow charts of passenger & goods terminals, terminal processing time, waiting time, capacity & level of service concept, study of typical facilities of highway, transit, airport and waterway terminals, concept of inland port.	**12**
SECTION-III	Design of Highways: Hierarchy of highway system, functions, design designations, concepts in horizontal & vertical alignment, integration, optical design, geometrical standards for mobility & accessibility components, landscaping and safety considerations, evaluation and design of existing geometrics.	**14**
SECTION-IV	Design of Intersections: Review of design of at-grade intersections, signal coordination – graphic methods & computer techniques, grade separated intersections – warrants for selection, different types & geometric standards, spacing & space controls, ramps & gore area design.	**14**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Learn about basic Traffic Engineering administration.
CO2	Students would be aware of the basic principles of speed, journey time and delay time
CO3	Students will be able to understand volume counts and parking surveys
CO4	Students would be aware of the basic principles of design, planning and management of traffic system.

Recommended Books:

1. Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna publishers (2011).
2. The Institute of Transportation Engineers, Transportation and Traffic Engg. Hand Book, Prentice Hall (1982)
3. Salter, R J., Highway Traffic Analysis and Design, ELBS (2013).
4. Edward K. Morlock, Introduction to Transportation Engineering & Planning, International Student Edition, Mc-Graw Hill Book Company, New York.(1991).

SUBJECT TITLE: SUBSURFACE GEOPHYSICAL METHODS
SUBJECT CODE: BTCE-4714
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Students will learn how to stabilize the soil by different methods and also different sampling techniques.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction: Necessity and Importance of soil exploration , Method of sub surface exploration Test pits , Trenches, Caissons, Tunnels and drifts, Wash boring , Percussion drilling , Rotary drilling, Factors affecting the selection of a suitable method of boring. Extent of boring, Factors controlling spacing and depth of bore holes, Spacing and depth of various Civil engineering structures.	**12**
SECTION-II	Stabilization of bore holes, Different method of stabilization of the bore holes, their relative merits and demerits	**12**
SECTION-III	Sampling: Source of disturbance and their influence, Type of sampler, Principle of design of sampler, Representative and undisturbed sampling in various types of soils, Surface sampling, Amount of sampling, Boring and sampling record, Preservation and shipment of sample preparation of bore log..	**14**
SECTION-IV	Penetration tests, Standard penetration tests, Dynamic cone penetration tests with and without bentonite slurry, Static cone penetration tests, factor affecting the penetration tests, Fields Tests: Wash boring, Percussion boring, Standard penetration test, Dynamic cone penetration tests with and without bentonite mud slurry. Static cone penetration test, Surface sampling.	**14**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Students would able to identify the objects of site investigation and describe the use of different types of samples and samplers
CO2	Students would understand the process of soil exploration by different boring methods
CO3	Students shall be able to perform standards penetration test, static and dynamic cone penetration test
CO4	Students will capable of carrying out plate load test, penetration test, using piezometer , slope inclinometer

Recommended Books:

1. Hvorsler M. "Subsurface exploration and sampling of soil for Civil Engg. Purposes(1970).
2. Simon and Cayton " Site investigation"(1991).

SUBJECT TITLE: PROJECT MANAGEMENT & SYSTEM TECHNIQUE

SUBJECT CODE: BTCE-4715
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Enable students to understand importance of planning and management of construction projects and different elements of a construction management. Enable students to learn about contracts, tenders and various works and works measurement standards

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Project Management Concepts and Needs Identification Attributes of a Project, Project Life Cycle, The Project management Process, Global Project Management, Benefits of Project Management, Needs Identification, Project Selection, Preparing a Request for Proposal, Soliciting Proposals, Project organization, the project as part of the functional organization, pure project organization ,the matrix organization, mixed organizational systems	**12**
SECTION-II	Project Planning and Scheduling: Design of project management system; project work system; work breakdown structure, project execution plan, work packaging plan, project procedure manual; project scheduling; bar charts, line of balance (LOB) and Network Techniques (PERT / CPM)/ GERT, Resource allocation, Crashing and Resource Sharing Project Monitoring and Control Planning, Monitoring and Control; Design of monitoring system; Computerized PMIS (Project Management Information System). Coordination; Procedures, Meetings, Control; Scope/Progress control, Performance control, Schedule control, Cost control,	**12**
SECTION-III	Project Performance Performance Indicators; Project Audit; Project Audit Life Cycle, Responsibilities of Evaluator/ Auditor, Responsibilities of the Project Manager	**10**
SECTION-IV	Drilling, Blasting and Tunneling Equipment : Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Understand importance of planning, scheduling and controlling the construction project
CO2	Understand and know the various types of contracts and works related to construction projects
CO3	Understand the significance and concept of scientific construction management, labour problems in construction projects
CO4	Discuss various labour problems and labour legislation in India.

Recommended Books:

1. Project Management – Gido / Clements – Cengage(2012).
2. Project Management, Meredith Mantel, Wiley(2011).
3. Successful Project Management – Rosenau / Githens – Wile(2005).

SUBJECT TITLE: DISASTER MANAGEMENT
SUBJECT CODE: BTCE-4716
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

Reduce the risk of disasters caused by human error, deliberate destruction, and building or equipment failures. Be better prepared to recover from a major natural catastrophe. Ensure the organization's ability to continue operating after a disaster. Recover lost or damaged records or information after a disaster.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction to Disaster Management: Define and describe disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and describe the types of natural and non-natural disasters. Important phases of Disaster Management Cycle Disaster Mitigation and Preparedness: Natural Hazards: causes, distribution pattern, consequences and mitigation measures for earth quake, tsunami, cyclone, flood, landslide drought etc. Man-made hazards: causes, consequences mitigation measures for various industrial hazards/disasters, Preparedness for natural disasters in urban areas.	**12**
SECTION-II	Hazard and Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems. Emergency Management Systems (EMS): Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation	**10**
SECTION-III	Capacity Building: Gender sensitive disaster management approach and inculcate new skills and sharpen existing skills of government officials, voluntary activists, development of professional and elected representative for effective disaster management, role of media in effective disaster management, overview of disaster management in India, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines Application of Geo informatics and Advanced Techniques: Use of Remote Sensing Systems (RSS) and GIS in disaster Management, role of knowledge based expert systems in hazard scenario, using risks-time charts to plan for the future, early warning systems.	**13**
SECTION-IV	Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management Case Studies: Lessons and experiences from various important disasters with specific reference to Civil Engineering	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Understand the basic concepts of disasters and hazards
CO2	Analyze the impacts of disaster on various societal component
CO3	Understand the components of disaster management cycle and roles of various agencies its risk reduction
CO4	Understand the process of recovery, reconstruction and development methods

Recommended Books:

1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill.Pub (1997).
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester(2011).
3. Disaster Management, R.B. Singh (Ed), Rawat Publications(2006).

SUBJECT TITLE: INFRASTRUCTURE SYSTEM PLANNING
SUBJECT CODE: BTCE-4717
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To achieve Knowledge of Planning and development of problem solving skills in management.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	An overview of Basic Concepts Related to Infrastructure. Introduction to Infrastructure. An Overview of the Power Sector in India. An Overview of the Water Supply and Sanitation Sector in India. An overview of the Road, Rail, Air and Port Transportation Sectors in India .An overview of the Telecommunications Sector in India. An overview of the Urban Infrastructure in India. An overview of the Rural Infrastructure in India..	**12**
SECTION-II	Strategies for Successful Infrastructure Project Implementation Risk Management Framework for Infrastructure Projects. Shaping the Planning Phase of Infrastructure Projects to mitigate risks .Designing Sustainable Contracts. Introduction to Fair Process and Negotiation. Negotiating with multiple Stakeholders on Infrastructure Projects. Sustainable Development of Infrastructure. Information Technology and Systems for Successful Infrastructure Management. Innovative Design and Maintenance of Infrastructure Facilities.	**10**
SECTION-III	Challenges to Successful Infrastructure Planning and Implementation Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks : The Case of the Vadodhara- Halol Expressway.f energy, Cultural Risks in International Infrastructure Projects .Legal and Contractual Issues in Infrastructure .Challenges in Construction and Maintenance of Infrastructure	**13**
SECTION-IV	Private Involvement in Infrastructure . A Historical Overview of Infrastructure Privatization. Benifits of Infrastructure Privatization. Problems with Infrastructure Privatization. Challenges in Privatization of Water Supply : A Case Study of Cochabamba, Bolivia. Challenges in Privatization of Power : Case Study from the Philippines. Privatization of Infrastructure in India : Case Study of the Tirupur Water Supply Project. Privatization of Road Transportation Infrastructure in India.	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Understand the principles of financial fundamentals.
CO2	Develop analytical skills.
CO3	Summarize the solution of economic evaluation techniques.
CO4	Understand the concepts of financial and Economics management.

Recommended Books:

1. Felix Aromo Ilesanmi, "Regional Infrastructure Development Intervention", LAP Lambert Academic Publishing (2013).
2. Biswa Nath Bhattacharyay, Masahiro Kawai and Rajat M. Nag," Infrastructure for Asian Connectivity", Edward Elgar Phublishing Limited, USA(2012).
3. Rakesh Mohan, India Infrastructure Report, pp 217-259 (1997).
4. Report of Task Force on Planning and Development of Small and Medium Towns& Cities, Govt. of India(1996).
5. Kulwant Singh, Steinberg, Einsiedal, Integrated Urban Infrastructure Development in Asia, HUDCO, New Delhi(1996).
6. A Singhal, Evolution of Development and Development Administration Theory, Indian Journal of Rural Development, Vol. 35(4) pp 841-850 (1989).
7. M.A.Khan, Sociological Analysis of the working of Small farmers Development Agency, Shimla, IIAS, Shimla(1978).

SUBJECT TITLE: PLANNING FOR SUSTAINABLE DEVELOPMENT
SUBJECT CODE: BTCE-4718
SEMESTER: VII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	0	0	3

Internal Assessment:40
End Term Exam: 60
Duration of Exam; 3 Hrs

Objective:

To make student aware of different ways to achieve the sustainable development.

Contents of Syllabus:

Sr. No	Contents	Contact Hours
SECTION-I	Introduction, Components of the environment. Understanding environment and ecology: A systems perspective Environment: A multi disciplinary perspective .Methodological approaches for environment & ecology analysis. Micro level environment. Macro level environment .Man made environment Natural environment. Environment, ecology and quality of life Development and environment: Issues of Noise pollution, Land pollution (Municipal industrial, Commercial, hazardous soled waste) Water pollution, Air pollution & Traffic Management Ecological Behavior & Knowledge management: recycling, energy, water conservation, political activism, Consumerism, Commitment to environmental organizations.	**12**
SECTION-II	Meaning and scope of Infrastructure Development Management; Functions, components, stages and principles of Management in relation to Infrastructure Development, Infrastructure Development Issues, Infrastructure Development in India.	**10**
SECTION-III	National level organizations related to Infrastructure Development e.g. NHAI, Planning Commission in terms of their background, functions, powers, setup and resources (with some case studies). State level organizations related to Infrastructure development PIDB, GIDB, PWD, GMB etc. in terms of their background, functions, powers, set-up and resources (with some case studies).	**10**
SECTION-IV	Process of decision making for Infrastructure Development at Human Settlements/local Level, Various local level organizations related to Development in terms of their background, functions, powers, set-up and resources MC etc. (with some case studies).	**10**

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Develop professional personnel in design, planning and management of urban areas
CO2	Evaluate different sustainable construction methods
CO3	Develop successful strategies for the implementation of urban development initiatives
CO4	Apply life cycle approach to optimize the performance of green construction materials

Recommended Books:

1. Carlos Cruz Rui C Marques, Infrastructure Public-Private Partnerships: Decision, Management and Development, Springer (2013)
2. WBI . Training Manual and Urban Infrastructure Services.(2006)
3. United Nations Centre for Human Settlements (UNCHS – Habitat) , Cities in a Globalizing World: Global Report on Human Settlements, Earthscan.(2001).

Program Name: B. Tech Civil Engineering
Program Code: CIV-301

SUBJECT TITLE: INDUSTRIAL TRAINING
SUBJECT CODE: BTCE- 4801
SEMESTER: VIII
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	0	16

Internal Assessment: 500
End Term Exam: 500
Duration of Exam; NA

Objective:
To consider construction costs, government regulations, potential environmental hazards, and other factors during the planning and risk-analysis stages of a project

Contents of Syllabus:

Contents
Students have to take industrial training/software training in any reputed company for 6 months.

Course Outcome:

On completion of the course, the student will have the ability to:

CO1	Analyze long range plans, survey reports, maps, and other data to plan and design projects
CO2	Oversee and analyze the results of soil testing to determine the adequacy and strength of foundations
CO3	Manage the repair, maintenance, and replacement of public and private infrastructure