SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS
FEROZEPUR

Ref. No.: SBS/FZR/ODA/708 Dated: 15/10/2016

NOTIFICATION

Teaching scheme and syllabus for the discipline of B.Tech, B. Arch, MBA, MCA and BCA (3rd Sem Onwards) for the students admitted in the year 2015 stands approved in the 6th Academic Council of the institute wide agenda item no. 6.16. The approved teaching scheme and syllabus are available on the institute website

Director 19/10/16

Endst. No. Dated:

A copy of the above is forwarded to the following for information and necessary action.

1. Mr. Amardeep Chopra to upload the teaching scheme and syllabus attached herewith on the institute website.
2. Registrar
3. Dr Tejeet Singh, Member Secretary Academic Council
4. PA to Director

SYLLABUS

FOR

B. Tech.
(Civil Engineering)
2015 Batch onwards

DEPARTMENT OF CIVIL ENGINEERING

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

Third Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 301A	Strength of Materials	C	3	2	-	40	60	100	4
2.	BTCE 302A	Fluid Mechanics	C	3	1	-	40	60	100	4
3.	BTCE 303A	Survey	C	3	-	-	40	60	100	3
4.	BTCE 304A	Building Materials	C	3	-	-	40	60	100	3
5.	BTCE 31YA	Professional Elective-I	E	3	-	-	40	60	100	3
6.	BTCE 305A	Fluid Mechanics Lab	C	-	-	2	30	20	50	1
7.	BTCE 306A	Strength of Materials Lab	C	-	-	2	30	20	50	1
8.	BTCE 307A	Survey Lab	C	-	-	3	30	20	50	1
9.	BTCE 308A	Training-I	T	-	-	-	60	40	100	2
10.	BTHU 301A	Professional Skills-I	C	-	-	2	30	20	50	1
Total				15	3	9	380	420	800	-
Total Contact Hours				27			Total Credits			23

Fourth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 401A	Structural Analysis - I	C	3	2	-	40	60	100	4
2.	BTCE 402A	Construction Machinery & Works Management	C	3	-	-	40	60	100	3
3.	BTCE 403A	Irrigation Engineering	C	3	1	-	40	60	100	4
4.	BTCE 404A	Building Construction	C	3	-	-	40	60	100	3
5.	BTCE 41YA	Professional Elective-II	E	3	1	-	40	60	100	4
6.	BTCE 405A	Structural Analysis Lab	C	-	-	2	30	20	50	1
7.	BTHU 401A	Professional Skills-II	C	-	-	2	30	20	50	1
Total				15	4	4	260	340	600	-
Total Contact Hours				23			Total Credits			20

Fifth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 501A	Structural Analysis - II	C	3	1	-	40	60	100	4
2.	BTCE 502A	Design of Concrete Structures - I	C	3	1	-	40	60	100	4
3.	BTCE 503A	Design of Steel Structures - I	C	3	1	-	40	60	100	4
4.	BTCE 504A	Transportation Engineering - I	C	3	-	-	40	60	100	3
5.	BTCE 9YYA	Open Elective - I	OE	3	-	-	40	60	100	3
6.	BTCE 505A	Concrete Technology Lab	C	-	-	2	30	20	50	1
7.	BTCE 506A	Transportation Engineering Lab	C	-	-	2	30	20	50	1
8.	BTCE 507A	Training-II	T	-	-	-	60	40	100	3
9.	BTHU 501A	Professional Skills-III	C	-	-	2	30	20	50	1
Total				15	3	6	350	400	750	-
Total Contact Hours				24			Total Credits			24

Sixth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 601A	Geotechnical Engineering	C	3	1	-	40	60	100	4
2.	BTCE 602A	Design of Concrete Structures - II	C	3	1	-	40	60	100	4
3.	BTCE 603A	Design of Steel Structures - II	C	3	1	-	40	60	100	4
4.	BTCE 604A	Transportation Engineering - II	C	3	-	-	40	60	100	3
5.	BTCE 9YYA	Open Elective - II	OE	3	-	-	40	60	100	3
6.	BTCE 605A	Computer Aided Design Lab	C	-	-	3	30	20	50	1
7.	BTCE 606A	Geotechnical Engineering Lab	C	-	-	2	30	20	50	1
8.	BTHU 601A	Professional Skills-IV	C	-	-	2	30	20	50	1

Total	15	3	7	290	360	650	-
Total Contact Hours	25			Total Credits			21

Seventh Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 701A	Foundation Engineering	C	3	1	-	40	60	100	4
2.	BTCE 702A	Environmental Engineering - I	C	3	1	-	40	60	100	4
3.	BTCE 703A	Estimating & Costing	C	3	1	-	40	60	100	4
4.	BTCE 71YA	Professional Elective - III	E	3	-	-	40	60	100	3
5.	BTCE 705A	Software Lab	C	-	-	2	30	20	50	1
6.	BTCE 706A	Environmental Engineering Lab	C	-	-	2	30	20	50	1
7.	BTCE 707A	Training-III	T	-	-	-	120	80	200	4
8.	BTCE 708A	Project-I	P	-	-	4	40	60	100	4
Total				12	3	8	380	420	800	-
Total Contact Hours				23			Total Credits			25

Eighth Semester										
Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 801A	Hydrology & Dams	C	3	1	-	40	60	100	4
2.	BTCE 802A	Environmental Engineering - II	C	3	1	-	40	60	100	4
3.	BTCE 81YA	Professional Elective – IV	C	3	-	-	40	60	100	3
4.	BTCE 804A	Project	P	-	-	6	120	80	200	6
Total				9	2	6	240	260	500	-
Total Contact Hours				17			Total Credits			17

*CBCS: Choice Based Credit System

C-Core; E-Elective; OE-Open Elective; T-Training;P-Project

Professional Elective-I (BTCE31YA)

1. BTCE 311A; Rock Mechanics & Engineering Geology
2. BTCE 312A ; Principles and Economics of Management
3. BTCE313A ; Town Planning

Professional Elective-II (BTCE41YA)

1. BTCE 411A; Geomatics Engineering
2. BTCE 412A; Disaster Management
3. BTCE 413A; Building Maintenance

Professional Elective-III (BTCE71YA)

1. BTCE 711A; Bridge Engineering
2. BTCE 712A; Environmental Impact Assessment
3. BTCE 713A; Ground Improvement Techniques

Professional Elective-IV (BTCE81YA)

1. BTCE811A; Elements of Earthquake Engineering
2. BTCE812A; Pre -stressed Concrete
3. BTCE813A; Pavement Design

Training-I: Workshop Training of 4 weeks duration after 2nd semester Carpentry, Electrical, Plumbing, Masonry, CAD.

Training-II: Survey Camp of 04 weeks duration after 4th Semester.

Training-III: In house/Industrial 8 week training during summer vacations after 6^{th} semester.

OPEN ELECTIVES (BTCE9YY)– Offered by Department of Civil Engineering to be studied by other discipline students except Civil Engineering students	
BTCE901A	Traffic Engineering
BTCE902A	Solid Waste Management
BTCE903A	Environment Pollution
BTCE904A	Civil Engineering Materials

OPEN ELECTIVES – likely to be Offered by other department to be studied by Civil Engineering students

BTCE-5YA	**Open Elective for 5th semester**
BTCE508A	Total Quality Management
BTCE509A	Introduction to Business system
BTCE510A	Optimization Techniques
BTCE511A	Project Management
BTCE-6YA	**Open Elective for 6th semester**
BTCE607A	New And Renewable Energy Sources
BTCE608A	Numerical Methods in Civil Engineering
BTCE609A	Traffic and Transportation
BTCE610A	Operation Research

Third Semester

BTCE301A Strength of Material

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

1. **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.

2. **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 vessels subjected to internal pressures.

3. **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.

4. **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.

5. **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.

6. **Columns and Struts:** Stability of Columns, Buckling load of an axially loaded columns with various end conditions, Euler's and Rankine's formula, Columns under eccentric load, lateral load.

7. **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.

8. **Failure theories:** Maximum principal stress theory, Maximum shear stress theory, Distortion Energy theory, Strain Energy theory, Constant Analysis of Thin Cylinder.

Books Recommended:

1. Strength of Material by S. Ramamrutham
2. Mechanics of Material : E .Popov
3. Strength of Materials : Sadhu Singh
4. Strength of Material : Dr. R.K. Bansal

CO1 To provide students with exposure to the systematic methods for solving engineering problems in solid mechanics.
CO2 Apply the linear laws of elasticity as related to different stress and strain conditions.
CO3 To learn the concept of shear force and bending moment diagram for different structure component under various loading conditions.
CO4 Determine the effect of combined axial and bending stress.
CO5 Understand the behavior of columns and struts under axial loading.
CO6 To learn about torsion, bending characteristics of shafts and various failure stress theories.

Chapter / CO	1	2	3	4	5	6	7	8
CO 1	M	M						
CO 2			M					
CO 3				M				
CO 4					M			
CO 5						M		
CO 6							M	M

BTCE302A Fluid Mechanics

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. **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.

2. **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.

3. **Fluid Kinematics:** Classification of fluid flows, velocity and acceleration of fluid particle, local and convective acceleration, normal & tangential acceleration streamline, path line and streak line, flow rate and discharge mean velocity continuity equation in Cartesian co-ordinates, stream & velocity potential functions.

4. **Fluid Dynamics:** Euler's equation, Bernoulli's equation and steady flow energy equation, kinetic energy and momentum correction factors, flow along a curved streamline, free and forced vortex motions.

5. **Dimensional Analysis and Similitude:** Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimension less number and their significance, geometric, kinematic and dynamic similarity, model studies, Flow Measurement in Manometers, Pitot tubes, Venturimeter and orifice meters, orifices, mouthpieces, notches **(Rectangular and V-notches)** and weirs **(Sharp crested Weirs)**.

6. **Laminar& Turbulent Flow:** Flow through circular section pipe, flow between parallel plates, stokes law, Transition from laminar to turbulent, Critical velocity and critical Reynolds Number Turbulent flows and flow losses in pipes, Darcy equation minor head losses in pipe fittings, hydraulic and energy gradient lines, Effects of turbulent flow in pipes.

7. **Uniform flow in open Channels:** Flow classifications, basic resistance equation for open channel flow, Chezy, Manning, Bazin and Kutter formulae, Variation of roughness coefficient, conveyance and normal depth, Velocity Distribution, Most efficient flow sections, rectangular, trapezoidal and circular.

8. **Energy principles and critical flow:** Energy and specific energy in an open channel, critical depth for rectangular and trapezoidal channels, Alternate depths, applications of specific energy to transitions and Broads crested weirs, Momentum and specific force in open channel flow, sequent depths.

Books Recommended:

1. Hydraulics & Fluid Mechanics by P.N.Modi and S.M.Seth; StandardPublication
2. Flow in Open Channels by S.Subraminayam; Tata MacGraw Hill
3. Introduction to Fluid Mechanics by Robert N.Fox& Alan T.Macnold
4. Fluid Mechanics : Dr. R.K. Bansal; Laxmi Publications
5. Fluid Mechanics : Dr.JagdishLal; Metropolitan Book Co. (p) Ltd

CO1 Able to describe appropriate physical properties of fluids and determine pressures and forces on submerged bodies.
CO2 Able to understand the concepts of fluid dynamics and kinematic.
CO3 Ability to present data or governing equations in non-dimensional form, design experiments, and perform model studies.
CO4 To study about laminar and turbulent flow, energy gradient and effects of head losses in pipes.
CO5 To classify the flow in open channel and various momentum principles in open channels.
CO6 To learn the applications of specific energy to transitions and Broads crested weirs, Momentum and specific force in open channel flow.

Chapter / CO	1	2	3	4	5	6	7	8
CO 1	**M**	**M**						
CO 2			**M**	**M**				
CO 3					**M**			
CO 4						**M**		
CO 5							**M**	
CO 6								**M**

BTCE303A Survey

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. **Introduction:** Definition, principles of surveying, different types of surveys, topographical map, scale of map, selection of stations and base line, corrections for base line.

2. **Chain and Compass Surveying:** Measurement of distances with chain and tape, direct & indirect ranging, offsets, bearing and its measurement with prismatic and surveyor's compass, calculation of angles from bearings.

3. **Plane Table Surveying:** Setting up the plane table and methods of plane tabling.

4. **Levelling & Contouring**: Setting up of a dumpy/auto level, booking and reducing the levels by rise & fall method and height of instrument method, correction due to curvature and refraction, characteristics of contours, methods of contouring, uses of contour maps.

5. **Theodolite Traversing:** Temporary and permanent adjustments, measurement of horizontal and vertical angles, adjustment of closing error by Bowditch & Transit rules.

6. **Tachometry:** Definition, determination of tachometer constants and reduced level from tachometric observations.

7. **Curves:** Elements of a simple curve, different methods of setting out of simple circular curve.

Books Recommended:

1. Duggal, S.K., Surveying Vol I & II, Tata McGraw Hill (2006)
2. Punmia, B.C., Jain, Ashok Kumar and Jain, Arun Kumar, Surveying Vol. I and II, Laxmi Publications (2005).
3. Agor, R., Surveying, Khanna Publishers (1982)
4. Bhavikatti,S.S. Survey Volume I&II (2009)
5. Surveying by Dr. Narinder Singh

CO1 Ability to use survey instruments in carrying out survey, collect data, write reports and able to perform required calculations to achieve the objective for different types of surveying for different Engineering projects.

CO2 Able to understand the different methods and techniques of surveying like levelling, compass survey, contouring and curve settings etc. and their applications in surveying.

CO3 Able to do field work and office work simultaneously with the help of plane table surveying

CO4 Apply the concept of Theodolite and Tachometry for surveying in different areas to obtain the topographical map of area.

CO5 To learn the different methods of setting out of curves.

Chapter / CO	1	2	3	4	5	6	7
CO 1	**M**	**M**					
CO 2		**M**		**M**			
CO 3			**M**				
CO 4					**M**	**M**	
CO 5							**M**

BTCE304A Building Materials

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. **Building Stones:** General, Qualities of a good building stone-Deterioration of stones-Preservation of stones, Common building stone of India & their Uses-Artificial stones.

2. **Bricks:** General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks, Varieties of fire bricks, sand lime bricks, building tiles- roofing, flooring and wall tiles.

3. **Lime:** Cementing material, Characteristics of good quality lime, classifications & testing of Lime, Hydraulic test, acid test, setting & slaking of lime, uses of different varieties of lime.

4. **Concrete:** Constituents of concrete, different types of cements used in concrete, brief introduction to ingredients and manufacture of cements, Hydration and compounds of hydration, Properties and testing of cement.

5. **Concrete Mixes:** Design of concrete mixes by ISI method and ACI method, Design of high strength concrete mixes, Design of concrete mix for flexural strength.

6. **Production of Concrete:** Introduction, Batching of materials, mixing of concrete materials, transportation and placing of concrete, compaction of concrete, curing of concrete.

7. **Properties of fresh and hardened concrete:** Introduction, workability, factors effecting workability, methods of determination of workability, strength of concrete, factors effecting strength of concrete, durability and permeability of concrete, factors effecting permeability of concrete, creep and shrinkage of concrete.

8. **Timber:** Advantages of timber construction, timber trees- exogenous and endogenous trees, soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber.

9. **Miscellaneous Materials:** Paints and varnishes, Distempering, white and color washing, glass and glass products, Asphalt and Bitumen.

Books Recommended:

1. Rangwala – Building Materials

2. Shetty MS, Concrete Technology
3. Punmia BC, Building Construction
4. Singh Parbin, Building Materials
5. M L Gambhir- Concrete Technology

CO1 Impart the knowledge about the characteristics, sources and defects in various materials used for construction purposes.
CO2 Able to design and test the materials either in the laboratory or in the field before their actual use at the site.
CO3 Learn to design concrete mixes by different methods.
CO4 Learn about different types of timbers being used in construction industry along with their uses characteristics ,defects and testing.
CO5 Able to know Paints and varnishes; Distempering; white and color washing; glass and glass products; Asphalt and Bitumen and their uses.

Chapter / CO	1	2	3	4	5	6	7	8	9
CO 1	**M**	**M**		**M**			**M**		
CO 2		**M**	**M**						
CO 3				**M**	**M**	**M**			
CO 4							**M**		
CO 5								**M**	**M**

BTCE305A Fluid Mechanics Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

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.

Books Recommended:

1. Practical Fluid Mechanics for Engineering Applications (Mechanical Engineering (Marcell Dekker) : John J.Bloomer
2. Fluid Mechanics Practical Manual: S. Sarabjit Singh.
3. Fluid Mechanics Manual: Baljit Kapoor

CO1 Know the behavior of water current in rivers, canal and drains
CO2 Use important practical results in common fluid flows.
CO3 Determine meta centre of a floating vessel.
CO4 Calibrate various flow measuring devices in pipe and open channel flow .
CO5 Determine various losses and velocity in pipe flow in field.

Chapter / CO	1	2	3	4	5	6	7	8	9
CO 1				M	M	M			
CO 2	M	M							
CO 3	M						M		

CO 4								**M**	**M**
CO 5									**M**

BTCE306A Strength of Material Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of experiments:

1. Draw Stress Strain curve for Ductile and Brittle material in tension.
2. Draw Stress Strain curve for Ductile and Brittle material in compression.
3. Draw shear stress, shear strain curve for ductile and brittle material in torsion strength testing
4. Draw load deflection curve for spring in loading and unloading conditions.
5. To determine the hardness of the given material by Rockwell and Brinell hardness testing machine.
6. To determine the fatigue strength of the material.
7. To determine the impact strength by Izod and Charpy test.
8. To determine the load carrying capacity of the leaf spring.
9. To test a mild steel and cast iron specimen in double shear.

Recommended Books:

1. Strength of Material Manual : M.L. Gahmbir
2. Strength of Material Manual: C.B Kukreja

CO1 Know stress-strain curves of different materials used in the field under different loading conditions.

CO2 Differentiate between properties of materials affect strength under various conditions.

CO3 Able to calculate simple tensile and shear stress using the appropriate guidelines and formats.

CO4 Analyze the bending stress on different types of sections.

CO5 Understand deflection of different sections at different loading conditions.

Chapter / CO	1	2	3	4	5	6	7	8	9

CO 1			**M**	**M**					
CO 2	**M**	**M**							
CO 3					**M**				
CO 4						**M**	**M**		
CO 5								**M**	**M**

BTCE307A Survey Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 3**
Total Marks: 50

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 levelling, height of instrument, rise & fall methods.
4. Measurement of horizontal and vertical angle by theodolite.
5. Determination of tachometric constants and determination of reduced levels by tachometric observations.
6. Plane table survey, different methods of plotting, two point & three point problem.
7. Setting out a transition curve. Setting out of circular curves in the field using different methods.

Books Recommended:

1 Agor, R., Surveying, Khanna Publishers (1982)
2 Bhavikatti S.S., Survey Volume I&II (2009)
3. Narinder Singh: Surveying:

CO1 Prepare the survey sheet according to the method used.
CO2 Application of theoretical considerations in field and other engineering projects.
CO3 Survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically.
CO4 Record the reduced levels using various methods of levelling and measurement of horizontal & vertical angles by Theodolite.
CO5 Determine the location of any point horizontally and vertically using Tachometry.

Chapter / CO	1	2	3	4	5	6	7
CO 1		**M**					**M**

CO 2	**M**	**M**					
CO 3		**M**				**M**	
CO 4			**M**	**M**			
CO 5					**M**	**M**	

BTCE308A Workshop Training

Internal Marks: 40
External Marks: 60
Total Marks: 100

This will be held after 2nd Semester during Summer in the Institute Workshop for four weeks daily for 4 hrs. The students will be trained in the area of Carpentry, Electrical, Plumbing, Masonary and CAD work.

CO1 Useful during the field working in the industry & Civil Engineering works.
CO2 Understand modern manufacturing operations, including their capabilities, limitations and how to design economically.
CO3 Gain insight into how designers influence manufacturing schedule and cost, and cost of different components.
CO4 Learn how to analyze products and be able to improve their manufacturability and make the cost effectively.
CO5 Able to acquire skills in basic engineering practice and identify the hand tools and instruments.

BTCE311A Rock Mechanics & Engineering Geology

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. **General Geology:** Importance of Engg. Geology applied to Civil Engg. Practices, Weathering, Definition- types and effect, Geological works of rivers, wind, glaciers as agents of erosion, transportation and deposition.

2. **Rocks & Minerals:** Minerals, their identification, igneous, sedimentary & metamorphic rocks. Classification of rocks for engineering purposes, Rock quality designation (RQD).

3. **Structural Geology:** Brief idea about stratification, apparent dip, true dip, strike and in Conformities, Folds, faults & joints: definition, classification relation to engineering operations.

4. **Engineering Geology:** Geological considerations in the Engg. Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake: Definition, terminology, earthquake waves, intensity, recording of earthquake.

5. **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.

6. **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.

7. **Improvement in properties of Rock masses** : Pressure grouting for dams and tunnels, Rock reinforcement, rock bolting.

Books Recommended:

1. Introduction to Rock Mechanics : Richard E. Goodman.
2. Engg. Behaviour of rocks :Farmar, I.W.
3. Rock Mechanics and Engg. : Jaager C.
4. Fundamentals of Rock Mechanics : Jaager and Cook
5. Engineering Geology : D.S.Arora
6. Engineering Geology : Parbin Singh
7. Rock Mechanics for Engineering : B.P. Verma

CO1 Appreciate importance of seismic activity considerations in a terrain.
CO2 Learn geology and its types, various structural features like folds, faults, joints, weathering etc., minerals, rocks, and rock formations in relation to civil engineering projects.
CO3 Understand various techniques to determine engineering properties of rocks etc. and distinguish the different types of rocks and minerals.
CO4 Understand various techniques to analyze and to make possible solutions for various Geological Engineering problems.

Chapter / CO	1	2	3	4	5	6	7
CO 1	**M**						
CO 2		**M**	**M**				
CO 3				**M**	**M**		
CO 4				**M**		**M**	**M**

BTCE312A Principles and Economics of Management

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. **Economics:** Definition, nature and scope.

2. **Economy:** Types, problems and functions.

3. **Basic Terms & Concepts:** Good, Utility, value, capital & margin Human wants, consumption and standard of living Consumers' Behaviour, Consumers' surplus Demand & law of demand, determinants of demand & elasticity of demand.

4. **Scale of Production:** Law of returns Costs & Costs Curves, Supply & Supply curves Market – Definition and types, equilibrium of firms & industry

5. **Pricing:** Commodity pricing under perfect competition, monopoly, monopolistic competition and oligopoly Theories of Distribution, Rent, Interest and Profits

6. **Functions of Management, Management-** Science or Art Universality of Management, Scientific Management, Principles of Management by Henry Fayol Authority, Responsibility, Accountability and Power Delegation of Authority

7. **Motivation-** Concept and theories.

Books Recommended:

1. Economics : Sloman
2. Managerial Economics : P.L. Mehta
3. Modern Micro Economics : Koutsoyannisa

4. Principles & practices of Management : L.M. Prasad
5. Essentials of Management : Koontz &Weihrich

CO1 To impart knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions.

CO2 To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management, various organizational structures and basic knowledge of marketing.

Chapter / CO	1	2	3	4	5	6	7
CO 1	M	M	M	M	M		
CO 2						M	M

BTCE-313A TOWN PLANNING

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. Introduction, Role, Importance and Scope of Town Planning
2. Planning Principals of Human Settlement in Nile Valley, Greek and Roman Periods.
3. Regional Plan -Objectives, Role, Importance and Methodology
4. Planning Concepts-Garden City, Linear City, Industrial City and Sustainable City and Neighbourhood
5. Existing Towns and Cities in India-Problems, Remedies etc.
6. Urbanization –Causes, Pattern and Effect in India.
7. Study of New Towns in India –Chandigarh, New Delhi & Gandhi Nagar

Books Recommended:

1. UDPFI Guidelines –Ministry of Urban Development
2. Rangwala S C, "Town Planning"
3. Gallion Arthur B, "The Urban Pattern: City Planning and Design".
4. Gupta S.P. "The Chandigarh: An Overview"

CO1 Able to explain the tools of town planning
CO2 Able to explain different components of town and their effect in town planning
CO3 Able to describe the facts relating to the Industrial areas of a town
CO4 Able to describe the aspects involved in a Development Plan
CO5 Able to apply land use regulation for planning issues

Chapter / CO	1	2	3	4	5	6	7

CO 1	**M**						
CO 2		**M**	**M**				
CO 3				**M**	**M**		
CO 4					**M**	**M**	
CO 5							**M**

BTHU-301A
(PROFESSIONAL SKILLS)

L T P **0 0 2**

Personality Development: General overview of Personality. Understanding Self Concept andSelf esteem, Building Self Esteem, Self Confidence, Assertiveness (activity Based training) Understanding assessment of Personality.

Mental Abilities: Understanding Intelligence, emotional intelligence, successful intelligence, development of emotional intelligence.

Social Etiquettes and Personal Grooming: Importance of social image, Do's and Dont's in dressing up, Developing an Understanding of Social Etiquettes.

Communication Skills: Features of an effective Communication. Verbal and Non- verbal Communication, Understanding role of body language in effective communication.

Recommended Books:

1. Personality Development by Harold Wallace and L. Ann Masters, Cengage Learning.
2. Psychology by Baron, Prentice Hall India.
3. Educational Psychology by Anita Woolfolk, Pearson
4. Organisational behaviour by Stephen Robbins, Pearson Education.
5. Communication in organisations by Dalmer Fisher, Jaico Publishing House, New Delhi.

Fourth Semester

BTCE401A STRUCTURAL ANALYSIS- I

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

1. **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 in members, 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.

2. **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 plane trusses, compound and complex trusses using method of joints, method of joints, tension coefficients. Analysis of three-hinged arch of various shapes under different loading conditions. Analysis of simple portal frame, cables under different loading conditions. Analysis of cables under point load and UDL with ends at same or different levels.

3. **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.

4. **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.

5. **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.

Books Recommended:

1. Basic structural Analysis C.S. Reddy; Tata McGraw-Hill Education
2. Analysis of Structures Vol- I and Vol.-II Vazirani&Ratwani; Khanna Publishers
3. Intermediate structural Analysis C.K.Wang; McGraw-Hill
4. Advanced Structural Analysis, A.K. Jain, Nem Chand & Bros., Roorkee.
5. Theory of Structures, Vol. I, S.P. Gupta &G.S.Pandit, Tata McGraw Hill, New Delhi

CO1 To interpret the various methods of structural displacements.

CO2 To analyse the determinate structure and its reaction diagram

CO3 Draw the influence line diagram for rolling loads.

CO4 To compute the pressure on supporting tower, suspension bridge etc.

CO5 Calculation of loads for no tension criteria on domes chimneys and retaining walls

Chapter / CO	1	2	3	4	5
CO 1	M	M			
CO 2		M			
CO 3			M		
CO 4				M	
CO 5					M

BTCE402A CONSTRUCTION MACHINERY & WORKS MANAGEMENT

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. **Introduction:** Need for project planning & management, time, activity & event, Bar chart, Milestone chart, uses & draw backs.

2. **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.

3. **CPM:** Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, numerical problems.

4. **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.

5. **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.

6.**Hoisting & Transporting Equipments**: Hosts, Winches, Cranes, Belt conveyors, Ropeways, trucks & Wagons.

7.Plants For Grading: Batching, mixing, types of mixers, concrete pumps, bitumen plants.

Books Recommended:

1. Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi
2. PERT and CPM - L.S.Srinath, East West Press
3. Management Guide to PERT & CPM - Wiest& levy; Prentice Hall
4. Construction Equipment & Planning and Application. - Mahesh VermaArtec Publication.
5. Construction Planning and Management by U. K. Shrivastava; Galgotia Publications Pvt.Ltd.
6. PERT and CPM - B.C. Punmia and K.K. Khandelwal

CO1 To describe the requirement of planning and management

CO2 To recognize the critical path and pert suitability for research projects

CO3 To determine projects schedule and estimate the activity time of CPM.

CO4 To discuss resource scheduling and planning of civil engineering Projects

CO5 To illustrate various construction equipments and machinery, their utility

Chapter / CO	1	2	3	4	5	6	7
CO 1	**M**						
CO 2		**M**	**M**				
CO 3			**M**				
CO 4				**M**			
CO 5					**M**	**M**	**M**

BTCE403A IRRIGATION ENGINEERING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1.Introduction: Objectives of Irrigation, Methods Of Irrigation and Advantages of various techniques of irrigation-water requirements of crops, water depth or delta , Duty of water, Base Period, relation between delta, duty and base period, Soil crop relation-ship and soil fertility.

2.Canal Irrigation: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories-Kennedy's theory, Lacey's theory, Design of unlined canals based on Kennedy & Lacey's theories, types of canal lining, selection of type of lining, maintenance of lined canals, silt removal, strengthening of channel banks, design of lined canals.

3. 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, Theories of Seepage, Seepage force and exit gradient, Bligh's & Creep theory, Khosla's theory, Determination of uplift pressures and floor thickness.

4. River Training Works: Objectives, classification of river-training works, Design of Guide Banks, Groynes or spurs - their design and classification, Recommendations of Approach embankments and

afflux embankments, pitched Islands, Types of head works, component parts of a diversion head work and their design considerations, silt control devices, Types of energy dissipators and their hydraulic design.

5. 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.

6. Canal Regulators, Falls and Outlets: Off take alignment, cross-regulators – their functions and design, Distributory head regulators, their design, canal escape, types of falls and their description, selection of type of falls, Principles of design of falls, Design of Sarda type, straight glacis and Inglis or baffle wall falls, Essential requirements of Canal Outlets and their classifications, Details and design of non-modular, semi-modular and modular outlets.

7. 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 and level crossing.

Books Recommended:

1.Principles & practice of Irrigation Engg. S.K.Sharma; S. Chand, Limited.
2.Irrigation & Water Power Engg. B.C. Punmia, PandeB.B.Lal; Laxmi Publications (p) Ltd
3.Fundamentals of Irrigation Engg. Dr. Bharat Singh; Nem Chand & Bros
4. Irrigation Engg. & Hydraulic Structure by Santosh Kumar Garg, Khanna Publishers
5. Design of Irrigation Structures by R.K. Sharma, Oxford IBH Pub
6. Irrigation Engg. and Hydraulics Structures by S.R. Sahasrabudhe, . Katson Publishing
7. Irrigation Practice and Design Vol. I to VII by K.B. Khushlani. Oxford IBH Pub

CO1 To understand various techniques and parameters of irrigation
CO2 To analyse the design of lined canal and its problems.
CO3 Able to calculate losses in canals ,water logging Seepage force and uplift pressure using different theories of seepage
CO4 To analyse the design and classification of river training works according to ISI recommendations
CO5 Learn about the weirs and energy dissipating devices, Design Different cross drainage works at canals, location and necessity of canal falls.

Chapter / CO	1	2	3	4	5	6	7
CO 1	M	M					
CO 2			M				

CO 3			**M**				
CO 4				**M**			
CO 5					**M**	**M**	**M**

BTCE404A Building Construction

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. **Brick & Stone Masonry:** Terms used; types of bonds; their merits and demerits; Rubble and ashlar joints in stone masonry, introduction to cement concrete hollow blocks, advantages and disadvantages of concrete block masonry over brick masonry. Walls and Foundation: Load bearing and non-load bearing walls, estimation of load on walls and footings, Thickness considerations, partition and cavity walls design of masonry walls, pillars and footings.
2. **Damp Proofing:** Sources, Causes of dampness in buildings, bad effects of dampness, methods of damp proofing.
3. **Arches and Lintels:** Introduction to terms used in Arches; different types of arches; brick and stone arches, types and functions of lintels.
4. **Roofs:** Introduction, terms used, types of roof trusses and roof coverings, details of rain proofing, rain water pipes.
5. **Doors and Windows:** Introduction, terms used, location of doors and windows, types of doors and windows, methods of fixing doors and window frames in walls. Ventilators.
6. **Plastering, Pointing and Painting:** Introduction, objects and types, special materials for plastered surfaces, distempering, white washing and colour washing of plastered surfaces.

7. Floors: Introduction, various types of floors commonly used and their suitability for different buildings, constructional details of concrete and Terrazzo floorings, marble flooring, anti- termite treatment.

8. Miscellaneous Topics:

(a) Site selection; and orientation of building.
(b) Principles of acoustical design of Building.
(c) Fire proof construction methods.
(d) Construction and expansion joints.
(e) Building bylaws

Books Recommended:

1. Building Construction: S.K. Sharma
2. Building Construction: Sushil Kumar
3. Building Construction: B.C. Punmia

CO1 Able to learn about different types of masonry bonds used in construction techniques.
CO2 To know about ill effect of dampness in construction and its remedial measures
CO3 Able to learn about arches, lintels, roof trusses and roof covering
CO4 To know about the various door and windows fitting techniques
CO5 To learn about different types of flooring ,Plastering, Pointing and Painting

Chapter / CO	1	2	3	4	5	6	7	8
CO 1	M	M						
CO 2		M						
CO 3			M	M				
CO 4					M			M
CO 5						M	M	

BTCE405A Structural Analysis Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

List of Experiments

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. Deflection of a fixed beam and influence line for reactions.
5. Deflection studies for a continuous beam and influence line for reactions.
6. Study of behaviour of columns and struts with different end conditions.
7. Experiment on three-hinged arch.
8. Experiment on two-hinged arch.
9. Deflection of a statically determinate pin jointed truss.
10. Forces in members of redundant frames.
11. Experiment on curved beams.
12. Unsymmetrical bending of a cantilever beam.

References:

A Laboratory Manual on Structural Mechanics by Harvinder Singh; New Academic Publishing Comp. Ltd.

CO1 Knowledge of the experimental study in structural analysis helps to check the stability of various structures in the field.

CO2 Able to design and conduct experiments, as well as being able to analyze and interpret data.

CO3 Able to design a system, component, or process to meet desired needs.

CO4 Able to function in multi-disciplinary teams.

CO5 Able to identify, formulate, and solve engineering problems.

Chapter / CO	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	**M**	**M**	**M**									
CO 2			**M**	**M**	**M**							
CO 3							**M**	**M**	**M**			
CO 4						**M**						**M**
CO 5	**M**									**M**	**M**	**M**

BTCE406AGeomatics Engineering

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. **Photogrammetry:** Introduction, Basic Principles, Photo-Theodolite, Elevation of a Point by Photographic Measurement, Aerial Camera, Vertical Photograph, Tilted Photograph, Scale, Crab and Drift,Flight Planning for Aerial Photography, Ground Control for Photogrammetry, Photomaps andMosaics, Stereoscopic Vision, Stereoscopic parallax, Stereoscopic Plotting Instruments, Applications.

2. **Electromagnetic Distance Measurement (EDM):** Electromagnetic Waves, Carrier Waves, Black body radiation, Laws of radiation Modulation, Types of EDM Instruments, Electro-optical, Infrared, and Microwave EDM Instruments, Effect of Atmospheric Conditions, The Geodimeter, The Tellurometer, Wild Distomats, Electronic Total Station.

3. **Remote Sensing:** Introduction, Basic Principles, Electromagnetic (EM) Energy Spectrum, EM Radiations and the Atmosphere, Interaction of EM radiations with Earth's Surface, Types of remote sensing systems, Remote Sensing Observation Platforms, Satellites and their characteristics – Geostationary and sun-synchronous, Earth Resources Satellites, Meteorological satellites, Sensors, Types and their characteristics, Across track and Along track scanning, Applications of Remote Sensing.

4. **Global Positioning System (GPS):** Introduction, Fundamental concepts, GPS system elements and signals, GPS measurement sand accuracy of GPS, Satellite Movement, GPS Satellites, Co-ordinate systems - Geoids, Ellipsoid and Datum, Spheroid, Customised Local Reference Ellipsoids, National Reference Systems, Worldwide Reference Ellipsoid, WGS 84, Differential-GPS, Classification of GPS receivers, GPS Applications.

5. **Geographical Information System (GIS):** Definition, GIS Objectives, Hardware and software requirements for GIS, Components of GIS, Coordinate System and Projections in GIS, Data structure and formats, Spatial data models – Raster and Vector, Data inputting in GIS, Data base design - editing and topology, creation in GIS, Linkage between spatial and non spatial data, Spatial data analysis - significance and type, Attribute Query, Spatial Query, Vector based spatial data analysis, Raster based spatial data analysis, Errors in GIS, Integration of RS and GIS data, Digital Elevation Model, Network Analysis in GIS, GIS Software Packages.

Books Recommended:

1. Arora, K.R., 2007: Surveying Vol-III, Standard Book House.
2. Campbell, J.B.2002: Introduction to Remote Sensing. Taylor Publications.
3. Chang.T.K. 2002: Geographic Information Systems, Tata McGrawHill.
4. Heywood.I, Cornelius S, CrverSteve. 2003: An Introduction to Geographical Information Systems, Pearson Education.
5. Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press.
6. Punmia, B.C., Jain A.K., 2005: Higher Surveying, Luxmi Publications
7. Sabbins, F.F., 1985: Remote Sensing Principles and Interpretation. W.H.Freeman

CO1 To understand the basic principles of aerial photogrammetry and its instrumental knowledge.

CO2 Illustration of different types of satellites and their characterstics

CO3 To analysis the data based on GIS Systems and GIS errors

CO4 Classification of Coordinate SYSTEM BASED ON GPS and its applications

Chapter / CO	1	2	3	4	5
CO 1	**M**				
CO 2		**M**			

CO 3			**M**		
CO 4				**M**	
CO 5					**M**

BTCE-407A DISASTER MANAGEMENT

Internal marks: 40 **L T P**
External marks: 60 **3 1 0**
Total marks: 100

1. **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.
2. **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.

3. **Hazard and Risk Assessment:** Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.
4. **Emergency Management Systems (EMS):** Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation.
5. **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.
6. **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.
7. **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.
8. **Case Studies:** Lessons and experiences from various important disasters with specific reference to Civil Engineering.

Books Recommended:

1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill.Pub
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester
3. Disaster Management, R.B. Singh (Ed), Rawat Publications ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction.
4. Disaster Management –Future Challenges & Opportunities by Jagbir Singh, I.K. International Publishing House.

CO1 To be familiar with disasters, their types, causes disaster management

CO2 To learn the importance of capacity building, vulnerability, Risk mapping, stages in disaster recovery and associated problems

CO3 To gain knowledge about Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation, role of different agencies during disasters

CO4 To learn the use of modern techniques like 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.

CO5 To learn about Planning and design of infrastructure for disaster management, Community based approach in disaster management, Lessons and experiences from various important disasters. Civil Engineering.

Chapter / CO	1	2	3	4	5	6	7	8
CO 1	**M**	**M**						
CO 2			**M**		**M**			
CO 3				**M**				
CO 4						**M**		
CO 5							**M**	**M**

BTCE408A Building Maintenance

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. **Principles of Maintenance** : Importance of Maintenance, Deterioration and durability, Factors affecting decision to carryout maintenance, Maintenance and GNP Agencies causing deterioration, effect of deterioration agencies on materials.

2. **Design and economic consideration in Maintenance** : Factors to reduce maintenance at design stage, Consideration of maintenance aspects in preparing tender document and specifications, Sources of error in design which enhances maintenance, Importance of working drawings and schedules Provision of access for maintenance and its importance at design stage. Economic consideration in Maintenance: Physical life, Functional life, Economic life of different types of buildings, Discounting technique for assessment of economic life.
3. **Maintenance Management** : Definition, Organization structure, work force for Maintenance, Communication needs, Building inspections, Maintenance budget and estimates, Property inspections and reports, Specification for maintenance jobs, Health and safety in maintenance, Quality in Maintenance, maintenance Manual and their importance.
4. **Materials for Maintenance :** Compatibility of repair materials, Durability and maintenance. Types of materials, their specification and application, Criteria for selection of material, Use of Commercial available materials in maintenance.
5. **Investigation and diagnosis for Repair of structures :** Basic Approach to investigations, Physical inspection, Material Tests, Non destructive testing for diagnosis, Estimation of actual, loads and environmental effects, Study of design and construction practices used in original construction, Retrospective analysis, Confirmation and repair steps.
6. **Building Defects and Remedial Measures :**Nature, types of problems, their causes, remedial measures and special treatment for building elements.
   - Foundation,
   - Basements
   - D.P.C.
   - Walls
   - Wall finishes
   - Chimney, stacks and shafts
   - Columns and beams
   - Roof and roof terraces
   - Floor and floor finishes
   - Joinery work - Decorative/decorative finishes
   - Services - Materials – Dampness

CO1 Able to explain the meaning of terms commonly used in the building maintenance.

CO2 Able to explain design and economic consideration in maintenance .

CO3 Able to make decisions about the management and maintenance of building systems.

CO4 Able to use material commonly used in the building maintenance

CO5 To learn various tests and design considerations regarding diagnosis and repair of structure.

CO6 Able to learn various defects in buildings and their remedial measures

Chapter / CO	1	2	3	4	5	6
CO 1	**M**					
CO 2		**M**				
CO 3			**M**			
CO 4				**M**		
CO 5					**M**	
CO 6						**M**

Course Outcomes:

Fifth Semester	

BTCE-501 Design of Steel Structures-I	CO1After going through this course the students will be able to design the various steel structures. CO2 Understand the behavior and properties of structural steel members to resist bending, shear, tension and compression and apply the relevant codes of practice. CO3 Able to analyses the behavior of structural steel members and undertake design at both serviceability and ultimate limit states. CO4 Able to design bolted and welded connections for tension and compression members and beams.
BTCE-502 Geotechnical Engineering	CO1To understand the origin of soil and to identify different types of soil and apply the knowledge of soil and rock to judge its behaviour and suitability for Civil Engineering structures. CO2 Able to describe Darcy's law for the flow of water through saturated soils; determine the coefficient of permeability and equivalent hydraulic conductivity in stratified soil. CO3 To understand the various physical and engineering characteristics of different types of soil. CO4 Able to calculate seepage, pore water pressure distribution, uplift forces and seepage stresses for simple geotechnical systems. CO5 Able to describe the direct shear test method and interpret the direct shear test results. CO6.To understand the concept of slope stability.structures.
BTCE-503Structural Analysis-II	CO1To understand develop computer program for the analysis of structures. CO2 Able to use slope defection method and rotation contribution method for various civil engineering structures. CO3 Able to analysis various type of loads by influence line diagram method. CO4 Able to identify determinate, indeterminate, stable and unstable structures.
BTCE-504Transportation Engineering-I	CO1 Able to Judge the properties of various pavement materials and their applications CO2 Able to design the flexible and rigid pavements.

	CO3 Able to compute road vehicle characteristics and estimate braking and stopping distances based on vehicle and human factors. CO4 Able to calculate traffic flow parameters.
BTCE-505 Environmental Engineering –I	CO1 To understand availability of water sources and rectify the water which improves the standard and living style of the community . CO2 Able to determine the population forecast for a city to meet its water requirement. CO3 Able to design water treatment plant by different methods. CO4 Able to know about the drainage and plumbing system in commercial , residential and industrial area.
BTCE-506 Transportation Engineering Lab	CO1 Understand the properties of materials used for construction of highways and airports. CO2 Knowledge about transportation characteristics, operations, design, planning, and maintenance. CO3 How to collect and analyze of transportation data for use in design. CO4 Able to prepare formal reports and describing complex design procedures.
BTCE-507 Geotechnical Engineering Lab	CO2 **Knowledge Of Site specific field investigation including collection of soil samples for testing and observation of soil behaviour** **CO3 Able to identify and classify soil based on standard geotechnical engineering practice.** **CO4 Be able to perform laboratory compaction and in –place density test for fill quality control** CO5 Able to determine different soil properties and classification of soil.
BTCE-508 Computer Aided Steel Structural	CO1 Application of software's in design and drawings of Civil Engineering structures. CO2 Able to proficiency, including the ability to use industry-

Drawing	standard computer software to generate 2D and 3D drawings CO3 An understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings. CO4 The ability to apply computer-aided design techniques to use computer-aided visualization techniques to prepare
BTCE-509 Survey Camp of 04 weeks duration after 4th Semester	CO1 To prepare Topographical map of the given area using different devices CO2 A field activity which provide real application of theoretical principles of surveying CO3 Able to doing simultaneously field work and office work.

Seventh	

Semester	
BTCE-801 Design of Steel Structures-II	CO1 Able to design various huge steel structures in the field of civil engineering works. CO2. Able to understand properties of steel under loading conditions. CO3.Able to determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling. CO4. Ability to analyse railway bridge, footbridge and industrial sheds
BTCE-802 Disaster Management	1. To be familiar with techniques related to the safety of people during disasters. 2. Identify various types of disasters, its causes, effect & mitigation of each and describe the various important phases of disaster management cycle having concern of vulnerability & risk for mankind and need of emergency management system to tackle the problems. 3.To design and perform research on the different aspects of the emergencies and disaster events while demonstrating insight into the potential and limitations of science, its role in society and people's responsibility for how it is used. 4. Understand the role of media, various agencies, and technology for the capacity building for effective disaster management & preparedness for future through various case studies. 5. Understand the importance of integration of public policy and how planning & design of infrastructure, community based approach and various ecological & sustainable models can be used for effective disaster management.
BTCE-803 Irrigation Engineering-II	CO1.Able to calculate Seepage force and uplift pressure using different theories of seepage. CO2 Understand the weirs and energy dissipating devices. CO3. Able to Design Different cross drainage works at canals . CO4. Understand location and necessity of canal falls.
BTCE-804 Transportation Engineering-II	CO1 Gain ideas about railways, permanent way stations, yards and tunnels. CO3. Know the different types of points and crossings used in

	railway tracks. CO4. Knowledge of signalling systems in railway stations and yards. CO5. Ability to design and orient airport runways.
BTCE-817 Hydrology & Dams (Elective-I)	1. To learn various techniques for determination of precipitation and runoff data. 2. Design rain gauge network and calculate depth of precipitation, runoff, infiltration, peak flow over the basin using different methods. 3. To gain knowledge about different type of dams like gravity dams, earthen dams, arch and buttress dams and their applications. 4. Estimate peak flows and fix design flood by different methods.
BTCE-820 Bridge Engineering (Elective-II)	1.To develop an understanding of and appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality. 2. To help the student develop an intuitive feeling about the sizing of bridge elements, ie. develop a clear understanding of conceptual design. 3.To understand the load flow mechanism and identify loads on bridges. 4. To carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements
Major Project (BTCE-805)	1. An understanding of professional and ethical responsibilities. 2. An ability to use various techniques, engineering knowledge and skill, and modern engineering tools necessary for planning, analysis and designing of engineering projects like building, roads, geotechnical works/problems. 3. Recognition of the need for, and ability to engage in life-long learning. 4. Knowledge of contemporary issues.

Scheme & Syllabus of 5th Semester (Batch 2015 Onwards)

5th Semester Scheme

Sr. No.	Course Code	Course Name	Schedule of Teaching				Evaluation Scheme			Credits
			CBCS*	L	T	P	Internal Assessment	External Assessment	Total Marks	
1.	BTCE 501A	Structural Analysis - II	C	3	1	-	40	60	100	4
2.	BTCE 502A	Design of Concrete Structures - I	C	3	1	-	40	60	100	4
3.	BTCE 503A	Design of Steel Structures - I	C	3	1	-	40	60	100	4
4.	BTCE 504A	Transportation Engineering - I	C	3	-	-	40	60	100	3
5.	BTCE 9YYA	Open Elective - I	OE	3	-	-	40	60	100	3
6.	BTCE 505A	Concrete Technology Lab	C	-	-	2	30	20	50	1
7.	BTCE 506A	Transportation Engineering Lab	C	-	-	2	30	20	50	1
8.	BTCE 507A	Training-II	T	-	-	-	60	40	100	3
9.	BTHU 501A	Professional Skills-III	C	-	-	2	30	20	50	1
Total				15	3	6	350	400	750	-
Total Contact Hours				24			Total Credits			24

5TH SEMESTER

BTCE 501A Structural Analysis-II

(Pre-requisite: Structural Analysis-1)

Internal Marks: 40 L T P

External Marks: 60 3 1 0

Total Marks: 100

1. 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.

2. Indeterminate Structural Systems: Pin-jointed and rigid-jointed structural systems; Deformation of redundant structures-sway and non-sway frames, elastic curve; Static equilibrium and deformation compatibility checks; Effects of support settlement and lack of fit; Fixed-end moments—member loading, sinking of supports, temperature.

3. Analysis of redundant beams, frames, trusses, arches using following methods: Slope deflection method; Moment distribution method; Rotation contribution method (Kani's Method), Theorem of three moments, Portal method; Cantilever method.

4. 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.

BOOKS & CODES RECOMMENDED:

1. Basic structural analysis - C.S. Reddy Tata McGraw-Hill

2. Intermediate structural analysis - C . K. Wang. McGraw Hill

3. Indeterminate structural analysis - J. Sterling Kinney Addison-Wesley Educational Publishers

4. Theory of structures - B.C. Punima, Laxmi Publications

5. Structural Analysis, Devdas Menon, Narosa Publishers.

Course Outcomes

CO1 Able to identify determinate, indeterminate stable and unstable structures.

CO2 Able to analyse various concepts of multi-storey buildings under different type of loading conditions.

CO3 Understand about slope deflection method and rotation contribution method for various civil engineering structures.

CO4 Ability to obtain the influence line diagram for statically indeterminate structures and trusses.

Chapter / CO	1	2	3	4
CO 1	**M**	**M**		
CO 2		**M**	**M**	
CO 3			**M**	
CO 4				**M**

BTCE-502A Design of Concrete Structures-I

Internal Marks: 40 L T P

External Marks: 60 3 1 0

Total Marks: 100

Note: (i) BIS 456 & SP16 are permitted in Examination.

(ii) Limit State Method of design should be used.

CONCRETE TECHNOLOGY

1. Concrete: 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; Target strength, Modulus of elasticity, Modulus of rupture, Types of Concrete.

2. Basic Concepts of Reinforced Cement Concrete: Objectives and Methods of Analysis and Design, Properties of Concrete and Steel, Design Philosophies of Working Stress Method and Limit State Method & Ultimate Method of Calculation of Loads according to BIS 875, Limit State of Collapse – Flexure.

3. Design of Elements using Limit State Method : Computation of Parameters of Governing Equations, Determination of Neutral Axis Depth and Computation of Moment of Resistance, Numerical Problems on Singly Reinforced Rectangular Beams, Doubly Reinforced Beams – Theory and Problems, Flanged Beams – Theory and Numerical Problems, Shear, Bond, Anchorage, Development Length and Torsion ,Reinforced Concrete Slabs: One, Two way Slab and Flat slab.

4. Design of Compression Members using Limit State Method : 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.

BOOKS:

1. Properties of Concrete by A.M.Neville – Prentice Hall

2. Concrete Technology by M.S.Shetty. – S.Chand& Co.;

3. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

4. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi

5. Advanced Design of Structures N. Krishna Raju

6. Advanced RCC Design Pillai &Mennon ; Tata MacGraw Hill

7. Limit State Design Ramachandra

8. Limit State Design A.K. Jain

9. Limit State Design of Reinforced Concrete P.C. Vergese

Course Outcomes

CO1. Able to Understand about composition and characteristics of concrete. And study of various properties of aggregates..

CO2. Design the proportion of concrete as per BIS method

CO3. Understand the design philosophies of Working Stress Method (WSM) and Limit State Method (LSM)

CO4. Able to solve problems in context to singly, doubly and flanged Beam, columns and slabs.

Chapter / CO	1	2	3	4
CO 1	**M**			
CO 2		**M**		
CO 3			**M**	**M**
CO 4			**M**	**M**

BTCE 503A Design of Steel Structures – I

Internal Marks: 40 L T P

External Marks: 60 3 1 0

Total Marks: 100

Note: BIS 800-2007 & SP6 are permitted in Examination.

1**. Introduction**: Properties of structural steel, I.S. rolled sections, I.S. specifications.

2. **Connections**: Riveted, bolted and welded connections for axial and eccentric loads.

3. **Tension members**: Design of members subjected to axial tension.

4. **Compression members**: Design of axially loaded members, built-up columns, laced and battened columns including the design of lacing and battens.

5. **Flexural members**: Design of laterally restrained and un-restrained rolled and built-up sections, encased beams.

6. **Column bases**: Design of slab base, gusseted base and grillage foundation.

BOOKS & CODES RECOMMENDED:

1) Limit state design of steel structures: S K Duggal, Mc Graw Hill

2) Design of steel structures: N Subramanian Oxford Higher Education

3) Design of steel structures (Vol. 1): Ram Chandra Standard Book House - Rajsons

4) Design of steel structures (by limit state method as per IS: 800-2007): S SBhavikatti I K International Publishing House

5) IS 800: 2007 (General construction in steel-Code of practice)*

6) SP: 6(1) (Handbook for structural engineers-Structural steel sections)* * permitted in Examination

Course Outcomes

CO1. Able to design bolted and welded connections for tension and compression members and beams.

CO2. Understand the behavior and properties of structural steel members to resist bending, shear, tension and compression and apply the relevant codes of practice.

CO3. Able to analyses the behavior of structural steel members and undertake design at both serviceability and ultimate limit states.

CO4. Knowledge to design the various steel structures.

Chapter / CO	**1**	**2**	**3**	**4**	**5**	**6**
CO 1	**M**	**M**				
CO 2			**M**	**M**		
CO 3					**M**	
CO 4						**M**

BTCE-504A Transportation Engineering – I

Internal Marks: 40 L T P

External Marks: 60 3 0 0

Total Marks: 100

1. Highway Development, Planning & Alignment: Principles of Highway Planning, Classification of Roads, Planning Surveys, Requirements of highway alignment, Alignment of Hill Roads, Engineering Surveys.

2. Highway Geometric Design: Cross Section Elements, Carriageway, Camber, Sight Distances, Horizontal Curves, Extra-widening, Super-elevation, Vertical Curves,

3. Highway Construction: Properties of Sub-grade and Component of Pavement. Earthen/Gravel Road, Water Bound Macadam, Wet Mix Macadam, Bituminous Pavements, Cement Concrete Pavements, Premix Carpet, Dense Bituminous Macadam, Bituminous Macadam & Bituminous Concrete. Importance of drainage and maintenance, Surface Drainage and Subsoil Drainage, Construction in Water-logged areas, Pavement Failures, Pavement Evaluation, Maintenance and Strengthening Measures.

4. Traffic Engineering: Road User Characteristics, Driver Characteristics, Vehicular Characteristics, Traffic Volume Studies, Speed Studies, O-D Survey, Parking Study, Traffic Signs, Markings, Islands, Signals, Cause and Type of Accidents, Use of Intelligent Transport Systems.

Books Recommended:

1. Khanna S.K., and Justo, C.E.G. "Highway Engineering", Nem Chand and Brothers, Roorkee, 1998.

2. Kadiyali, L.R. "Principles and Practice of Highway Engineering", Khanna Publishers, New Delhi, 1997

3. Flaherty, C.A.O. "Highway Engineering", Volume 2, Edward Arnold, London, 1986.

4. Sharma, S.K. "Principles, Practice & Design of Highway Engineering", S. Chand & Company Ltd., New Delhi, 1985.

5. Mannering, "Principles of Highway Engineering & Traffic Analysis", Wiley Publishers, New Delhi.

Course Outcomes

CO1. Understand the properties of various pavement materials and their applications.

CO2. Able design the flexible and rigid pavements.

CO3. Acquire the understanding of properties of Sub-grade and Pavement Component Materials.

CO4. Able to compute road vehicle characteristics and estimate braking and stopping distances based on vehicle and human factors.

Chapter / CO	1	2	3	4
CO 1	M	M		
CO 2			M	
CO 3			M	
CO 4				M

BTCE-505A Concrete Technology Lab

Internal Marks: 30 L T P

External Marks: 20 0 0 2

Total Marks: 50

List of experiments:

1. Testing of Brick as per BIS.

2. To Determine the fineness modulus, Specific Gravity, Soundness, Standard Consistency, Setting Time and Compressive Strength of Cement.

3. To Determine the 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 as per BIS.

6. To Determine the Compressive Strength of Concrete by Cube and Cylinder.

7. To determine the strength of hardened concrete by using Rebound Hammer Method & Ultrasonic Pulse Velocity Test

8.. To carry out the Split Tensile and Flexural strength of Concrete.

Books/Manuals :-

1. Concrete Manual By Dr. M.L. Gambhir, Dhanpat Rai & Sons Delhi.

2. Concrete Lab Manual by TTTI Chandigarh

3. Concrete Technology, Theory and Practice by M.S.Shetty. S.Chand& Company.

Course Outcomes

CO1. Able to know the different properties of bricks and concrete as per BIS.

CO2. Acquire knowledge about specific gravity, soundness, standard consistency, initial, final setting time and compressive strength of Cement.

CO3. Able to determine the fineness modulus, bulk density, water absorption and specific gravity of fine and coarse aggregates.

CO4. Able to mix design of concrete by BIS methods.

Chapter / CO	1	2	3	4	5	6	7	8
CO 1	M					M	M	M
CO 2		M						
CO 3			M	M				
CO 4					M			

BTCE-506A **Transportation Engineering Lab**

Internal Marks: 30 L T P

External Marks: 20 0 0 2

Total Marks: 50

List of experiments:

1. To determine the California Bearing Ratio value of soil.
2. To determine the Aggregate Crushing Value of coarse aggregates and to access suitability of aggregates for use in different types of road pavement.
3. To determine Los Angeles Abrasion Value and to find out the suitability of aggregates for use in road construction.
4. To determine the Impact value of road aggregates and to access suitability of aggregates for use in different types of road pavement.
5. To determine the shape and size of aggregates by Flakiness and Elongation Index.
6. To determine the Penetration value of bitumen.
7. To determine the Ductility of bitumen.
8. To determine the Softening Point of tar or bitumen.
9. To determine Flash & Fire Point of given bitumen sample.
10. To determine the bitumen content of given sample.
11. Job Mix Formula for Wet Mix Macadam.

Books/Manuals Recommended :

1. Khanna S.K., and Justo, C.E.G. "Highway Material & Pavement Testing", Nem Chand and Brothers, Roor

Course Outcomes

CO1 Understand the properties of aggregate used for construction of highways and to prepare formal report.

CO2 Able to determine the properties of bitumen used for construction technique for highways.

CO3 Able to collect and analyze the data for use in planning and designing of highway.

CO4 Able to maintain the highway.

Chapter / CO	1	2	3	4	5	6	7	8	9	10	11
CO 1	M	M	M	M	M						
CO2						M	M	M	M	M	
CO 3	M										M
CO4		M	M	M	M	M	M	M	M	M	

BTCE-507A Training -II (Survey Camp)
Internal Marks: 60
External Marks: 40
Total Marks: 100

Survey Camp contents are as under (4 weeks duration):
Part-I
Survey Camp will be held immediately after 4th semester preferably at hill station. The students are required to prepare the Topographical Map of the area by traditional method.
Part-II
Students should also be exposed to modern Survey Equipment and practices, like Total Station, DGPS etc.

Course Outcomes

CO1 Understand field activity which provide real application of theoretical principles of surveying.

CO2 Able to do simultaneously field work and office work.

CO3 Able to prepare Topographical map of the given area using different devices/ modern equipment's.

Chapter / CO	1	2
CO 1	M	
CO 2	M	M
CO 3		M

Open Elective- I
RENEWABLE ENERGY SOURCES

External Marks: 60	**L**	**T**	**P**
Internal Marks: 40	**3**	**0**	**0**
Total Marks: 100			

Objective: The objective of this course is to acquaint the students with the renewable energy sources available to supplement and augment the energy requirements.

Introduction: **(2 hrs)**
Global and Indian scenario, sources, Energy conservation, types of NCES with applications

Solar Energy: **(12 hrs)**
Role and development of new renewable energy sources, instruments for measuring solar radiations, solar radiation data, Flat plat and concentrating collectors, classification of concentrating collectors, advanced collectors, different methods of solar energy storage, solar ponds
solar applications: Solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Hydro electric Energy: **(3 hrs)**
Hydro-electric power plant, conversion of hydro energy into electricity.

Wind Energy: **(5 hrs)**
Sources and potentials, horizontal and vertical axis, wind mills, wind regime analysis and evaluation of wind mills.

Biomass and Biofuels: **(8 hrs)**
Recycling of agricultural waste, anaerobic/ aerobic digestion and types of biogas digesters; gas yield, and combustion characteristics of bio gas, design of biogas system for heating, lighting and running IC engines. Introduction to Biofuels such as biodiesel, ethanol, biobutanol etc., their production and present status.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy **(3 hrs)**

Ocean and Tidal Energy:
Introduction and conversion technique, mini hydel power plants and their economics **(3 hrs)**

BOOKS RECOMMENDED:

1. Rai G D, Non-Conventional Energy Sources, 4th edition, Khanna Publishers, 2009
2. Kumar Ramesh editor, Udayakumar K., Anandakrishnan M., Renewable Energy Technologies: Ocean Thermal Energy Conversion and Sustainable Energy Options, Narosa Publication, 1997
3. Desai Ashok V, Jhirad D., Munasinghe M., Non-Conventional Energy, New Age International, 1990
4. Sukhatme S. P. , Solar Energy: Principles of Thermal Collection and Storage, 3rd Edition, Tata McGraw-Hill Education, 2008
5. Mittal K.M., Non-Conventional Energy System, Principles, Progress and Prospects, Wheeler Pub, 1997

OPEN ELECTIVE OFFERD TO OTHER DEPARTMENTS

BTCE-901A **Disaster Management**

Internal marks: 40 **L T P**
External marks: 60 **3 0 0**
Total marks: 100

1. **Introduction to Disaster Management:** Define disaster, hazard, emergency, vulnerability, risk and disaster management; Identify and description of the types of natural and non-natural disasters. Important phases of Disaster Management Cycle.
2. **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.
3. **Hazard and Risk Assessment:** Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems.
4. **Emergency Management Systems (EMS):** Emergency medical and essential public health services, response and recovery operations, reconstruction and rehabilitation.
5. **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.

Books Recommended:

1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill.Pub
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester
3. Disaster Management, R.B. Singh (Ed), Rawat Publications ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction.
4. Disaster Management –Future Challenges & Opportunities by Jagbir Singh, I.K. International Publishing House.

Course Outcomes

CO1 Understanding of disasters, their types, causes disaster management
CO2 Able to learn the importance of capacity building, vulnerability, Risk mapping, stages in disaster recovery and associated problems
CO3 Knowledge about Emergency medical and essential public health services.
CO4 Understanding about response and recovery operations, reconstruction and rehabilitation, role of different agencies during disasters

Chapter / CO	1	2	3	4	5
CO 1	M	M			
CO 2			M		
CO 3				M	
CO 4					M

BTCE-903A Traffic & Transportation Engineering

Internal Marks: 40 L T P
External Marks: 60 3 0 0
Total Marks: 100

1. Introduction: Elements of Traffic Engineering, Components of traffic system – road users, vehicles, highways and control devices.

2. Traffic Stream Characteristics: Traffic stream parameters, characteristics of interrupted and uninterrupted flows.

3. Traffic Studies: Traffic volume studies, origin destination studies, speed studies, travel time and delay studies, parking studies, accident studies.

4. Traffic Regulation and Control: Signs and markings, Traffic System Management, At-grade intersections, Channelisation, Roundabouts.

5. Traffic Signals: Pre-timed and traffic actuated. Design of signal setting, phase diagrams, timing diagram, Signal co-ordination.

Books Recommended:

1. William, R.M. and Roger, P.R., "Traffic Engineering", Prentice Hall.
2. Hobbs, F.D., "Traffic Planning and Engineering", Pergamon Press.
3. Khisty, C.J. and Kent, B.L., "Transportation Engineering – An Introduction", Prentice Hall of
India Pvt. Ltd.
4. Kadiyali, L.R., "Traffic Engineering & Transport Planning", Khanna Publishers, New Delhi.
5. Mannering, "Principles of Highway Engineering & Traffic Analysis", Wiley Publishers, New
Delhi.

Course Outcomes

CO1. Know about the elements, components of traffic systems and vehicle characteristics.

CO2. Understanding about traffic stream characteristics.

CO3. Acquire knowledge about various traffic signals and traffic regulation and their control.

CO4. Able to understand various traffic safety practices.

Chapter / CO	1	2	3	4	5
CO 1	M				
CO 2		M	M		
CO 3				M	
CO 4					M