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COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE701	DCC	Design of Hydraulic Structures	60	20	20	0	0	2	1	0	3

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The students will be able to design different hydraulic structures according to the conditions and nature of work efficiently & economically.

Course Outcomes (COs):
Students will be able to

1. Design different hydraulic structures like Gravity Dam, Earth Dam, etc.
2. Design Spillways and Energy dissipators
3. Design Canal irrigation structures & Cross Drainage Work

Syllabus

UNIT I **8 Hrs.**

Reservoir Planning: Investigations, Zones of storage; Mass Inflow and Mass Demand curves; Life of Reservoir.
Earth Dams: Types, causes of failure, and design criteria; Soil suitability for earth dam construction, construction methods, foundation requirements; Typical earth dam sections, estimation of seepage through and below the dam, seepage control; Stability analysis of slopes by slip circle method.

UNIT II **8 Hrs.**

Gravity dams: Design criteria, Various forces acting on gravity dam and their load combinations; low and high height gravity dams; Stability analysis, Elementary profile, practical profile, evaluation of profile by the method of zoning; Foundation treatment, construction joints, galleries in gravity dams.

UNIT III **8 Hrs.**

Spillways: Ogee spillway and its design, details of siphon, shaft, chute, side channel spillways, emergency spillways; Spillway crest gates -vertical lift and radial gates, their design principles.
Energy Dissipators: Principles of energy dissipation; Energy dissipators based on tailwater rating curve and jump height curves.

UNIT IV **8 Hrs.**

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BTCE701	DCC	Design of Hydraulic Structures	60	20	20	0	0	2	1	0	3

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Structures on Pervious Formations: Bligh's creep theory, limitations, Khosla's theory of independent variable, Khosla's corrections; Design principles of Weir and Barrages: waterways and crest levels, design of impervious floors and protection works.

UNIT V **8 Hrs.**

Canal Regulation work: Introduction and Practical application: Canal Falls, Head and Cross Regulators, canal escapes, canal outlets.

Cross Drainage Work: Various types of cross drainage work and their selection criteria, IS code recommendation for clearance and freeboard, and Design of channel transitions by Mitra's and Chaturvedi's formula.

Text Books:

1. Irrigation & Waterpower Engineering by B.C. Punmia & Pandey B.B. Lal, Laxmi Publications, Sixteenth edition (2019).
2. Water Resources Engineering Irrigation Engineering & Hydraulic Structures - Vol.2 by S.K. Garg, Khanna Publications.

References:

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds, New York Wiley Publications (1961).
2. Hydroelectric Handbook by Creager, John Wiley & Sons, Inc; Second edition (1952).
3. Hydraulic Structures by Varshney, Nem Chand & B Publications (2007).
4. Waterpower Engineering by Dandekar, Vikas Publishing House; Second edition (2013).

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BTCE703	DCC	Design of Reinforced Concrete Structures - II	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To understand and apply the codal recommendations for designing various RCC structures.
2. To analyze and design various reinforced concrete structures.

Course Outcomes (COs):

Students will be able to

1. Implement codal provisions in various designs.
2. Analyse and design various types of tanks.
3. Analyse and design various soil retaining structures.
4. Understand the behaviour of structures under earthquake loading.

Syllabus

UNIT I **8 Hrs.**

Water Tanks Resting on ground: Design of Tanks on ground and underground tanks: square, rectangular, and circular tanks.

UNIT II **9 Hrs.**

Overhead water tanks: Design of square, rectangular, circular & Intze tanks.

UNIT III **8 Hrs.**

Design of Multistory Buildings: Design concepts of sway and non-sway buildings; Introduction to earthquake resistant building as per Indian Standard codes; Introduction to of shear walls and bracing elements.

UNIT IV **8 Hrs.**

Earth Retaining Structures: Design and analysis of cantilever and counterfort type retaining walls.

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BTCE703	DCC	Design of Reinforced Concrete Structures - II	60	20	20	30	20	2	1	2	4

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UNIT V **9 Hrs.**

Bridges: Introduction to slab bridges for highway loading (IRC loads).
Pre-stress: Pre-stressing concepts, materials used for prestressing, systems of pre-stressing, and losses.

Text Books:

1. Reinforced Concrete Structures Vol. II by Dr. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, Laxmi Publication, 2015
2. Reinforced concrete, Vol.1 & 2, H. J. Shah, Charotar publishing house Pvt. Ltd, 2011.
3. Advanced Reinforced Concrete Design, P.C. Varghese, Prentice Hall of India, New Delhi, 2010

References:

1. Advanced Reinforced Concrete Design by S.S. Bhavikatti New Age International Publishers, 2016
2. Design of Reinforced Concrete Structures - N. Subramanian, Oxford, 2013

List of Experiments.
Detailed drawing of various structural systems as per the syllabus

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BTCE704 (1)	DSE	Environmental Engineering - II	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The aim of this course is to teach students about the characteristics of wastewater, selection of effective treatment with suitable disposal techniques and environmental pollution with their causes and prevention measures.

Course Outcomes (COs):
After successfully studying this course, students will:

1. Understand the impact of humans on environment and environment on humans.
2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water, and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of wastewater, solid waste and contaminated air.
5. Understand the principle and necessity of a wastewater disposal system.

Syllabus

UNIT I **10 Hrs.**

Quality of Wastewater: Characterization and composition physical, chemical, microbiological; Primary parameters of pollution BOD, COD, ThOD, total solids, total organic carbon, nitrogen and its forms, pH, chlorides, colour, micro-organisms etc.; Indian Standards of disposal into natural watercourses and on land; Relative stability, population equivalent

Design of Sewerage System: Types of sewerage systems, sanitary sewers, storm sewers, combined and partially combined sewers; Quantity of sewage, design period, self-cleaning velocity, maximum velocity; Design of circular sewer for full and partial flow; Laying of the sewer pipe, sewer appurtenances, ventilation of sewer.

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BTCE704 (1)	DSE	Environmental Engineering - II	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT II **9 Hrs.**

Wastewater Treatment: Introduction to wastewater treatment, necessity of treatment; Layout plan of municipal waste water treatment plant; Primary treatment processes: screens, grit chambers, grease and oil removal, sedimentation tank, sedimentation with coagulation; Secondary treatment processes: Trickling filters, principles of working, design criteria.

UNIT III **9 Hrs.**

Process theory and design consideration of various units; Activated sludge process; Oxidation ditch; Oxidation ponds; Types, advantage and disadvantage; Aerated lagoons; Anaerobic lagoons; Septic tank; Imhoff tank; Sludge digestion tank (SDT); Sludge thickening and disposal.

UNIT IV **8 Hrs.**

Wastewater Disposal: Disposal by dilution; Standards of dilution; Types of natural water bodies for sewage discharge; Lakes, Ocean, Stream etc; Comparison between ocean and stream dilution; Self-purification of natural stream; Zones of pollution in stream, oxygen sag analysis, streeter-phelps equation; Disposal by land treatment; Comparison between disposal methods by land and dilution.

UNIT V **9 Hrs.**

Air pollution and solid waste management: Air quality, primary and secondary pollutant; Effect of air pollution on human health and plants; Control of particulate and gaseous pollutant with mechanical devices; Cyclone separator, spray tower, wet- cyclone scrubber, and absorption units etc; Solid Waste Management: Introduction; Waste collection, storage and transport; Waste disposal, waste processing techniques; Solid waste utilization

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BTCE704 (1)	DSE	Environmental Engineering - II	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Text Books:

1. Environmental engineering volume -II by S. K. Garg, Khanna publisher (39th edition)
2. Environmental engineering volume 2 by Dr. P. M. Modi (15th edition)
3. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi (2nd edition, 2019)
4. Environmental engineering -II by B. C. Punamia, Laxmi Publications (P) Ltd. New Delhi (2019

References:

1. Metcalf and eddy, (revised by Tchobanoglous) Wastewater Engineering: Treatment, disposal reuse, Tata-Mc Graw Hill, New Delhi (2017)
2. Environmental pollution engineering by C.S. Rao, Wiley eastern

List of Experiments.

1. To study the Effluent standard for wastewater.
2. To study sampling procedure for water and wastewater analysis.
3. To determine total solids of the given wastewater sample.
4. To determine dissolved solids of a given wastewater sample.
5. To determine the dissolved oxygen in a given sample of wastewater.
6. To determine the biochemical oxygen demand of the given sample of sewage.
7. To determine the chemical oxygen demand of a given sample of sewage.
8. To study the sludge volume Index (SVI) of a given sample.
9. To study High volume air sampler, Respirable dust sampler.
10. To study determination of Total suspended particulate Matter & Respirable particulate matter with the help of RDS in the ambient air.

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BTCE704 (2)	DSE	Urban Transportation	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to Plan urban transportation systems

Course Outcomes (COs):
1. To understand Principles and techniques of Traffic forecasting
2. To understand concept and purpose of trip generation
3. To analyze different distribution models and assignment of model.
4. Understand economic analysis in urban transportation.

Syllabus

UNIT I **8 Hrs.**

Introduction to transportation planning: Planning methods of transport system planning, stages of planning; Transportation study area, collection of travel data, external cordon and screen-line, survey, zoning types of surveys, concept of travel demand and supply

Traffic forecasting: Principles and techniques; Demand, price and capacity relationships, price elasticity; Forecasting for long term demand, variables, determination of the design hourly volume; Four step travel demand, forecasting models.

UNIT II **8 Hrs.**

Trip Generation Models: Introduction and definition; Factors governing trip generation and attraction rates, multiple linear regression analysis, aggregated and disaggregated analysis, category analysis.

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BTCE704 (2)	DSE	Urban Transportation	60	20	20	30	20	2	1	2	4

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UNIT III **8 Hrs.**

Distribution Models: Methods of trip distribution; Growth factor models; Gravity model; Tanner model; Intervening opportunity model; Competing opportunity model.

Assignment Models: General principle; Assignment techniques; All or nothing Assignment; Multiple route assignment; Capacity restraint assignment; Diversion curves

UNIT IV **8 Hrs.**

Economic analysis: Need, costs and benefits; Time horizon in Economic assignment; Basic principles, methods of Economic evaluation; Traffic and the environment effects of traffic on the environment.

UNIT V **10 Hrs.**

Probability and Statistics for Traffic Engineering Design: Random variable and statistical measures; Basic concept of probability; Probability laws; Binomial, Poisson, Normal and Exponential distributions; Sampling theory and regression analysis; General consideration of the accuracy, cost and time requirements of data collection; Sampling theory and principles for determining sample size and accuracy relationship; Principles of the population mean and standard deviation, regression analysis examples.

Text Books:

1. Traffic Engineering and Transport Planning, Kadiyali L.R., Khanna Publication,2015
2. C. S. Papacostas and P. D. Prevedouros, Transportation Engineering and Planning, Prentice Hall of India Pvt. Ltd., 2001.

References:

1. J. de D. Ortuzar and L.G. Willumsen, Modelling Transport, John Wiley and Sons, 2001.
2. C.J. Khisty and B.K. Lall, Transportation Engineering – An Introduction, Prentice Hall of India Pvt. Ltd., 2002.

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BTCE704 (2)	DSE	Urban Transportation	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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List of Experiments.

1. Rotary Design
2. Home Interview survey
3. Parking Survey
4. Traffic Volume Count
5. Transport Planning for a small area

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BTCE704 (3)	DSE	Earthquake Resistant Design of Structures	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. Learning methods to analyze structures subjected to any kind of dynamic excitation and computing quantities like displacements, forces, stresses, etc.
2. Understanding the analytical methods and procedures in a way that emphasize physical insight.
3. Ability to apply the structural dynamics theory to real-world problems like seismic analysis and design of structures.

Course Outcomes (COs):

At the end of the course, the student will be able to:

1. Discuss the equations of motion for undamped free vibrations for SDOF and MDOF systems.
2. Explain the engineering seismology including causes and effects of earthquakes.
3. Analyse a multi-storeyed structure using Equivalent Static Method and Response Spectrum methods.
4. Assess various irregularities in buildings.
5. Apply the provisions of IS:13920 and IS: 4326 to building structures.

Syllabus

UNIT I **9 Hrs.**

Structural Dynamics: Introduction; Laws of Equilibrium; Newton's Law of Motion; D'Alembert's Principle; Types of Dynamic Loading; Single Degree of Freedom System (SDOF); Undamped Free Vibrations; Damped Free Vibrations (concept only); Two Degree of Freedom System (2DOF) – Undamped Free Vibrations.

UNIT II **9 Hrs.**

Engineering Seismology: Introduction, Internal structure of earth, Continental drift theory; Plate tectonics; Movement of plate Boundaries; Movement of Indian plate; Faults; Types of faults; Elastic Rebound theory. Earthquake terminology; Classification of Earthquakes; Causes and effects of Earthquakes; Earthquake waves; Quantification of Earthquakes; Intensity and Magnitude; Recording Earthquakes.

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BTCE704 (3)	DSE	Earthquake Resistant Design of Structures	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT III **9 Hrs.**

Earthquake Resistant Design: Reviews of latest I.S : 1893 (Part 1) provisions for buildings; General principles and design criteria; Assumptions; Design Acceleration spectrum; Horizontal seismic coefficient; Design acceleration; Seismic zones of India; Importance factor; Response reduction factor; Design lateral force; Design imposed loads for Earthquake force calculation; Seismic weight; Analysis by Equivalent Static Method and Dynamic Method (Response Spectrum Method); Storey drift limitation.

UNIT IV **9 Hrs.**

Building Configurations: Introduction: Regular and Irregular Buildings.

Plan Irregularities: Torsion Irregularity, Re-entrant corners, Floor slabs having excessive cut-outs or openings- Out of plane offsets in Vertical Elements, Non-parallel Lateral Force system.

Vertical Irregularities: Stiffness Irregularity (soft storey), Mass Irregularity, Vertical Geometric Irregularity, In-plane discontinuity in Vertical Elements resisting lateral force, strength Irregularity (weak storey), Floating or stub columns, Irregular Modes of Oscillation in two Principle Plan Directions.

UNIT V **9 Hrs.**

Ductile Design and Detailing: Review of Latest IS: 13920 provisions General specifications; Beams, Columns, Shear walls; Special confining reinforcement; Review of Latest IS: 4326 provisions, General principles, Special Construction features relating to separations of structures (above ground only).

Text Books:

1. Dynamics of Structures, Anil K Chopra, Pearson Education India; 3 edition
2. Pankaj Agarwal & Manish Shrikhande, "Earthquake Resistant Design of Structures", 5th Edition Prentice Hall of India, New Delhi, 2011.
3. S. K. Duggal, "Earthquake Resistant Design of Structures", Oxford University Press, 1st Edition, 2012.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCE704 (3)	DSE	Earthquake Resistant Design of Structures	60	20	20	30	20	2	1	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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1. IS 456: 2000 Indian Standard Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standard, New Delhi. (or latest).
2. IS 1893 (Part 1): 2016, Indian Standard "Criteria for Earthquake Resistant Design of Structures, Part 1, General provisions and Buildings (six revision) Bureau of Indian Standard, New Delhi. (or latest).
3. IS 13920: 2016 Indian Standard "Ductile Design and Detailing of Reinforced Concrete Structures, subjected to Seismic forces - Code of Practice, Bureau of Indian Standard, New Delhi. (or latest).
4. IS 4326: 2013 Indian Standard "Earthquake Resistant Design and Construction of Buildings - Code of Practice, Bureau of Indian Standard, New Delhi. (or latest).

List of Experiments.

1. Study of forced vibration system with the help of shake table.
2. Study of single degree of freedom system.
3. Study of multiple degree of freedom system.
4. Analysis of multistorey building using softwares like STAAD Pro. , ETABS etc.

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BTCE705 (1)	DSE	System Applications in Civil Engineering	60	20	20	30	20	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):
Student will understand fundamentals of optimization, focusing on model formulation for civil engineering problems.

Course Outcomes (COs):
At the conclusion of this course, the students will understand:

1. To understand the use of systems approach in Civil Engineering.
2. To analyze and understand different optimization process.
3. To understand queuing theory and queuing models.
4. To formulate Linear optimization models for Civil engineering applications.

Syllabus

UNIT I **8 Hrs.**

Introduction to System approach: Operations Research and Optimization Techniques, Use of systems approach in Civil Engineering, Methods, Introduction to Linear and Nonlinear programming methods (with reference to objective function, constraints), Local and Global optima, Unimodal function, convex and concave function.

UNIT II **9 Hrs.**

Single variable unconstrained optimization: Sequential Search Techniques-Dichotomous, Fibonacci, Golden section Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton's Method Multivariable optimization with equality constraints - Lagrange Multiplier Technique.

UNIT III **8 Hrs.**

Sequencing: n jobs through 2, 3 and M machines
Queuing Theory: Elements of Queuing system and its operating characteristics; Waiting time and ideal time costs; Kendall's notation; Classification of Queuing models; Single channel queuing theory; Monte Carlo Simulation.

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BTCE705 (1)	DSE	System Applications in Civil Engineering	60	20	20	30	20	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT IV **9 Hrs.**

Multistage decision processes: Principle of optimality; Recursive equation; Applications of D.P. Formulation of Linear optimization models for Civil engineering applications; Simplex method; Method of Big M; Two phase method; Duality

UNIT V **9 Hrs.**

AI and ML in Civil Engineering: Introduction, Historical context, Necessities, ML in modern civil engineering, Real-world application examples. Introduction to AI, Application of AI, Application, Implementation of Civil Engineering project.

Text Books:

1. Engineering Optimization: Methods and Application-- A. Ravindran, K. M. Ragsdell—Wiley India (2nd Edition 2006)
2. Engineering Optimization by S. S. Rao (4th Edition 2009)
3. Artificial Intelligence: A Modern Approach; Stuart J.Russell, Peter Norvig, Third Edition Pearson Education, Inc., India

References:

1. Topics in Management Science by Robert E. Markland.(Wiley Publication)
2. An Approach to Teaching Civil Engineering System by Paul J. Ossen bruggen.
3. A System Approach to Civil Engineering Planning & Design by Thomas K. Jewell (Harper Row Publishers)

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BTCE705 (2)	DSE	Construction Planning and Management	60	20	20	0	0	3	1	0	4

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Course Educational Objectives (CEOs):

1. Demonstrate the knowledge of basic science, mathematics, material, engineering economy and techniques to execute the civil engineering construction project.
2. Students also understand the importance of professional ethics, moral values, and norms of Civil Engineering practices.

Course Outcomes (COs):

1. Planning and allocation of various construction resources during construction of building, roads, etc.
2. Understand the importance and uses of tenders and contracts in civil engineering construction.
3. Understand the importance of specifications and able to prepare public accounts.
4. Understand the importance of various construction equipment and there uses.

Syllabus

UNIT I **8 Hrs.**

Project Management and Management Techniques: Elements and Objective of project management; Methods of project management; Fundamentals of network diagram; Programme evaluation review technique (PERT); Critical path method (CPM); Crashing, updating and resource allocation.

UNIT II **9 Hrs.**

Tenders and Contracts: Different types of tenders and contracts, Notice inviting tender; Departmental method of construction; Contract document, conditions of contract, rate list, security deposit and earnest money; Arbitration; Administrative approval, technical sanction.

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BTCE705 (2)	DSE	Construction Planning and Management	60	20	20	0	0	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT III **8 Hrs.**

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

UNIT IV **8 Hrs.**

Construction Equipment: Factors affecting selection of construction equipment; Investment and output of various equipment, operating cost; Brief study of equipment required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction, grouting.

UNIT V **9 Hrs.**

Site Organization and Engineering Economy: Accommodation of site staff, contractor's staff; Various organizational charts and manuals, personnel in construction; Labour laws and welfare facilities; Safety engineering.

Concept of time value of money, cash flow diagrams, nominal, and effective interest rate, capitalized cost; Depreciation, Salvage value, methods for calculating depreciation, depletion.

Text Books:

1. Construction Management & Machinery by B.L. Gupta, Standard Publishers Distributors (2010).
2. Construction Equipment & Job Planning by S.V. Deodhar, Khanna publishers (2010)
3. Project Planning & control with PERT & CPM by DR. B.C. Punmia & K.K. Khandelwal, Laxmi Publications Private Limited; Fourth edition (1 September 2016)

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BTCE705 (2)	DSE	Construction Planning and Management	60	20	20	0	0	3	1	0	4

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References:

1. Construction Planning, Equipment and Methods, Robert Peurifoy, McGraw Hill Education; 7 edition (22 May 2010).
2. Pert and CPM Principles and Applications, L S Srinath, Affiliated East-West Press (Pvt.) Ltd. (2001).
3. PERT & CPM by P.N. Modi, Standard Book House Since 1960 (2017).
4. Construction, Management & Accounts by Harpal Singh, McGraw Hill Education India Pvt Ltd (22 January 2001).

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BTCE705 (3)	DSE	Advanced Building Design	60	20	20	30	20	3	1	0	4

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Course Educational Objectives (CEOs):

1. Be able to perform analysis and design of reinforced concrete members and connections.
2. Be able to identify and interpret the appropriate relevant industry design codes.

Course Outcomes (COs):

1. To understand the general mechanical behavior of reinforced concrete portal frames.
2. To analyze and design reinforced concrete Multistoried Building.
3. To analyze and design reinforced concrete shells, domes, and folded plates.

Syllabus

UNIT I **8 Hrs.**

Design of R.C.C: Portal frame, Knee braced portals in steel for factory; Analysis of building frames for lateral loads by portal method, cantilever method, their assumptions, and limitations.

UNIT II **9 Hrs.**

Multistoried Building: Introduction, example of frames, structural layout, estimation of loads, load combinations; Analysis and design of R.C.C. multistoried building frames; Design of multistoried buildings in steel

UNIT III **8 Hrs.**

Advance R.C.C. Structures: Design of R.C.C. circular cylindrical shells; R.C.C. Folded Plates; Design of Domes, introduction, Stresses in domes: Formulae for forces in spherical domes, design of a spherical dome.

UNIT IV **8 Hrs.**

Gantry Girders: Design of Gantry Girders and Gantry Columns.

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			THEORY			PRACTICAL		L	T	P	CREDITS
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BTCE705 (3)	DSE	**Advanced Building Design**	60	20	20	30	20	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT V **9 Hrs.**

Composite Structures: Steel — Concrete composite structures, design philosophy, shear connectors, beams, girders and slabs, FRP composites, Types, Mechanics, behavior, properties, application

Text Books:

1. Basic Structural Analysis, C S Reddy, McGraw Hill Education; 3 edition (1 July 2017)
2. Advanced Reinforced Concrete Design, Raju N.K., CBS; 3rd Revised edition (2016).
3. Mechanics of composite material and structure by M. Mukhopadhyay.

References:

1. Thin Shell Concrete Structures, David P. Billington, McGraw-Hill College; Subsequent edition
2. Design and Analysis of Steel Structures, Prof. V.N. Vazirani and Dr. M.M. Ratwani, Khanna Publishers.

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