

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit: 04	Lecture (L): 3 Hrs.	Tutorial/Activity (T/A): 1 Hrs.	Practical (P): 2 Hrs.
Subject Code	BTCVE601T	Name of Subject: Estimating and Costing	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks (15marks for sessional Examination) (15 Marks for Activity based)	70 Marks	45 Marks	4 Hours

Course Objective	
1	To differentiate the types of Estimation, adopt specification and Unit Rates.
2	To analyse rates for different items of works.
3	To interpret the drawings and estimate the Quantities of various items in civil engineering structures.
4	To understand departmental procedures and Take measurement of completed work On successful completion of this course.
5	To understand different techniques of preliminary & detailed estimation of buildings & roads.

Course Outcome	
After completion of syllabus student able to	
1	Prepare the preliminary estimate for administrative approval & technical sanction for a civil engineering project.
2	Write the specification of the works to be undertaken, prepare the tender documents, fill the contracts and make use of knowledge of different contract submission & opening in awarding the work to the contractor.
3.	Use the concept of SD, EMD, MAS, Running Bill, Final Bill during the entire project
4.	Use the technique of Rate analysis in estimating the exact cost of material & manpower and hence the entire project.
5.	Estimate the bill of quantities using different techniques of preliminary & detailed estimation of buildings & roads & Arrive the exact value of the asset (movable & immovable) using different Valuation techniques

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Subject Code & CO NO.												
1	2	2									1	3
2	1	2									2	
3									2		3	
4			2	3	2						2	
5	3	2									2	
6	3		2			2					2	
	1 Low			2 Medium			3 High					

SYLLABUS

Unit No.1 Introduction			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Introduction: Importance and purpose of the subject, Units of measurement as per I.S.1200. Items of work and Description of items of work,,	01		1
Administrative approvals, technical sanction, preliminary estimates. objectives, and its methods	02		1
Study of Earthwork estimates in road, hill roads and canals, methods of consumptions of earthwork.	01		
Detailed estimates , objects, importance, accuracy. Methods of detailed estimates, Detailed estimates of load bearing and framed structures.	04		
	08		
Unit No.2 Calculation of steel , Tender and contracts			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Calculation of reinforcing steel with Bar bending Schedule.	03		
Tenders and Contracts: Method of carrying out works, tender notice, acceptance of tender, essentials of contract, type of contracts, contract documents, land acquisition act, Legal aspects of various contract provisions, Arbitration.	03		2
Public work department procedure of work: Organisation of Engineering department, Methods of carrying out works, stores, stucks, Tools and plants, Mode of payment, Public work account, Power of sanctions	01		2
	07		

Unit No.3 Specifications:			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Specifications: IS 1200 Introduction, Purpose and principles of specifications writing, Types of specifications, writing and developing	02		
Detailed specifications of Important items of building and road work.	03		
Classification of cost, direct and indirect charges, distribution of overheads, M.A.S Account, issue rates and stores account.	02		3
	07		
Unit No.4 Rate Analysis			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Introduction, Purpose and principles of CSR, Factors affecting analysis of rates, labour guidelines from National Building Organization, Task work.	04		4
Market rates of materials and labour, Rate analysis of major items of work	03		4
	07		
Unit No.5 Valuation			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Purpose of valuation, Factors affecting property price and cost, Types of Value.	03		5
Real Estate, Tenure of land, Free hold and lease hold, sinking fund, Depreciation, and its methods, Capitalised value, Methods of valuation, Net & Gross income, Rent fixation.	04		5
	07		

Signature
Chaitan K. Shinde

Signature
 (Dr. Avinash N Shrikhande,
 BOS (Civil Engg) chairman

Signature
 (Dr. A.N. Dashade)
 BOS Member

ESTIMATING AND COSTING

BTCVE601P

Evaluation Scheme: (25-Internal/25-External)

(P-2 Hrs/Week); Total Credits-01

PRACTICAL – Minimum 8 practical assignments based on

1. Preliminary estimate using Plinth area method.
2. Detailed estimate of Load bearing structure
3. Detailed estimate of Frame structure.
4. Calculation of steel with Bar bending Schedule.
5. Detailed estimate of earthwork of road for Approximate 1km length.
6. Draft Detailed specification for 8 major items.
7. Collection of four different types of Tender
8. Calculation of annual and total Depreciation and book value of the end of each year.
9. Fixation of standard rent of property.
10. Analysis the unit rate of 8 major items of work contained.
11. Market survey for material and labour rates for various items.
12. Detailed planning and estimate of plumbing work.

Note: Collection of different bank rates of nearby location, Comparative study of different units eg- Brass, foot, meter, cm, cum etc is compulsory.

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1 to 5	Estimating and Costing	by Dutta					
1 to 5	Estimating and Costing	by Chakraborty					
5	Valuation	by Roshan Namavati					
5	Philosophy of Valuation	S. S. Rathore.					

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
1 to 5	Handbook for quick cost estimates. By Ball, J R		
4	IS 14835 (2000): Guidelines for Estimating Unit Rate of Items		

5/11/15
Chetan G. Shinde

Asst. Prof.
Dr. A. N. Dabhadre
BAS Member

Dr. Avinash N. Shrikhande,
BOS (Civil Engg) chairman

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FACULTY OF SCIENCE & TECHNOLOGY
B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem:VI	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 02 Hrs.	Tutorial/Activity (T/A):01Hrs.	Practical (P): 00 Hrs.
Subject Code	BTCVE602T	Name of Subject:Construction Engineering and Management	
Examination Scheme			
Internal Marks:		University Marks:	Minimum Passing Marks:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)		70 Marks	45 Marks
			Examination Duration: 3 Hours

Course Outcome	
After completion of syllabus student able to	
1	Get themselves acquainted with various economic and managerial aspects of construction industry
2	Understand the tools and techniques of economic analysis for improving their decision making skills
3	Analyze the structure of market and effects of inflation with special reference to construction industry.
4	Understand the importance of marketing management and its effect on construction industry.
5	Acquire financial acumen for construction business.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BECVE602T1			2	2		1					3	1
BECVE602T2			2	2		1					3	1
BECVE602T3			2	2		1					3	1
BECVE602T4			2	2		1					3	1
BECVE602T5			2	2		1					3	1

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Importance of construction industry in economic development and economic growth of India. Construction- akey industry of India, Law of Demand, Law of supply, Laws of returns to the scale, types of costs	04	04	1
Unit No.2			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Factors of production with special reference to construction industry, Turnkeyconstructionprojects,Deprecation- its types and methods, The concept of business cycle, Affordable housing schemes by Government of India	04	04	2
Unit No.3			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Types of market structure, Monopoly, oligopoly and monopolisticcompetition, Recession,inflation and Deflation, Direct	04	04	3

and indirect taxes			
Unit No.4			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Meaning of Marketing managements, concepts of Marketing, Marketing Mix, Administrative and cost plus pricing, Channels of distribution, Advertising and sales promotion	03	03	4
Unit No.5			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Meaning, Nature and scope of Financial management, Sources of Finance, profit and loss account, Balance sheet, merger and acquisitions of business, Concept of stock market	04	04	5

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
I,II,III,IV,V	Modern Economics	H.L. Ahuja					YES
	Monetary Economics	M.L. Seth					YES
	Industrial Management	I.K. Chopde, A.M. Sheikh					YES
	Business Organization and Management	S.A. Sherlekar					YES
	Modern Economic Theory	K.K. Dewett					YES

Signature
Aravind K. Shinde

Signature
 (Dr. Avinash N Shrikhande,
 BOS (Civil Engg) chairman

Signature
 (Dr. A.N. Dabhade)
 BOS Member

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE & TECHNOLOGY

B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week			
Total Credit: 03	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hrs.	Practical (P): 0 Hrs.	
Subject Code	BTCVE603T	Name of Subject: Water Resource Engineering		
Examination Scheme				
Internal Marks:		University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)		70 Marks	45 Marks	3 Hours

Course Objective	
1	To describe occurrence, movement and distribution of water and to estimate water abstractions, runoff and hydrographs
2	To study the concepts of irrigation and different systems and methods of irrigation and to estimate the quantity of water required by crops.
3	To determine storage capacity of reservoir and to analyse and design earth dams
4	To analyse and design gravity dams and to study types of spillways and energy dissipators
5	To design unlined and lined channels and study the concept of other irrigation structures

Course Outcome	
After completion of syllabus student able to	
1	Understand occurrence, movement and distribution of water and estimate water abstractions, runoff and hydrographs
2	Illustrate different systems and methods of irrigation and estimate the quantity of water required by crops and estimate the quantity of water required by crops.
3	Estimate reservoir capacity and analyse and design earth dams
4	Design and analyse gravity dams and illustrate types of Spillways and energy dissipators
5	Design unlined and lined channels and illustrate concepts of other irrigation structures

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BECVE603T CO1	1	3	3	2								2
BECVE603T CO2		3	2									2
BECVE603T CO3	1	3	3	2								2
BECVE603T CO4	1	3	3	2								2
BECVE603T CO5		3	3	2								2

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1 Hydrology			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Hydrologic cycle, Water availability in India, Water balances, National Water Policy	01		1
Precipitation: Types, Measurement, Data analysis and presentation, Probable Maximum Precipitation	02		1
Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method, Infiltration: Horton's equation and Green Ampt method.	02		1
Concept of basin as a unit for development, Runoff: drainage basin characteristics, Estimation of runoff, Streamflow measurement	02		1
Concepts of unit hydrograph, S-curve hydrograph, Synthetic hydrograph, Stage discharge curve	02		1
	09		
Unit No.2 Water application and Irrigation methods			
Details of Topic:	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Systems of Irrigation: Lift irrigation, Tank irrigation, Well irrigation,	02		2

Irrigation methods: Surface and Sub-Surface Irrigation, Sprinkler and Drip Irrigation	02		2
Duty, Delta and Base period, Computation of duty and frequency of Irrigation	02		2
Soil Moisture and Consumptive use, Irrigation water quality, Crop rotation and Irrigation assessment	02		2
	08		
Unit No.3 Reservoir and Earthen dam			
Details of Topic:	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Reservoir: Types, Investigations, Site selection, Zones of storage,	01		3
Safe yield, Reservoir storage capacity, Reservoir sedimentation and control.	02		3
Dams: Types of dams, Earth and rockfill dams, typical sections of earth and rockfill dams	02		3
Analysis and design of earthen embankments, seepage control in earth dams	03		3
	08		
Unit No.4 Gravity Dams and spillways			
Details of Topic:	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Gravity dams, overflow and non-overflow sections, Forces acting on Gravity dams	02		4
analysis and design of gravity dams, Foundation treatment in concrete dams, joints, water seals, galleries in concrete dams	03		4
Types of spillways, design of Ogee spillway,	01		4
Types of gates in spillways and types of energy dissipation below spillways	01		4
	07		

Unit No.5 (Canals and hydraulic structures)

Details of Topic:	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Alignment of canals, canal capacity, losses, FSL of canal, Kennedy's silt theory, Lacey's regime theory, use of Garrets diagrams and Lacey's Regime diagrams	03		5
Lining of irrigation channels, design of lined canal, balancing depth, Cross section of an Irrigation channel	02		5
Water logging: Causes, surface and sub-surface drains	01		5
Introduction: hydraulic structures, storage, diversion, conveyance and distribution structures	01		5
	07		

References

Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1	A Textbook of Hydrology	Dr. P. Jaya Rami Reddy	University Science Press		Yes		
1	Engineering Hydrology	Subramanya, K.	Tata McGraw Hill, New Delhi				Yes
2 to 5	Irrigation Water Resources and Water Power Engineering,	Modi, P.N.	Standard Book House, New Delhi		Yes		
2 to 5	Irrigation Engineering	G. S. Birdie and R. C. Das	Dhanpat Rai Publishing Company pvt. Ltd., New Delhi				Yes
2 to 5	Irrigation Engineering and Hydraulic Structures	Garg Santosh Kumar	Khanna Publishers, New Delhi.		Yes		

Applicable for Unit No.	Website address
1	http://nptel.iitm.ac.in
2 to 5	http://www.uiowa.edu
2 to 5	http://www.ngwa.org
2 to 5	http://nptel.iitm.ac.in/video.php?courseId=1029&v=XmO2pltg7YBz/m3109.pdf
2 to 5	http://nptel.iitm.ac.in/video.php?courseId=1029&v=SO0suW7TLiCs
2 to 5	http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3102.pdf
2 to 5	http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3103.pdf
2 to 5	http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3105.pdf
2 to 5	http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m310

Shrihari
Carsten G. Shende

A. N. Dabhadre
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B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit:01	Practical (P): 2Hrs.		
Subject Code	BTCVE606P	Name of Subject: Computer Aided Civil Engineering Drawing	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	
50 Marks	50 Marks	50 Marks	

List of Practical's- (Any Eight)

1. Introduction to Auto-CAD
2. Auto CAD – Basics Drawing, Editing and Dimensioning
3. Preparation of 2-D drawings using Auto CAD – Plan, Elevation, section and layout of Building. Preparation of Submission drawing for the local sanctioning authority- Residential Building.
4. Preparation of 2-D drawings using Auto CAD – Plan, Elevation, section and layout of Building. Preparation of Submission drawing for the local sanctioning authority- Public Building.
5. Preparation of 2-D drawings using Auto CAD of reinforcement detailing of Civil Engineering Structures specially foundation, slab, beam and staircase.
6. To prepare submission drawing of Bridge.
7. To prepare submission drawing of Slab and culvert.
8. To prepare submission drawing of underground water reservoir
9. 3-D drawing of residential building by using Auto CAD
10. Creation of 3 D models of simple objects and obtaining 2-D Multiview drawings by using Auto CAD.

(Signature)
Cluster - G. Shinde

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Sem: VI	Total Hours Distribution per week 3-0-0		
Total Credit:	Lecture (L): 03Hrs	Tutorial/Activity (T/A): 0 Hrs.	Practical (P): 00 Hrs.
Subject Code	BTCVE604T	Name of Subject: Prestressed Concrete (Elective-III)	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)	70 Marks	45 Marks	3 Hours

Course Objective	
1	To familiarize the students with concept of pre-stressed concrete.
2	To impart knowledge to design pre-stressed concrete structures.

Course Outcome	
After completion of syllabus student able to	
1	Understand the behaviour of pre-stressed concrete.
2	Design of the pre-stressed concrete structures.
3	Understand the knowledge of basic theories and fundamental behaviour of prestress concrete.
4	Perform the analysis and design of pre-stress elements.
5	Apply the fundamental knowledge to the solution of practical problems.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Subject Code & CO NO.												
CO1	3	3	3	2	-	-	-	-	-	-	-	3
CO2	3	3	3	2	-	-	-	-	-	-	-	3
CO3	3	3	3	2	-	-	-	-	-	-	-	3
CO4	3	3	3	2	-	-	-	-	-	-	-	3
Avg CO	3	3	3	2	-	3						

1 Low

2 Medium

3 High

SYLLABUS

	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Unit No.1			
Partial pre-stressing, Analysis and design of End Blocks as per IS 1343 Method. (Only comparative study with the other methods is expected) Use of un-tensioned reinforcement. Types of pre-stressed concrete structures - Type – I, II, and III. Effect of Post-tensioning on axial Compression and tension members	09		1
	09		
Unit No.2			
Design of pre-stressed concrete Rectangular beam and one way slab by Limit state method, cable profile, Limiting zone of cable profile. Deflection of pre-stressed concrete beams (short-term, and long term) Shear and Torsional resistance of the pre-stressed concrete members, principal tension. Behavior of unbounded and bonded pre-stressed concrete beams	09		2
	09		

Unit No.3			
Composite construction of pre-stressed concrete structures and in-situ concrete, Differential shrinkage, deflection, flexural strength, serviceability (Limit state) of the composite sections. Introduction to application of pre-stressing to continuous beams, primary and secondary moment, Linear transformation and concordant cables	09		3
	09		
Unit No.4			
Flexibility Influence coefficient, Analysis of single-storey, single-bay fixed portal frame. Analysis and design of circular water tank, fixed, hinged, use of (IS-3370-2021)	05		4
	05		
Unit No.5			
Design of pre-stressed concrete poles, Special problems in pre-stressed concrete structures like corrosion, fatigue, dynamic behavior of pre-stressed concrete beams, behavior of pre-stressed concrete structures under fire.	04		5
	04		

RECOMMENDED BOOKS:

- 1 Pre-stressed Concrete by Dr, N. Krishna Raju
- 2 Pre-stressed Concrete by Dr. TY Lin
- 3 Pre-stressed Concrete by N. Rajgopalan, Narosa Publishing House, Mumbai, Ed. II- 2007.
- 4 Pre-stressed Concrete Design & Construction- Leonhardt F. Ernst Wilhelm and Sohen, Publ

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
All	IS 1343 <i>Prestress Concrete-Code of Practice</i>		2012

Signature
C. S. S. S.

Signature
(Dr. Avinash N Shrikhande,
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B.TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VIth	Total Hours Distribution per week		
Total Credit: - 03	Lecture : 03 Hours	Tutorial//Activity: 0 Hrs	Practical(P): 0 Hrs
Subject Code	BTCVE604T	Subject: - Soil Dynamics (Elective-III)	
Examination Scheme			
Internal Marks-	University Marks	Minimum Passing Marks:	Examination Duration:
30 Marks (15 Marks for sessional Examination) (15 Marks for Activity based)	70 Marks	45 Marks	3Hours

Course Objectives	
1	To enhance students knowledge in dynamic loading
2	To enhance students knowledge in theory of vibrations.
3	To know the dynamic soil Properties, to train the students in machine foundation design.
4	To know the occurrence of liquefaction and the analyzing it.
5	Learn procedure of analysis & Design of different types of Machine foundation.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Understand basics of soil dynamics, theory of vibration, propagation of body waves and surface waves through soil.
2	Understand different laboratory and field tests to determine dynamic soil properties required for design purpose
3	Understand liquefaction mechanism and evaluation of liquefaction potential studies by various tests
4	Understand the general requirements of machine foundation, and criteria for its design.
5	Understand analysis & design of different types of Machine foundation required in the field

MAPPING OF CO WITH PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	1	2	2	1	--	--	2	2
CO2	3	2	1	2	--	--	2	1	--	1	--	2
CO3	2	1	2	2	--	2	--	2	--	--	--	1
CO4	3	2	1	1	1	2	2	1	--	2	--	2
CO5	3	2	2	2	2	--	--	1	--	--	2	2
Avg	2.8	1.8	1.6	1.6	1.33	2	2	1.2	--	1.5	2	1.8

1 Low

2 Medium

3 High

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT NO.1 Introduction to Dynamic loading			
Earthquake loading, machine vibrations, blast loading, background and lessons learnt from damages in past earthquakes due to soil and ground failure,	04		1
Effect of soil properties on seismic response of structures, seismic waves and their characteristics.	03		1
	07		
UNIT NO.2 Soil Dynamics and its applications			
Fundamentals of vibrations: single, two and multiple degree of freedom systems, vibration isolation, vibration absorbers, vibration measuring instruments.	03		2
Wave propagation: elastic continuum medium, semi-infinite elastic continuum medium, soil behaviour under dynamic loading.	04		2
	07		
UNIT NO.3 Dynamic elastic constant of soil			
Stress-strain behaviour of cyclically loaded soils, effect of strain level on the dynamic soil properties, measurement of seismic response of soil at low and high strain, using laboratory tests	03		3
Cyclic triaxial, cyclic direct simple shear, resonant column, shaking table, centrifuge and using field tests - block vibration test, cross bore hole, their suitability and limitations, Interpretation of results, IS Codes	04		3
	07		
UNIT NO.4 Liquefaction of soils			
Liquefaction mechanism, factors affecting liquefaction, liquefaction of cohesionless soils and sensitive clays, liquefaction susceptibility,	4		4
Evaluation of liquefaction potential studies by dynamic tri-axial	3		4

testing, oscillatory shear box, shake table and blast tests.			
	07		
UNITNO.5 Machine Foundation			
Introduction: Types of machines, Types of machine foundations, Modes of vibrations, General requirements of machine foundation, General criteria for design, permissible amplitude	02		5
Analysis & Design of Machine foundation: Elastic homogeneous half space and lumped parameter solutions, analysis and design of foundations for reciprocating and impact type machines, turbines, effect of machine foundation on adjoining structures.	03		5
vibration isolation& control: Force isolation & motion isolation, Methods of isolation in machine foundations Isolating materials and their properties Bearing capacity of foundations: Introduction to bearing capacity of dynamically loaded foundations	03		5
	08		

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1,2,3,4,5	Advanced Soil Dynamics and Earthquake Engineering	Bharat Bhushan Prasad	PHI (1 December 2010)		Yes		
1,2,3,4,5	Fundamentals of Soil Dynamics	Braja M. Das	Elsevier, 1983				Yes

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
5	Indian Standard Code Of Practice For Design And Construction Of Machine Foundations Part 1 Foundation For Reciprocating Type Machines	Indian Standard	December 1982
1,2,3,4	Handbook of Soil Mechanics: Soil Mechanics of Earthworks, Foundations and Highway Engineering v.3 Hardcover – Import, 1 September 1988.	Elsevier Science Ltd; Revised, Subsequent edition	1 September 1988

3/11/18
Arshad G. Shinde

Arshad
 (Dr. A.N. Dabhadre)
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 (Dr. Avinash N Shrikhande,
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B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 03 Hrs	Tutorial/Activity (T/A): 00Hrs.	Practical (P): 00Hrs.
Subject Code	BTCVE604T	Name of Subject: Environment Management (Elective-III)	
Examination Scheme			
Internal Marks:	University Marks:	Maximum Passing Marks:	Examination Duration:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)	70 Marks	45 Marks	3 Hours

List of Course Objective	
1	To develop, implement, monitor and maintain environmental strategies, policies, programmes and systems that promote sustainable development.
2	To identify and understand the major environmental management systems responsible for carrying out any sustainable development.
3	To oversee the environmental performance including compliance with environmental legislation across the organization.
4	To lead the implementation of environmental policies and practices and raise awareness, at all levels of an organization, about the emerging environmental issues.
5	To coordinate all aspects of pollution control, waste management, environmental health and conservation.

List of Course Outcome	
After completion of syllabus student should be able to	
1	Identify the scientific and social aspects of environmental issues.
2	Understand the procedure of environmental impact assessment.
3	Identify and evaluate and the environmental risk assessment involved in the EMP.
4	Understand the importance of the process of Environmental Audit and vital parameters associated with it.
5	Understand the role of environmental management system in protecting the resources using environmental legislations.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	2	3	1	2	2	1	2
CO2	3	2	3	1	1	2	3	1	2	2	1	2
CO3	3	2	3	1	1	2	3	1	2	2	1	2
CO4	3	2	3	1	1	2	3	1	2	2	1	2
CO5	3	2	3	1	1	2	3	1	2	2	1	2

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1 (Introduction)			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Introduction to Environmental Management: Objectives, Standards of living	2		1
Goals and components of Environmental Management, Socio-economic context.	2		1
Environmental Sustainability and sustainable development, issues and constraints	2		1
Environmental values and ethics	1		1
	7		
Unit No.2 (Environmental Impact Assessment)			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Environmental Impact Assessment (EIA) – Definition, History and Objective	1		2
Role, Benefits and flaws of EIA in India,	1		2
EIA Procedures	1		2
Key elements of EIA: Screening, scoping identifying and evaluating impacts	2		2
Mitigations and issuing environmental statements.	1		2
Environmental Impact Statement	1		2
	7		
Unit No.3 (Environmental Risk Analysis)			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Environmental Risk Analysis: Fundamentals of hazards, exposure & risk assessment management.	2		3
Basic Steps in risk management- hazard identification, exposure assessment & risk characterization.	2		3
Stages in the prior Environmental Clearance (EC), Process for New Projects: Screening, scoping, public consultation	3		3

Critical environmental issues and formulation of strategies of Environmental Management Plan (EMP)	2		CO3
	9		
Unit No.4(Environmental Audit)			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Environmental Audit (EA)- Concept of EA, procedural aspects of conducting environmental audit,	2		4
Environmental Management System (EMS), Life Cycle Assessment and Management (LCA),	2		4
ISO environmental standards: Introduction to ISO 1400 series, International voluntary standards	1		4
Eco marks and eco labelling: Assuring the quality.	1		4
Post Project Monitoring	1		4
	7		
Unit No.5 (Environmental legislation)			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Environmental Policy, Law And Appraisals –various enactment and their provisions	2		5
Role of State & Central boards of pollution control	1		5
Cleaner Technology of production	1		5
Energy Impact Analysis: Energy sources, Importance of energy impact analysis	2		5
Resource Management: Mineral, Energy, Water, Renewable, Food, Land and its depletion– causes & effects, Optimization of resource utilization.	2		5
	8		

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
Unit I	An Introduction to Environmental Management	Anand Bal	Himalaya Publishing House				
Unit II,III,IV	Environmental Impact Assessment	John Rau & Wooten	Mc Graw Hill				
Unit II,III,IV	Environmental Impact Assessment	Larry Canter	Mc Graw Hill				
Unit II,III,IV	The New Environmental Age	R.K. Sapra, S. Bhardwaj	Ashish Pub. House, New Delhi				
Unit V	Environmental Law and Policy in india, Cases, Materials And Statutes	Rosencranz, S. Divan, M.L. Noyal	Tripathi Pvt. Ltd. Bombay.				

Unit V	Environmental Legislation of India	Gupta, K.R.,	Atlantic Publishers, 2006				
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B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit: 3	Lecture (L): 3Hrs	Tutorial/Activity (T/A): 1 Hrs.	Practical (P):
Subject Code	BTCVE604T	Name of Subject: Repairs & Rehabilitation of Civil Engineering Structures (Elective- III)	
Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks (15marks for sessional Examination) (15 Marks for Activity based)	70 Marks	45 Marks	3 Hours

Course Objective	
1	Familiarize Students with deterioration of concrete in structures
2	Equip student with concepts of NDT and evaluation
3	Understand failures and causes for failures in structures
4	Familiarize different materials and techniques for repairs
5	Understand procedure to carryout Physical evaluation of buildingsand prepare report

Course Outcome	
After completion of syllabus student able to	
1	Explain deterioration of concrete in structures
2	Carryout analysis using NDT and evaluate structures
3.	Assess failures and causes of failures in structures
4.	Carryout Physical evaluation and submit report on condition of the structure
5.	Carryout analysis of structures and take preventive action as per conditions & Requirement

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Subject Code & CO NO.												
1	2						2					3
2	2	2	3			2					2	2
3	2	2					2		2		3	2
4	2				2	2	2				2	2
5	3	2	2	2			2		1	1	2	2

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1 Deterioration of concrete in structures			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Physical processes of deterioration like Freezing and Thawing, Wetting and Drying,	02		1
Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion,	02		1
Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. -	02		1
Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures.	02		1
	08		
Unit No.2 Non Destructive Testing			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Nondestructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity,	03		2
Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting-	02		2
Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.	02		2
	07		

Unit No.3 Failure of buildings			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Definition of building failure-types of failures- Causes of Failures- Faulty Design,	02		3
Accidental over Loading, Poor quality of material and Poor Construction practices-	02		3
Fire damage - Methodology for investigation of failures-diagnostic testing methods and equipments-repair of cracks in concrete	03		3
	07		
Unit No.4 Materials for repair and rehabilitation			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Admixtures- types of admixtures- purposes of using admixtures-chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects –	04		4
Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.	03		3
	07		
Unit No.5 Investigation of structures &Repair Techniques			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.	03		3
Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes.	04		5
	07		

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1 to 5	Maintenance & Repair of Civil Structures	B.L. Gupta & AmitGupta			yes		
1 to 5	Rehabilitation of Concrete Structures	B. Vidivelli	Standard Publishers		yes		
1 to 5	Concrete Bridge Practice Construction, Maintenance & Rehabilitation	V. K. Raina			yes		
1 to 5	Concrete Structures-protection Repair and Rehabilitation	R.Doodge Woodson	BH Publishers				
1 to 5	Repair and protection of concrete structures by	Noel P.Mailvaganam,	CRC Press,	1991		yes	
1 to 5	Concrete repair and maintenance Illustrated	Peter.H.Emmons,	Galgotia publications Pvt. Ltd.,	2001.			yes
1 to 5	Earthquake resistant design of structures	Pankaj Agarwal & Manish shrikande	PHI,	2006.	yes		

List of Code/Handbook			
Applicable for Unit No.	Title of Code	Type of code	Year of Publication
1 to 5	Handbook on repair and rehabilitation of RCC buildings	CPWD, Government of India.	
1 to 5	Handbook on seismic retrofit of buildings A. Chakrabarti et.al., Narosa PublishingHouse, 2010.		

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B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit: 03	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 0 Hrs.	Practical (P): 0 Hrs.
Subject Code	BTCVE604T	Name of Subject: Water Transmission and Distribution Systems (Elective-III)	
Examination Scheme			
Internal Marks:		University Marks:	Minimum Passing Marks:
30 Marks (15marks for sessional Examination) (15 Marks for Activity based)		70 Marks	45 Marks
			Examination Duration: 3 Hours

Course Objective	
1	To learn the concept of computation of optimal diameter of rising main based on the various cost elements involved in it
2	To estimate the storage capacity of a distribution reservoir and to discuss various components of distribution reservoir
3	To discuss various methods of analysis of a water distribution network
4	To study various criteria of planning of an optimal water distribution network
5	To know the methods of the optimal design of water distribution network and their suitability

Course Outcome	
After completion of syllabus student able to	
1	Understanding the various head loss formula used for water distribution design and also know the methodology of optimal diameter of pumping main
2	Estimation of storage capacity of a distribution reservoir and also to understand the utility of various appurtenance used in WDN
3	Understand the concepts of various methods of analysis of WDN
4	Understanding various techniques of the optimal planning of water distribution network
5	Implementation of various methods of optimal water distribution network design

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BECVE604T CO1	3	3	3	2	2	3						
BECVE604T CO2	3	3	3	2	2	2	1					
BECVE604T CO3	3	3	3	2	2	2	1					
BECVE604T CO4	3	3	3	2	2	2	1					
BECVE604T CO5	3	3	3	2	2	2	1					

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1			
	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Introduction- General principle used in pipe line design, various components of water transmission and distribution systems, Head loss formula, minor losses, equivalent pipe concept	04		1
Rising main- Basic requirements, Types, diameter computation by considering various cost elements. Optimal diameter of rising main	04		1
	08		
Unit No.2			
	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Distribution reservoirs- impounding and service reservoirs, necessity, various storages, location and height, various component parts, capacity computation.	03		2
Design principle of water distribution system- Planning, design and analysis of WDN, component parts	01		2
Pipe appurtenances- Various valves and fittings, pumps, pressure release valve and check valves	03		2
	07		
Unit No.3			
	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Analysis of water distribution network- Parameter inter relationship,	08		3

formulation of equations, types of problem, Hardy cross method, Newton Raphson method, Linear theory method, Electrical analogy method, Multi reservoir system analysis			
	08		
Unit No.4			
	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Node Flow analysis- Node Head Analysis (NHA) and Node Flow Analysis (NFA), Node classification, Node flow compatibility, NFA of serial network	04		4
Planning of an optimal network- Branching of network, selection of branches computation of first trial HGL values	04		4
	08		
Unit No.5			
	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Design of optimal WDN- Various approaches, cost head loss ratio criterion, Linear Programming technique, introduction to non linear programming	8		5
	08		

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1 and 2	Analysis of Water distribution Systems	T.M.Walski	C.B.S.Publication	1984	Yes		
3	Analysis of Flow in pipe network	Jepson R.W.	Ann Arbor Science, Michigan USA	1997		Yes	
3	Analysis of Flow in pipe network	Gupta Rajesh Bhave P.R.	Narosha Publishing House New Delhi	2013	Yes		
3	Analysis of Water Distribution Network Part I	Dr. P.R.Bhave	Journal of IWWA Vol XIII No. 2	1981			Yes

	to Part III						
3	Node Flow analysis of Serial water distribution System	Dr. P.R.Bhave	Journal of IWWA Vol XII	1981			Yes
4 and 5	Non Computer Optimisation of Single source network	P.R. Bhave	Journal of Environmental Engg. Div. ASCE	1978			Yes

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Sem: VI	Total Hours Distribution per week		
Total Credit: 3	Lecture (L): 3Hrs	Tutorial/Activity (T/A): 0hrs.	Practical (P): 0 Hrs.
Subject Code	BTCVE604T	Name of Subject: Urban Transportation Planning (Elective III)	
Examination Scheme			
Internal Marks:		University Marks:	Minimum Passing Marks:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)		70 Marks	45 Marks
Examination Duration:			
3 Hours			

Course Objective	
1	Students should be able to explain and describe improving transport economic efficiency for transport providers and business user
2	Students should be able to explain, generate alternatives for improving transportation system
3	Students should be able to describe the future demand and selecting the best alternative after proper evaluation
4	Improve mobility levels for the urban poor through promotion of affordable urban transport plans, programmes and technologies
5	Increase the efficiency of existing transport operations through improved planning and management of all modes of transport

Course Outcome	
After completion of syllabus student able to	
1	Explain the characteristic of urban transportation, structure of urban transportation and classification of urban roads.
2	Describe the objectives of transportation planning, data collection for planning and environmental impact analysis.
3	Explain the process of travel demand forecasting & need for interation in different modes of transportation.
4	Describe the use of intelligent Transport System and need to accommodate non-motorized transports.

MAPPING OF CO WITH PO

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO 12
Subject Code & CO												
CO1	3	3										
CO2	3	2										
CO3	3	3	2									
CO4	3	3	1									
CO5	3	2	2	1								

1 Low

2 Medium

3 High

SYLLABUS

Unit No.1 Urbanization and Transportation			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Importance of urban area	08		1
Structure of urban area			1
Urban design			
Use of road space			
Classification of urban roads			
	08		
Unit No.2 Urban Transportation Characteristics			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Factors influencing transportation needs	08		2
Transportation demand			2
Type of trips			
Mode of travel, urban transportation scene in India			
Road congestion			2
Impact of transport on environment			2
	08		
Unit No.3 Transportation Planning Process			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Urban transportation planning objectives	08		3
Urban transportation system			

Urban transportation planning process			3
Data collection			3
Surveys for data collection			
Environmental impact analysis			3
	08		
Unit No.4 Travel Demand Forecasting			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Trip generation and attraction analysis	08		
Trip distribution models			4
Model split analysis			
Route assignment analysis			
	08		
Unit No.5 Public Transportation, Innovations in Urban Transportation			
Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
Bus transport characteristics, bus route planning, performance indicator	08		5
Types of rail transit, rail transit system development in Indian cities, Integrated Transport System, Modes of Integrated transport systems			
Need for innovative approaches			
Track guided bus			5
BRT, GIS, ITS			5
Functional areas of ITS			5

References							
Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
I,II,III, IV&V	Traffic Engineering and Transport Planning	L R Kadiyali	Khanna	I	✓	-	
I,II,III, IV&V	Urban Transportation	D. J. Victor & S. Ponnuswamy	Tata McGraw - Hill	I	✓	-	
III	Transport Planning and Traffic engineering	C A O' Flaherty	Butter Worth-Heinemann	I		-	✓
I,II,III,	Urban	P. Anbalagan	Bookwell	I		-	✓

IV&V	Development and Sustainable Transport		Publications				
I,II,III, IV&V	Urban Transporation Planning	Michael Meyer & Eric Miller	McGraw - Hill	II		-	✓

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