RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE & TECHNOLOGY

BE CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week		
Total Credit: 3	Lecture (L): 3Hrs	Tutorial/Activity (T/A): N.A	Practical (P): N.A
Subject Code	BECVE401T	CONCRETE TECHNOLOGY	

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 Objectives	
1	To know different types of cement as per their properties for different field applications, properties of Aggregates and Admixture
2	To know tests on concrete in plastic and hardened stage as well as behaviour of concrete structure
3	To understand Design economic concrete mix proportion for different exposure conditions and intended purpose.
4	To understand the knowledge of Special Concrete.
5	To understand the various repairing techniques and their material.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Think logically for development Concrete technology application in field of Civil Engineering
2	Gain an experience in the implementation of Concrete Materials on Engineering concepts which are applied on Construction Fields
3.	Understand the process of mix design of concrete.
4.	Differentiate special concrete from conventional concrete.
5.	Analyze causes of deterioration of concrete components

MAPPING OF CO WITH PO

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C 01	2	3	2	-	-	1	1	1	1	-	-	2
C 02	2	2	2	2	-	1	1	1	1	1	2	2
C 03	3	3	2	2	1	1	1	1	2	1	1	2
C 04	3	3	2	1	-	1	1	-	-	-	-	2
CO5	1	2	2	-	-	-	-	-	-	-	-	2
AVG.	**2.2**	**2.6**	**2.00**	**1.00**	**0.2**	**0.8**	**0.8**	**0.75**	**1**	**0.5**	**0.75**	**2.00**

1 Low **2 Medium** **3 High**

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(CHOICE BASED CREDIT SYSTEM)

BECVE401T- CONCRETE TECHNOLOGY

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT NO.1(BASICS AND CONSTITUENTS OF CONCRETE)			
Historical background, composition of concrete, general note on strength mechanism, recent practice and future trends	1		1
Constituent of Concrete : **Cement** - Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, grades of cement, testing of cement as per Indian standard.	2		1
Aggregates - Utility in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements	2		1
Water - General Requirements & limiting values of impurities	1		1
Admixtures - Additives and admixtures, types, necessity and benefit Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage	2		1
	8		
UNIT NO.2(FRESH AND HARDENED CONCRETE)			
General: Methods of batching and mixing. Workability –factors affecting workability, measurement tests on workability(Slump cone test, Compaction factor test, Vee-bee consistometer test, flow table test), transporting and placing of concrete, curing of concrete, W/c ratio, Segregation and bleeding, Maturity of Concrete.	3		2
Compressive and tensile strength test, flexural strength and their relationship, factors affecting strength of concrete.	2		2
Introduction to aspects of elasticity, shrinkage and creep. Factors affecting shrinkage and creep, non-destructive tests with their limitations.	2		2
	7		

UNIT NO.3(MIX DESIGN)			
Principles of mix proportioning, probabilistic parameters, factors governing selection of mix.	2		3
Methods of Concrete Mix Design: Variability of test results, acceptance criteria, Road note 4 method(DOE), ACI and IS method of concrete mix design and fly ash based mix Design.	5		3
	7		
UNIT NO.4 (SPECIAL CONCRETE)			
Review of behaviour and characteristics of high strength concrete, high performance concrete, self-compacting Concrete, fibre reinforced concrete, light weight and heavy weight concrete,.	4		4
Pumped concrete, underwater concrete, hot and cold weather concreting, Ready mixed concrete.	3		4
	7		
UNIT NO.5 (REPAIR AND REHABILITATION OF CONCRETE STRUCTURE)			
Distress in structure – causes and precautions, damage assessment of structural elements, repairing techniques and repairing materials.	3		5
Cracks in concrete: Causes, types, prevention, repairs of cracks – materials and methods.	4		5
	7		

References

Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference book
1&2	Concrete Technology	M S Shetty;	S.Chand Publication New Delhi		Text Book		
3	Concrete Technology	P Kumar Mehta,	Indian Concrete Institute		Text Book		
4&5	Properties of Concrete	A.M.Neville	Pearson Education		Text Book		
3	Concrete Technology	M L Gambhir;	Tata McGraw Hill		Text Book		
3	Concrete mix design for flyash and superplasticizer	Kishore kaushal	ICI bulletin	Apr - june 1997		Research paper	

List of Code/Handbook			
Applicable for Unit No.	**Title of Code**	**Type of code**	**Year of Publication**
2	IS 269-2013		**2013**
	IS 516-1959		**1959**
2	IS 1786-1985		
4	IS 3812 part 1	Specification of fly ash	
3	IS 10262 - 2009		**2009**

Applicable for Unit No.	Website address
2	http://www.nptel.iitm.ac.in

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BE CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week	
Total Credit: 4	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): 1 Hr.
Subject Code	BECVE402T	STRUCTURAL ANALYSIS

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 Objectives	
1	To make students understand the determinate and indeterminate structures, their methods of analysis and construction of influence lines.
2	To make students understand the behaviour of beams and frames using Slope Deflection Method and Moment Distribution Method.
3	To make students understand the concept of Influence Line Diagram and analysis of the structural members subjected to Rolling Loads.
4	To make students understand the concept of formulation of Stiffness Matrix, Transformation Matrix, Load Matrix and its application to Beams and Plane Frames.
5	To make students understand the concept of formulation of Stiffness Matrix, Transformation Matrix, Load Matrix and its application to Plane Truss.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Apply knowledge to analyse determinate and indeterminate structures.
2	Apply knowledge to perform analysis of beams and frames using Slope Deflection Method and Moment Distribution Method.
3	Apply knowledge of Influence Line Diagram to analyse structural members for rolling loads.
4	Apply knowledge of Direct Stiffness Method to analyse Beams and Plane Frames.
5	Apply knowledge of Direct Stiffness Method to formulate Stiffness Matrix, Transformation Matrix, Load Matrix to analyse Plane Truss.

MAPPING OF CO WITH PO

CO/PO ⬇ ➡	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO11	PO12
1	3	3	3	3						3		3
2	3	3	3	3						3		3
3	3	3	3	3						3		3
4	3	3	3	3						3		3
5	3	3	3	3						3		3

1 Low **2 Medium** **3 High**

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FACULTY OF SCIENCE & TECHNOLOGY

BE CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

BECVE402T- STRUCTURAL ANALYSIS

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	
UNIT NO.1 (STATICALLY INDETERMINATE STRUCTURES)			
Introduction to Statically indeterminate Structures : Concept of Static indeterminacy.	2	1	1
Analysis of Fixed and Continuous Beams by Three Moments Theorem, effects of Sinking of Support.	6	1	
UNIT NO.2 (ANALYSIS OF BEAMS AND FRAMES)			
Analysis of Continuous Beams & Portal frames by Slope Deflection Method .	4	1	2
Analysis of Continuous Beams & Simple Portal frames (sway and Non Sway) Using Moment Distribution Method.	4	1	
UNIT NO.3 (INFLUENCE LINE DIAGRAM)			
Rolling loads on simply supported beams with concentrated and uniformly distributed loads, maximum B.M. and S.F. Influence Line Diagrams for Reactions, Shear Forces and Bending Moments in simply supported beam, cantilevers and beams with overhangs, ILD for forces in members of Simple Trusses.	6	1	3
UNIT NO.4(MATRIX STIFFNESS METHOD –APPLICATION TO BEAMS AND PLANE FRAMES)			
Basic concept, Degree of Freedom, Direct Stiffness Method. Formulation of elemental/local stiffness matrix and global stiffness matrix for beam members (without axial deformation), for plane frame members. Member load matrix due to concentrated loads, uniformly distributed loads. Transformation matrix, Assembly of global/ structural load matrix upto three elements. Solution to problems with maximum degree of freedom three.	7	1	4
UNIT NO.5 (STIFFNESS METHOD – APPLICATION TO PLANE TRUSS)			
Formulation of elemental/local stiffness matrix and global stiffness matrix for plane truss. Transformation matrix, Assembly of global/ Structural stiffness matrix upto (8 x 8). Assembly of global / structural load matrix. Solution to problems with maximum degree of freedom three.	7	1	5

References			
Name of Book	**Name of Author**	**Name of Publisher**	**Edition**
Theory of Structures	S Ramamurtham R. Narayan	Dhanpat Rai & Sons	V edition
Structural Analysis	L S Negi & R S Jangid	Tata McGraw Hill	I
Matrix Analysis of Framed Structures	W Weaver & Gere	CBS publisher	III edition
Theory of Structure	S P Timoshenko	Mc. Graw Hill	
Intermediate Structural Analysis	C.K Wang	Mc. Graw Hill	
Structural Analysis	C.S Reddy	Mc. Graw Hill	
Structural Analysis	R.C. Hibbler		

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(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week	
Total Credit: 1	Practical (P): 2 Hrs.	
Subject Code	BECVE402P	STRUCTURAL ANALYSIS
Examination Scheme		
Internal Marks:	University Marks:	Maximum Passing Marks:
25 Marks	25 Marks	25 Marks

List of Practicals – (Any Six)

1. Verification of Maxwell's reciprocal theorem using simply supported beam.
2. Verification of Maxwell's reciprocal theorem using simply supported truss.
3. Horizontal thrust in two hinged arch.
4. ILD for Horizontal thrust in two hinged arch.
5. Horizontal thrust in three hinged arch.
6. ILD for Horizontal thrust in three hinged arch.
7. Verification of flexural rigidity using simply supported beam.
8. Analysis of a continuous beam using computer software.
9. Analysis of a plane frame using computer software.
10. Analysis of a plane truss using computer software.

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BE - CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): NA
Subject Code	BECVE403T	ENVIRONMENTAL ENGINEERING

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 Objectives	
1	The course will provide students knowledge regarding the sources of water, water demands, population forecasting, characteristics, standards of drinking water
2	To prepare students to analyze, plan and design of various phases of water supply systems and waste water treatment.
3	To provide the students the knowledge regarding the various characteristics of water, waste water estimation of the quantity of water
4	The course will provide students with fundamentals of air pollution and solid waste management, climate change, geo environment and sustainable resource management

Course Outcomes	
After completion of syllabus, students would be able to	
1	Have knowledge of characteristics of water,drinking water standards and necessity of treatment.
2	Design various units of conventional water treatment plant.
3	Understand the characteristics of waste water, necessity of treatment, types of treatment processes
4	Equip with the basic knowledge related to design of waste water treatment
5	Understand of significance of air pollution, solid waste , climate change, geo environment etc

MAPPING OF CO WITH PO

CO / PO ➡	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	3	3						1		3
2	3	3	3	3						1		3
3	3	3	3	3						1		3
4	3	3	3	3	1					1		3
5	3	3	3	3	1					1		3

1 Low **2 Medium** **3 High**

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BE - CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

BECVE403T – ENVIRONMENTAL ENGINEERING

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT NO.1			
Introduction: Basics of water supply scheme, Water Demand, population forecasting methods, Sources of water & intake structures.	2		1
Conveyance of water: Types of pipes, joints, fittings, valves & appurtenances.	2		
Water quality: characteristics of water, Standards of drinking water. (WHO 2011, CPHEOO, IS 10500-2016).	2		
Water Treatment: Objective of water treatment, flow sheet of conventional water treatment plant.	1		
Sedimentation: Principles, types of setting basins, inlet and outlet arrangements, simple design of sedimentation tank.	2		
UNIT NO.2			
Coagulation and Flocculation: Definition, Principles, types of coagulants, coagulant doses, types of mixing and flocculation devices, Clariflocculators.	3		2
Filtration: Mechanism of filtration Types of filters-RSF, SSF, Pressure filters, sand specification, operational problems.Simple design of SSF and RSF, Membrane filtration technique of water treatment.	3		
Disinfection: Purpose, Mechanism, disinfectants, disinfection by chlorination. Type of chlorination.	2		
Distribution systems: Requirements & methods of distribution systems with layouts	1		

UNIT NO.3			
General Introduction: Study of waste water, black water & grey water. System of collection and conveyance of sewage- separate and combined systems, patterns of sewage collection systems. Quantity of storm water and sanitary waste water, Problems on quantity estimation.	3		3
Sewer: Types, Shapes, Hydraulic Design (Capacity, Size, Grade, etc.), Construction of sewer - Shoring, Trenching and laying to grade. Sewer materials, Sewer Appurtenances - manhole street inlets, storm water overflows, inverted syphons, flushing and ventilation: House plumbing systems, sanitary fitting and appliances, traps, anti-syphonage, inspection chambers and intercepting traps. Sewage pumping - location of pumping station. Sewer testing and maintenance.	3		
Characteristics: Physical and chemical characteristics of wastewater, significance of BOD, COD, BOD rate constant (Problems)	2		
UNIT NO.4			
Preliminary & Primary Treatments: Sewage treatment flow sheet, site selection for sewage treatment plant. Preliminary and primary treatments - Screens, Grit chambers, oil & grease removal, Primary settling tank (Only working principles)	3		4
Secondary treatments - Principle of Biological Treatment, bacterial growth curve, Activated sludge process, trickling filter, sequence batch reactors, oxidation ponds (Only working principles)	2		
Sewage Disposals: Indian Standard for disposal, Methods of disposal, Sewage farming, self-purification of stream (Streeter Phelp's equation, Oxygen sag curve). Recycle & reuse of sewage (Zero discharge concept). Sludge digestion process, sludge drying beds.	2		
Rural sanitation: Pit privy, aqua privy, bio-gas recovery, Septic tank- soak pit (Only working principles). Sullage collection and disposal	2		
UNIT NO.5			
Introduction of air pollution and municipal solid waste, climate change, geo environment, environmental management system and sustainable resource management.	3		5

References			
Name of Book	**Name of Author**	**Name of Publisher**	**Edition**
Water Supply Engineering	B.C.Punmia, Ashok Jain and Arun Jain	Laxmi Publication	
Water Supply & Sewage	M.J.Macghee	McGraw Hill Publication	
Environmental Engineering Vol – I (Water Supply Engineering) and Environmental Engg Vol. II.	Dr P.N. Modi.	Standard Book House	
Environmemtal Engineering	Howards Peavy, Donald R. Rowe and George Tchobanoglous.	McGraw Hill Education	
Central Public Health Environmental Engg. Manual	--	(CPHEEO) New Delhi	
Wastewater Engineering: Treatment and Reuse	Metcalf & Eddy	McGraw Hill Education	
Environmental Engineering-Vol II	S.K.Garg	Standard Publication	
Waste Water Engineering	B.C.Punmia, Ashok Jain and Arun Jain	Laxmi Publication	
Water Supply & Sanitary Engineering	G.S.Birdie	DhanpatRai Publication	

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(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE403P	ENVIRONMENTAL ENGINEERING	
Examination Scheme - Practical			
Internal Marks:	University Marks:	MinimumPassing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

List of Experiments: (Part A, B and C)

A) Any TEN

1. Determination of pH
2. Determination of Conductivity
3. Determination of Turbidity
3. Determination Chlorides
4. Determination of Solid's (Suspended & dissolved)
6. Determination of Acidity and alkalinity
7. Determination of Dissolved Oxygen
8. Determination of Available Chlorine
9. Determination of Residual Chlorine
10. Jar Test(optimum dose of coagulant)
11. Only demonstration of COD, BOD.
12. Bacteriological Plate count and MPN tests

AND

B) Design of Water treatment unit or waste water treatment unit (Any **Two Units** as per CPHEEO manual).

AND

C) Brief Report on visit to water and waste water treatment plant.

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BE - CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week	
Total Credit : 3	Lecture (L): 3 Hrs	Tutorial/Activity (T/A): NA
Subject Code	BECVE404T	TRANSPORTATION ENGINEERING

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 Objectives	
1	The course will provide students knowledge regarding transportation technologies, administrative set-up in India, development plans and vision 2025.
2	To prepare students to design the cross section elements and the pavement using latest IRC Codes.
3	To provide the students the knowledge regarding the traffic characteristics, road safety audit and introduction to ITS.
4	The course will provide students with fundamentals of Railway Engineering and Airport Engineering.

Course Outcomes	
After completion of syllabus, students would be able to	
1	Define and describe different objectives and requirements of Highway Development and Planning, Alignments.
2	Explain, Discriminate and Design various Geometric Features of Highways & Pavement Design
3	Understand, analyze, apply and evaluate the parameters of Traffic Engineering.
4	Explain and describe various terms in railway engineering and should be able to explain, discriminate and design various geometric features of railway track.
5	Understand the aircraft characteristics and terminal area functions, analyze, and evaluate the basic runway length, orientation of runway.

COs to Unit Mapping Matrix

Course Code	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
CO1	X					
CO2		X				
CO3			X			
CO4				X		
CO5					X	
CO6						X

For Entire Course, PO/PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO

PO1	Engineering Knowledge	**PO7**	Environment & Sustainability
PO2	Problem Analysis	**PO8**	Ethics
PO3	Design & Development	**PO9**	Individual & Team Work
PO 4	Investigation	**PO10**	Communication Skills
PO5	Modern Tools	**PO11**	Project Mgt. & Finance
PO6	Engineer & Society	**PO12**	Life Long Learning

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	2	1	2	1	1	1	1	-	-	-	1
2	3	2	2	-	-	2	-	1	-	-	-	1
3	3	3	-	2	1	1	-	1	-	-	-	1
4	3	2	2	-	-	2	-	-	-	-	-	1
5	3	1	2	1	-	2	-	-	-	-	-	1

1 Low **2 Medium** **3 High**

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(CHOICE BASED CREDIT SYSTEM)

BECVE404T – TRANSPORTATION ENGINEERING

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT NO.1			
Introduction Transportation Technologies, Components of Transportation Systems, Transportation Coordination, Transportation Administrative Set-up in India.	2		1
Highway development: Rural Road Development Plan and Vision 2025, Highway Organizations (MoRTH, IRC, CRRI, NHAI, NRRDA, CIRT)	3		
Highway Alignment: Ideal Alignment, Factors controlling alignment, Fact finding survey, Engineering survey for highway location.	3		
UNIT NO.2			
Highway Geometric Design: Cross-Sectionelements (Boundary lines, right-of way, carriageway width, Shoulder, Camber), surface characteristics,Sight distance Considerations (SSD, OSD,ISD), Design of horizontal Curves including transition, extra widening, Design of vertical curves.	5		2
Pavement Design: Types of Pavements and their comparison, Factors affecting design, Design of Flexible pavement using latest IRC code. Stresses in rigid pavement, joints, Pavement Distresses and remedies	3		

UNIT NO.3			
Traffic Engineering: Traffic characteristics (Road User and Vehicular), Traffic Studies (Speed Volume, O&D, Parking), Traffic Control Devices (Sign, Marking, Signal), Types of Intersections, Parking facilities, Road safety situation in India, Causes of road accidents, Safety of Vulnerable Road users, Introduction to road safety audit Introduction to ITS.	8		3

UNIT NO.4			
Railway Engineering: Permanent Way, ideal permanent way, Gauges in railway tracks,function of rial, sleeper ballast. Traction and resistances.Cant , negative cant & cant deficiency, Types of turnouts & functions of its components	8		4

UNIT NO.5			
Airport Engineering: Aircraft Characteristics, Airport site selection, Runway Orientation, Basic Runway length and corrections, Terminal Area and facilities. Aircraft parking, configuration and system, Aprons, Hangers, Gate in airport[8]	8		5

References

Name of Book	Name of Author	Name of Publisher	Edition
Highway Engineering	Khanna, S.K., Justo, C.E.G and Veeraragavan, A	Nem Chand & Bros	10th (2017)
Traffic Engineering and Transport Planning	Kadiyalai, L.R	Khanna Publishers	
Principles of Transportation Engineering	Partha Chakraborty and Animesh Das	PHI Learning	
Textbook of Highway Engineering	Srinivasa Kumar	Universities Press	2011
Highway Engineering	Paul H. Wright and Karen K. Dixon	Wiley Student Edition	7th (2009)
'Principles of Highway Engineering and Traffic Analysis	Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski	John Wiley 3, IRC Codes	4th

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BE - CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week	
Total Credit : 1	Practical (P): 2 Hrs.	
Subject Code	BECVE404P	TRANSPORTATION ENGINEERING

Examination Scheme - Practical			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

Course Outcomes:

On successful completion of the course students will be able to;

1. Determine the various properties of aggregates
2. Determine the various properties of bitumen
3. Determine the various properties of soil subgrade

List of Experiments: (Part A, B, C and D)

A. Test on Soil

1. CBR Test
2. AASHO Classification
3. Test on Stabilized soil

B. Test on Aggregate

1. Specific Gravity & Water Absorption
2. Crushing Value test on Aggregate
3. Abrasion Value test on Aggregate
4. Impact Value test on Aggregate

C. Test on Bitumen

1. Penetration Test
2. Softening Point Test
3. Ductility Test
4. Specific gravity of bitumen

D. Study experiments

1. Bituminous Mix Design
2. Road Construction Machineries
3. Road Safety Audit

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FACULTY OF SCIENCE & TECHNOLOGY

BE CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem:IV (4^{th})	Total Hours Distribution per week		
Total Credit:3	Lecture (L): 3Hrs	Tutorial/Activity(T/A):NA	Practical (P): 4Hrs.
Subject Code	BECVE405T	SURVEYING AND GEOMATICS	

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 Objectives	
1	To make the students aware of various surveying instruments, operating principles and theirsuitability
2	To develop skills of handling instruments, taking measurements and Performcalculations based on theobservation
3	Identification of source of errors and rectifythem.
4	To prepare the students to plot and also read the variousmaps.
5	To make the students aware of various surveying instruments, operating principles and theirsuitability

Course Outcomes	
After completion of syllabus, students would be able to	
1	Measure length and bearing of lines using various instruments and calculate area of given field.
2	Use the theodolite to measure angle and distances for traversing also identify and correct the errors in traverse. Design and lay-out the various types of curves.
3	To carry out levelling and contouring also able to determine volume of earthwork.
4	Use modern instrument like Total work station , GPS, DGPS for surveying and able to prepare maps in CAD
5	Use Remote Sensing and Geographical Information System(GIS), UAV Drone and LiDAR Survey.

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	2	2	1	1	1	1	2	3	1	1	1
CO2	3	2	3	1	2	1	1	2	3	1	2	1
CO3	3	3	3	1	2	1	1	2	3	2	1	1
CO4	3	3	3	2	3	1	1	2	3	2	2	2
CO5	3	3	3	2	3	1	2	2	3	2	2	2

1 Low **2Medium** **3 High**

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE & TECHNOLOGY

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BECVE405T- SURVEYING AND GEOMATICS

SYLLABUS

Details of Topic	Allotment of Hours		Mapped with CO Number
	L	T/A	CO
UNIT NO.1 (LINEAR AND ANGULAR MEASUREMENT)			
Principal of Surveying, Classification,	01		01
measurement of distance using tape, EDM (Distomat), error and correction in length	02		01
Measurement of area by tape and cross-staff and plane table surveying	02		01
Compass Surveying-Prismatic Compass & Surveyor compass,Bearings,Localattraction,Fieldwork&Plotting	03		01
UNIT NO.2 (THEODOLITE TRAVERSING AND CURVES)			
Uses of theodolite, measurement of horizontal and vertical angle.	2		2
measurement of horizontal and vertical distances(stadia methods)	2		2
errors and corrections in traverse	2		2
Introduction to simple circular curves, Transition curves, vertical curves and Reverse Curve	2		2
UNIT NO.3 (LEVELING AND CONTOURING)			
Levelling , types of levelling, Auto level, temporary adjustments,	1		3
calculation of Reduced level by rise and fall & H.I. method	2		3
correction for curvature and refraction , visible horizon distance,	1		3
Contours: Definition, characteristics, uses, locating and plotting of contour map.	2		3
Computation of area and volume: Trapezoidal and Simpsons Rule	2		3

UNIT NO.4(MODERN SURVEYING)			
Total station-advantages and Applications.	1		4
Field Procedure for total station survey,	1		4
Errors in Total Station Survey and preparation of Contours and site plan in CAD	2		4
Introduction to GPS and DGPS (Differential Global Positioning System) Principle and Applications for Static and Real Time Kinematic (RTK)Survey	4		4
UNIT NO.5 (REMOTE SENSING AND GIS)			
Introduction to Remote Sensing and Geographical Information System (GIS) and itsapplications	4		5
Introduction to UAV Drone and LiDARSurvey and applications.	4		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	SurveyingandLevelling	KanetkarandKulkarni	Vidhatigrihan Prakashan	2008			
I,II,III,IV	Surveying (Vol-I)	Dr. B.C. Punmia, A.K.Jain	Laxmi Publications (P)Ltd.	2016	Y		
III	Surveying (Vol-II)	Dr. B.C. Punmia, A.K.Jain	Laxmi Publications (P)Ltd.	2016	Y		
I,II,III,IV	Surveying and Levelling	N.N.Basak	Tata McGraw-Hill education (P) Ltd	2001	Y		
IV,V	Advance Surveying, Total Station, GIS and Remote Sensing	SatheeshGopi &R.Sathikumar& N.Madhu	Pearson Education	2008	Y		

1. A. ... HINGAREY
2. (Rohit S. Mane)
3. (Dr. A. M. Pande)
4. A. M. Shende
5. Tushar G. Shende
6. (Dr. A. N. Rashade)
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NAGPUR FACULTY OF SCIENCE & TECHNOLOGY
BE - CIVIL ENGINEERING
(CHOICE BASED CREDIT SYSTEM)

Sem: IV (4th)	Total Hours Distribution per week		
Total Credit : 1	Practical (P): 2 Hrs.		
Subject Code	BECVE405P	SURVEYING AND GEOMATICS	
Examination Scheme - Practical			
Internal Marks:	University Marks:	MinimumPassing Marks:	Examination Duration:
25 Marks	25 Marks	25 Marks	--

List of Experiments

A. Any 15

1. Determination of area of given polygon by tape and cross staffsurvey.
2. Measurement of area of plot by plane table surveying.
3. DeterminationofelevationofvariouspointswithAuto level.
4. Levelling – Longitudinal and cross-section andplotting
5. Measurement of Horizontalangle by usingtheodolite
6. Measurement of vertical angle and Trigonometric leveling usingtheodolite
7. Determination of Tacheometric constants.
8. Determination of elevation of points, horizontal distance and gradient by Tacheometricsurvey
9. Setting out of simple circular curve by offsets from chord producedmethod
10. Setting out of simple circular curve by Rankine method of tangentialangle
11. Determination of height, remote elevation, distance between 2-3 points using totalstation
12. Determination of Area using totalstation.
13. Determination of Area using DGPS.
14. CONTOUR MAP: contouring using DGPS.
15. Toposheet: Understanding and identification of different features ofdrawing.
16. Lay-out marking of building plan
17. Study of EDM,GPS,Digital Planimeter.

B. Four days Survey Camp on any ONE using advanced survey instruments

1. Contouring
2. RoadSurvey
3. Lay outing , Location of Boundary and areacalculation

1. A M SHINGAREY
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2. (Rohit S. Mane)

3. (Dr. A. M. Pande)

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BE CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

Sem:IV (4th)	Total Hours Distribution per week		
Total Credit:1	Lecture (L): 2Hrs	Tutorial/Activity(T/A):NA	Practical (P): 2Hrs.
Subject Code	BECVE406P	MINI PROJECT	

Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
25 Marks	25 Marks	25Marks	--

Course Objectives	
1	To achieve and promote skill development and technology transfer.

List of Course Outcome	
1	After completion of syllabus student able to propose research/ basic concepts question and present them in a clear and distinct manner through different oral, written, analysis and design techniques.

Marks distribution of Internal Marks

Sr. No.	Name of activity	Expected work	Allotted marks(maximum)
1	Seminar-1	Title Finalization & Approval of topic	10 marks
2	Students Diary	Detailed report of student interaction with guide weekly and duly signed and evaluated by concern guide/co-guide	5 marks
3	Seminar-2	Pre submission of Mini project	10 marks
Total			25 marks

For seminar conduction kindly refer point no.6 of below guidelines

Marks distribution of External Marks

Sr. No.	Name of activity	Expected work	Allotted marks(maximum)
1	Presentation	Student wise presentation on the basis of submitted reports	10 marks
2	Viva Voce	Student wise at the time of presentation or after completion of presentation.	15 marks
Total			25 marks

For seminar conduction kindly refer point no.7of below guidelines

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BE CIVIL ENGINEERING
(CHOICE BASED CREDIT SYSTEM)
BECVE406P- MINI PROJECT
SYLLABUS

Project allotment and identification should be done at the end of 3rd semester. Following guidelines may be used for the mini project allotment and evaluation.

Guidelines:

The knowledge and concepts related to Engineering acquired by the students in four years of the course has to be implemented in the form of some practical work. Hence in the second year of the course every student has to do a mini project work by applying the acquired concepts and knowledge. Therefore at the entry of fourth semester, student initiates mini project work with a defined group. Industry oriented projects should be preferred.

1. The institute will care the research and topic interest of each student and it offers flexibility to the student for formation of groups according to their choice of particular interest. However it is advised them to follow limitation of group members (four to five students per group). The list of guides along with their specialization should be provided at the end of third semester. Every teacher can be guide and co-guide. Institute can take Industry person /Government Organization member such as PWD, Irrigation department's person as a Co –guide.
2. The group of students will approach to the guide for the consent and submit the application to the project coordinator of the department at the end of third semester.

OR

The group of students will submit the application to the department at the end of third semester with preferences of Guides as per their specialization and previous semester's university scored marks.

3. Project Coordinator should prepare the merit list of the project groups as per the policy of the Institute.
4. In the due course of time students will carry out literature review about their area of interest and identify the scope of work by deciding the topic in consultation with guide. The mini projects should be industry oriented, application, product, research, review etc. title of mini project should be basis on feasibility study of the project
5. The project may have analytical approach in respective discipline area or interdisciplinary domain.
6. Progress seminars are conducted, wherein the students will present their progress of the work before the project review committee. The committee will evaluate their work with respect to the following rubrics:

A. Understanding the background and topic/Content of the progress report or seminar
B. Knowledge about existing system/Literature Review

C. Technical design and findings of the system/technical content
D. Presentation skills
E. Viva voce (Individual/group)

7. Contents of Presentation/reports at the time of external examinations (may be used for Internal Examinations also) will as below:
   A. Index
   B. Introduction
   C. Literature review
   D. Objective
   E. Working model/analysis/design details
   F. Conclusion
   G. References

The parameters mentioned above are for general guidelines; however they may vary from department to department. The departments should ensure that the evaluation is done at individual and group levels.

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