

Hindi Seva Mandal's,
Shri Sant Gadge Baba
College of Engineering & Technology,

Near Z.T.C., Bhusawal. Dist. - Jalgaon (Maharashtra) Pin - 425203.

**An Autonomous Institute with Accreditation by
NAAC with A+ Grade**

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere.)

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Bachelor of Technology (B Tech)
In
Second Year Civil Engineering

Programme Curriculum

With Effect from the Academic Year 2026-2027

**4-year, 8 Semester Full time Programme Choice Based Credit System (CBCS) and
Grading System Outcome Based Education Pattern Aligned with National
Education Policy (NEP) 2020**

Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal
Department of Civil Engineering
Second Year Structure 26-27 as per NEP 2020

Semester III											
Course Category	Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. Of Credits
				L	T	P	CA	MSE	ESE	Total	
PCC	Programme Core Course	BTCE25PC301	Engineering Mathematics – III	3	0	0	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC302	Strength of Material	3	0	0	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC303	Surveying	2	0	0	20	20	60	100	2
MDM	Multidisciplinary Minor Bucket	BTCE25MD304	MDM-I A. 3D Printing In Construction B. Smart Cities & IOT In Civil Engineering.	3	0	0	20	20	60	100	3
OE	Open Elective Bucket	BTCE25OE305	OPEN ELECTIVE - I A. Building Construction B. Engineering Economics & Finance	3	0	0	20	20	60	100	3
PCC	Programme Core Course Lab	BTCE25PC306L	Strength of Material Lab	0	0	2	50	-	50	100	1
PCC	Programme Core Course Lab	BTCE25PC307L	Surveying lab	0	0	2	50	-	50	100	1
OE	Open Elective	BTCE25OE308L	OPEN ELECTIVE - I Lab	0	0	2	50	-	50	100	1
HSSM	Entrepreneurship	BTCE25HM309	Case Study/EDP Programme/ Start Up Activity	0	0	4	50	-		50	2
HSSM	Humanities Social Science and Management	BTCE25HM310	Basics of Human Rights	1	0	0	50	-		50	1
VEC	Value Education Course	BTCE25VEC311	Indian Constitution- Value Education	1	0	0	50	-		50	1
CEP	Community Engg.Project	BTCE25CEP312	Field Visit/Special Study/ Internship/ Social Activity Project/ Community Initiative	-	-	4	50	-	0	50	2
	Total			16	0	14	450	100	450	1000	23

Second Year Structure 26-27 as per NEP 2020

Semester IV											
Course Category	Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. Of Credits
				L	T	P	CA	MSE	ESE	Total	
PCC	Programme Core Course	BTCE25PC401	Building Planning & Drawing	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC402	Concrete Technology	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC403	Structural Mechanics -I	2	-	-	20	20	60	100	2
MDM	Multidisciplinary Minor Bucket	BTCE25MD404	MDM-II A. Transportation Engineering & Traffic Simulation B. MOOC / SWAYAM / NPTL	3	-	-	20	20	60	100	3
OD	Open Elective Bucket	BTCE25OE405	OPEN ELECTIVE - II A. Hydraulics Engineering B. Legal Aspect in Civil Engineering Contracts	2	-	-	20	20	60	100	2
(AEC)	Programme Core Course Lab. (AEC)	BTCE25AE406	Building Planning & Drawing Lab	-	-	2	50	-	50	100	1
(AEC)	Programme Core Course Lab (AEC)	BTCE25AE407	Concrete technology Lab	-	-	2	50	-	50	100	1
(VSEC)	Open Elective Course Lab (VSEC)	BTCE25AE408	OPEN ELECTIVE - II Lab.	-	-	2	50	-	50	100	1
(VSEC)	Vocational & Skill Enhancement Course	BTCE25VSE409	Workshop/Skill Activity/Course/Seminar	-	-	2	50	-	-	50	1
VEC	Value Education Course	BTCE25VEC410	Universal Human Values-II	3	-	0	50	-	-	50	3
EN	Entrepreneurship	BTCSE25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	-	-	4	50	-	-	50	2
VEC	Value Education Course	BTCE25VEC412	Life of Shri Sant Gadge Baba	1	-	0	0	-	-	0	AU
VEC	Value Education Course	BTCE25VEC413	Moral and Ethical Development	1	-	0	50	-	-	50	1
	Total			18	-	12	450	100	450	1000	23

HONORS- CIVIL ENGINEERING

Sr. No.	Course Offered	Teaching Scheme (Hrs)				Credits
		L	T	P	Total	
1	Advance RCC Design	03	-	-	03	03
2	Application of Drone Technology for civil engineering	03	-	-	03	03
3	Introduction to Earthquake Engineering	03	-	-	03	03
4	Tunneling and Underground Excavation	03	-	-	03	03
5	Air Pollution Controal	03	-	-	03	03
6	Rock Machanics	03	-	-	03	03

RESEARCH - CIVIL ENGINEERING

Sr.No.	Course Offered	Teaching Scheme (Hrs)				Credits
		L	T	P	Total	
1	Problem Identification and Definition	03	01	00	04	04
2	Experimental Work / Analytical Tools and Prototype Development	03	01	00	04	04
3	Literature Review	03	01	00	04	04
4	Publication	03	01	00	04	04
5	Data Analysis	03	01	00	04	04

SEMESTER - III

Hindi SevaMandal's (Estd. 1950) Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal – 425203. Dist. – Jalgaon (M. S.)					
SEMESTER- III					
Course Category : PCC				Course Code:BTCE25PC301	
Course Title : Engineering Mathematics - III					
Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03
03	--	20	20	60	
• Course Objectives:					
1.	Develop fundamental understanding of linear and partial differential equations used in engineering				
2.	Introduce methods for solving partial differential equations				
3.	Build statistical knowledge for analyzing and interpreting data				
4.	Provide a foundation in probability theory and its important distributions for modeling real-life uncertain events				
5.	Familiarize students with sampling techniques and hypothesis testing for decision-making and quality control applications.				
• Course Outcomes:Students will be able to					
CO1:	To solve linear differential equations of higher order with constant coefficients.				
CO2:	To solve partial differential equations and analyze physical problems like heat flow and wave motion.				
CO3:	To use statistical measures to analyze and interpret data.				
CO4:	To apply probability distributions to model random phenomena.				
CO5:	To perform sampling and hypothesis testing for decision-making and quality control.				

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	-	-	-	-	-	-	-	-	-	1
CO2	2	-	-	-	1	-	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	-	1
CO4	2	-	-	-	1	-	-	-	-	-	-
CO5	2	1	-	-	-	-	-	-	-	-	1

SYLLABUS		
Unit I:	Linear Differential Equations	[08 Hours]
	Linear Differential equation of order n, Solution of LDE with constant coefficient, method of variation of parameters, equations reducible to linear form with constant coefficients, Cauchy's linear equation, Legendre's linear equation.	
Unit II:	Partial Differential Equation	[08 Hours]
	A. Simultaneous linear differential equations of the forms: (i) $f_1(D)x + \Phi_1(D)y = \psi_1(t)$, $f_2(D)x + \Phi_2(D)y = \psi_2(t)$, where $D = \frac{d}{dt}$ (ii) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{r}$ (Symmetrical form) B. Differential equation of 1st order, and higher degree (Clairaut's form) C. Applications of Partial Differential equations to: (i) Vibration of strings or wave equations: $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$ (ii) One dimensional heat flow equation: $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ (iii) Laplace equation: Two dimensional heat flow equation. $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, by separating variables only.	
Unit III:	Statistics	[08 Hours]
	Mean, Mode, Median standard deviation, Variance, co-efficient of variation, Moments, Skewness and kurtosis, Bivariate distribution,	
Unit IV:	Probability	[06 Hours]
	Theorems on Probability, Binomial Distribution, Poisson distribution, Normal distribution, Beta distribution, Gamma distribution,	
Unit V:	Theory of Sampling	[06 Hours]
	Sampling, Types of sampling, Sampling distribution, Testing Hypothesis, Null Hypothesis level of Significance, Test of significance, Test of Significance of large sample. Decision quality control.	

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal 44th Edition (2024).
2. Higher Engineering Mathematics, H. K. Dass & Rajnish Verma, 2025 Revised Edition.
3. Higher Engineering Mathematics, B. V. Ramana 2nd Edition (2026) – Recently refreshed by McGraw Hill

Reference Books:

1. Advanced Engineering Mathematics, Wylie C.R. & Barrett 6th Edition (1995/2019 Reprint)
2. Engineering Mathematics, B.V. Ramana 2025/2026 Edition – Integrated with McGraw Hill.
3. Applied Mathematics (Vol I & II), P.N. & J.N. Wartikar 2023 Revised Reprints – Pune Vidyarthi Griha Prakashan.
4. Adv. Engineering Mathematics with MATLAB, Thomas L. Harman 2nd Edition (2003/2022 Reprint) – MATLAB versions in 2022.
5. Engineering Mathematics III, Gokhale, Chaudhari & Singh 2024 Revised Edition – Published by Niral Prakashan.

Course Category : PCC				Course Code::BTCE25PC302		
Course Title : Strength of Materials						
Teaching scheme		Examination scheme			Credit	
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03	
3	0	20	20	60		

• **Course Objectives:**

1. To understand concept of various types of stresses and strains.
2. To study concept of stresses in beam.
3. To understand the theory of failure in beams.
4. To study Axial force, Shear force & Bending moment for determinate beams.
5. To familiarize students with the behavior of columns and strut.

• **Course Outcomes:**

CO1: Perform the stress-strain Analysis.

CO2: Determine stresses in beam, and distribution of stress for various cross sections.

CO3: Understand concept of Principal stresses and strains, and perform failure Analysis.

CO4: Draw force, and bending moment distribution diagrams for determinate beams.

CO5: Analysis columns, and yield stresses in thin-walled members.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	-	-	1	3	3	-	-
CO2	2	2	2	-	-	-	-	1	3	-	1
CO3	-	-	1	-	1	1	-	1	3	-	3
CO4	2	2	3	-	1	-	-	-	3	-	2
CO5	3	3	1	2	-	2	2	1	3	-	1

SYLLABUS		
Unit I:	Simple Stresses and Strains	[08Hours]
	Properties of Materials, Analysis of internal forces, Simple stresses and strains, stress Mechanical strain curve, Hooke's law, Modulus of elasticity, Shearing, Thermal stress, stress, Poisson's ratio, Volumetric stress, Bulk Modulus, Shear Modulus, relationship between elastic constants. Principal Stresses and Strains, Simple shear, general state of stress, Principal Stresses and Principal planes, Principal Strains, Shear strains.	
Unit II:	Stresses in Beams, and Direct and Bending stresses	[06 Hours]
	Simple Bending: assumptions and derivation of flexural formula, Economic sections, Analysis of flexural action, Moment of resistance, Section modulus. Shearing stress: Derivation of formula, Shear stress distribution for various cross sections, Concept of shear flow, Shear lag and Shear center. Concept of Direct and Bending stresses.	
Unit III:	Combined Stresses and Strains, Theories of failure	[06 Hours]
	Combined Stresses and Strains: Principal Stresses and Strains, Application of Mohr's circle. Theories of Failure: Maximum Principal Stress theory, Maximum Principal strain theory, Maximum Strain energy theory, Maximum Shear stress theory, Maximum Shear strain theory.	
Unit IV:	Shear Force and Bending Moment Diagram	[08 Hours]
	Axial force, Shear force and Bending moment in beams: Concept of unbalanced forces and Moments at a transverse section, Axial forces, Shear forces and Bending moment diagram, relations among load Shear and Moment, introduction to moving loads.	
Unit V:	Columns & Struts, and Thin-Walled Structures	[08 Hours]
	Columns and Struts: Concept of short and long columns, formulae by Euler, Euler's Crippling load for different end conditions, limitations of Euler's formula, Equivalent length, Rankine's formula and its Applications, Concept of Thin cylinders and spheres & its application.	

Text Books:

- 1 Sadhu Singh, 2024, "Strength of Materials", Khanna Publishers, N. Dehli
- 2 Junnarkar S.B., 2023, "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,
- 3 Khurmi R.S., 2022, "Strength of Material", S. Chand and Co., New Delhi
- 4 Singer F.L. and Pytle, 2018, "Strength of Materials", Harper Collins Publishers, 4th Edition
- 5 Prasad I.B, 1988, "A text book of Strength of Materials", Khanna Publishers, N. Dehli
- 6 Timoshenko S.P. and Young D.H., 2002, "Elements of Strength of Materials", East West Press
- 7 Ramamrutham S., and R. Narayanan 2020, "Theory of Structures", Dhanpat Rai and Sons

Reference Books:

- 1 Beer F P., Jhonston E. R., John. T. D E wolf, (2018) “Mechanics of Materials” TMH
- 2 Popov E.P.,(2020), “Introduction to Mechanics of Solids”, Prentice-Hall, Second Edition 2020.
- 3 Nash W., (2005) “Strength of Materials Schaum’s outline series”, McGraw Hill, fourth edition
- 4 Punmia B. C., (2018), “Mechanics of Materials”Laxmi Publications, revised edition, (2016).
- 5 Subramanian R., (2016), “Strength of Materials” Oxford University Press, 2nd edition

Course Category : PCC			Course Code::BTCE25PC303		
Course Title : Surveying					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	02
02	--	20	20	60	

• **Course Objectives:**

1. To introduce the fundamental principles and methods of surveying.
2. To develop competency in measuring horizontal and vertical angles.
3. To enable students to carry out levelling operations and contour mapping.
4. To train students in the application of Theodolite for traversing and angular measurements.
5. To familiarize students with surveying techniques used in engineering projects.

• **Course Outcomes:**

- CO1:** Demonstrate various methods of linear and angular measurements.
- CO2:** Analyze surveying data of different types.
- CO3:** Conduct field work and application of scientific methodology in handling field data.
- CO4:** Apply various surveying techniques for Civil engineering problems.
- CO5:** To prepare a map or plan to represent an area on a horizontal plan.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	-	-	-	3	-	-	-
CO2	2	3	2	-	-	-	-	1	3	-	1
CO3	-	-	-	-	-	1	-	1	1	-	-
CO4	2	2	3	-	1	-	-	-	-	-	2
CO5	3	3	1	2	-	2	-	1	-	-	-

SYLLABUS		
Unit I:	Linear Measurements	[06 Hours]
	Definition, principles of surveying, classification, fields and office work, Scales. Surveying instruments. Ranging and chaining, offsetting, errors in chain and tapes, corrections- length, slope, temperature, pull sag reciprocal ranging, setting perpendiculars, well-conditioned triangles, traversing, plotting, enlarging and reducing figures.	
Unit II:	Angular Measurements and Plane Table Survey	[04 Hours]
	Prismatic compass, surveyor's compass, bearing systems and conversions, local attraction, magnetic declination, dip, traversing, adjustment of errors, Plane table instruments and accessories, merits and demerits, methods: radiation, intersection, resection, traversing.	
Unit III:	Levelling and Contouring	[06 Hours]
	Level line - Horizontal line, Bench marks, Temporary and permanent adjustments, Fly and Check leveling, Booking, reduction, Curvature, Refraction – reciprocal levelling- Longitudinal and cross sections -plotting, Contouring - Methods - Characteristics and uses of contours - Plotting -Earth work volume - Capacity of reservoirs. Planimeter-Types, Theory, concept of zero circle, Study of DigitalPlanimeter, Computation of Areas and Volumes.	
Unit IV:	Theodolite Traversing	[04 Hours]
	Theodolite - Vernier and micro-optic - Description and uses - temporary and permanent adjustments of vernier transit–Angles: Horizontal - Vertical - Heights and Distances - Traversing - Closing error and distribution - Gales's table -Omitted measurements.	
Unit V:	Engineering Survey	[04 Hours]
	Reconnaissance, Preliminary and location surveys for engineering projects, Layout, Setting out works, Route Surveys for highways, railways and waterways, Mine Surveying - Instruments – Tunnels: correlation of underground and surface surveys, shafts.	

Text Books:

1. Kanetkar T.P. and Kulkarni S. V., "Surveying and Leveling", Vols. I, II and III, Vidyarthi Gruh Prakashan, Pune
2. Punmia B.C., "Surveying", Vols. I, II and III, Laxmi Publications.
3. Surveying & Levelling- R.Subramanian- Oxford Publication.

Reference Books:

1. Clark D., "Plane and Geodetic Surveying", Vol. I & II, C.B.S. Pub. and Distri., N. Delhi,
2. Anderson J. M. and Mikhail E. M., "Introduction to Surveying", McGraw Hill Book
3. Bannister A. and Raymond S., "Surveying", ELBS, Sixth Edition, 2023
4. Kahmen Heribert and Faig Wolfgang, "Surveying", Walter de Gruyter, 2021

MDM – I BUCKET SEM - III

Course Category :MDM			Course Code: BTCE25MD304 A		
Course Title : 3D Printing In Construction					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03
03	--	20	20	60	

- Course Objectives:**

1. Provide a historical and technical foundation.
2. Explain the specialized material science.
3. Introduce computational workflows.
4. Address structural challenge.
5. Prepare students for site-specific logistics.

- Course Outcomes:**

CO1: Analyze different printing systems (Gantry vs. Robotic Arm)

CO2: Formulate and test printable concrete mixtures.

CO3: Develop complex, topologically optimized geometries using parametric design tools and successfully convert 3D models into executable G-code for robotic systems.

CO4: Identify and mitigate anisotropy in printed elements, and design appropriate reinforcement strategies (such as post-tensioning or automated mesh feeding).

CO5: Design a site logistics plan that accounts for weather protection.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	-	-	-	-	-	-	-	1
CO2	1	-	-	-	-	-	-	-	-	-	1
CO3	1	-	-	-	-	-	-	-	-	-	1
CO4	1	-	-	-	-	-	-	-	-	-	1
CO5	1	-	-	-	-	-	-	2	-	-	1

SYLLABUS		
Unit I:	Fundamentals of Construction 3D Printing	[08 Hours]
	History & Evolution: From rapid prototyping to full-scale habitable structures, Methods of Printing: Gantry Systems: Fixed-frame systems for on-site printing, Robotic Arms: 6-axis flexibility and modularity, Advantages vs. Constraints: Waste reduction, labor safety, and design freedom vs. high initial costs and regulatory hurdles, Case Studies: Analysis of iconic projects like the Dubai 3D-printed office and European housing developments.	
Unit II:	Materials Science & Rheology	[06 Hours]
	Printable Cementitious Mixtures: Mix design, binders, and aggregates, Rheology of Concrete: * Extrudability: Ability to pass through the nozzle without clogging, Buildability: Ability of the lower layers to support the weight of subsequent layers, Admixtures: Accelerators, retarders, and superplasticizers, Alternative Materials: Earth-based printing (cob/clay), geopolymers, and recycled plastic composites.	
Unit III:	Computational Design & BIM Integration	[08 Hours]
	Parametric Design: Using tools like Grasshopper (Rhino) to create complex, optimized geometries, BIM (Building Information Modeling): Integrating 3D print paths into the digital twin of a building, Slicing & Path Planning: Converting a 3D model into G-code, Topology Optimization: Reducing material use by placing it only where structural stress requires it.	
Unit IV:	Structural Integrity & Reinforcement	[06 Hours]
	Anisotropy: Understanding that printed objects are weaker at the "seams" (interlayer bonding), Reinforcement Strategies: Manual insertion of rebar, Automated "cable" or wire mesh feeding during the print, Post-tensioning techniques, Testing Standards: Compression, tension, and shear testing of printed samples.	
Unit V:	Project Management & Site Logistics	[06 Hours]
	Preparation: Levelling, power requirements, and weather protection (humidity/temperature control for Site curing), Workflow Integration: Coordinating with plumbers and electricians for "printing-in" utility conduits, Codes & Regulations: Navigating current building codes and the path to certification for 3D-printed structures, Economics: Cost-benefit analysis of 3D printing vs. traditional formwork	

Text Books:

1. 3D Printing and Design by Sabrie Soloman (Khanna Publishing House).
2. 3D Concrete Printing Technology by Jay G. Sanjayan (and others).
3. Concrete Technology: Theory and Practice by M.S. Shetty and A.K. Jain (S. Chand Publishing)
4. BIM and Construction Management by Brad Hardin & Dave McCool (Wiley India Edition)
5. Advanced Concrete Technology by Zongjin Li (Wiley India)

Reference Books:

1. BIM and Construction Management by Hardin & McCool.
2. 3D Concrete Printing Technology by Jay G.Sanjayan.
3. 3D Printing and Design Sabrie Soloman.

Course Category : MDM				Course Code: BTCE25MD304 B		
Course Title : Smart Cities & IOT In Civil Engineering.						
Teaching scheme		Examination scheme			Credit	
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03	
03	--	20	20	60		
• Course Objectives:						
1.	Introduce IoT Fundamentals: Familiarize students with IoT architecture, sensors, and communication protocols tailored for civil infrastructure.					
2.	Infrastructure Monitoring: Enable real-time monitoring of bridges, tunnels, and buildings using smart sensor networks.					
3.	Smart Urban Systems: Develop applications for smart water management, waste management, traffic control, and energy management.					
4	Data Analysis: Teach methods to analyze and visualize data for decision-making in urban planning and maintenance.					
5	Sustainability: Focus on smart construction and green building initiatives					
• Course Outcomes: Students will be able to						
CO1:	Understand IoT architecture and its application in civil engineering.					
CO2:	Select & Deploy appropriate sensors for monitoring structural and environmental parameters.					
CO3:	Develop smart solutions for urban mobility and traffic management.					
CO4:	Analyze data to optimize water distribution and waste management systems.					
CO5:	Implement IoT prototypes for real-time monitoring of civil infrastructure					

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	2	-	1	3	2	-	-
CO2	2	2	-	-	-	-	2	-	3	-	1
CO3	-	-	-	2	1	1	-	1	-	-	3
CO4	-	2	3	-	1	-	-	-	-	-	-
CO5	-	-	1	2	-	2	2	1	3	-	-

SYLLABUS		
Unit I:	Unit I: Introduction to Smart Cities & IoT:	[08 Hours]
	Concepts, features, and need for smart cities in India; introduction to IoT components (sensors, microcontrollers).	
Unit II:	Unit II: IoT in Structural Health Monitoring:	[06 Hours]
	Sensors for crack detection, strain, vibration, and temperature monitoring in bridges, dams, and buildings.	
Unit III:	Unit III: Smart Urban Infrastructure & Utilities:	[08 Hours]
	Intelligent traffic management systems, smart street lighting, smart parking solutions.	
Unit IV:	Unit IV: Smart Water & Waste Management:	[06 Hours]
	IoT-based water quality monitoring, smart metering, and automated garbage collection systems.	
Unit V:	Unit V: Data Management & Analytics:	[06 Hours]
	Using Cloud platforms (e.g., Things peak) for data logging, visualization, and actionable insights	

Reference Books

1. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony M. Townsend.
2. Internet of Things for Architectural Heritage by M.J.M. Martins et al.
3. Smart Cities in India: A Case Study Approach by P.P. Anilkumar.
4. Introduction to IoT by Sudip Misra, Anandarup Mukherjee, Arijit Roy (Cambridge University Press).

Course Category : OE- I			Course Code:: BTCE25OE305A		
Course Title : Building Construction					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03
03	--	20	20	60	

• **Course Objectives:**

1. To study different types of masonry construction.
2. To discuss RCC, Mix design for project.
3. To study vertical and horizontal communication.
4. To understand different types of Roofs and Floors.
5. To study Prefabricated construction, advanced construction techniques and its application.

• **Course Outcomes:**

CO1: To know the masonry construction and its application

CO2: Detailed study of RCC and mix proportion as per required grade knowing.

CO3: A different type of staircase and openings and its application comes to know.

CO4: To enable the students regarding roof material and floor material and its application on site.

CO5: To know prefabricated construction, advanced construction techniques with its advantages

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	3	1	1	-	-	-	-	1	-	1
CO2	-	3	2	1	-	-	-	-	1	-	1
CO3	-	3	1	1	-	-	-	-	1	-	1
CO4	-	3	2	1	-	-	-	-	1	-	1
CO5	-	3	2	1	-	-	-	-	1	-	1

SYLLABUS		
Unit I:	Masonry Construction	[08 Hours]
	Stone masonry: Setting of stone, joints, Random rubble, un-coursed rubble, coursed rubble & ashlar, General principles observed in stone Masonry. Brick masonry: General principles observed in Brick masonry, Bonds – English bond, Flemish Bond Composite Masonry: types, Partition walls in brick, concrete block, timber, glass & aluminum, autoclaved blocks, fly ash bricks. Spanning members in Masonry construction – a) Arch – Types, method of construction b) Lintels – steel, timber, stone, RCC.	
Unit II:	Reinforced Cement Concrete	[06 Hours]
	Concrete & Reinforcement: Ingredients of concrete, mix design, Properties, tests, curing, Mixing, Reinforcement specification etc. Footing Types: Column footing, Isolated and Combined Column Footing, Raft Foundation, Types of Pile foundation – bearing, friction, sheet, anchor, batter, fender, and compaction. Column, Slab & Beam: Construction detail, Reinforcement, Slab (one way & two way), Type of beams – simply supported, continuous, cantilever. Formwork: Definition, Requirements, Materials used, Types and Removal of Formwork	
Unit III:	Circulation	[08 Hours]
	Horizontal Communication: Doors –Components of Doors, Classification, Battened & ledged, Battened, ledged & braced, batten, ledged, braced & framed, framed & paneled, glazed, flush, revolving, sliding, collapsible, rolling. Windows: Component of windows, Types of Windows: fixed, pivoted, double hung, sliding, casement, glazed, louvered, metal, dormer, sky light, ventilators, bay window. Vertical Communication – a) Stair Case, Types – straight, dog legged, open newel, geometrical, Bifurcated, circular b) Construction detail -staircase in Timber, stone, RCC, steel, etc. c) Designing staircase with given area & height. Lift, Elevator and Escalators	
Unit IV:	Roofs & Floors	[06 Hours]
	Roofs –a) Types - Pitched, Flat, lean-to roof, coupled roof, Couple close roof, Collar roof, Scissor roof, Domes, Shells b) components of pitched roof – wall plate, rafter, purlin, batten etc. Trusses – a) Timber – king post truss, queen post truss b) steel trusses (types, joints). Floors – Timber floor, Timber floors supported on rolled steel joist, Flag stone floors resting on steel joists, Jack arch floors, Ribbed floors, pre cast concrete floor. Roof covering – Thatch covering, Shingles, Mangalore Tiles, Asbestos cement sheets, galvanized corrugated iron Sheet, slates...	
Unit V:	Pre-fabricated structures, Building Skin, Low-cost construction	[06 Hours]
	Pre-fabricated structure - Principles- advantages and disadvantages, types of prefabricate, standardization, basic, nominal and actual dimensions, tolerances, joints production, transportation and erection	

	Building Skin – Curtain walls with transoms, mullions and infilling panels of various materials, Suspended Glazing, Composite panel cladding. Low-cost construction techniques – Rat trap bond, compressed stabilized earth blocks, Bamboo Construction, hollow blocks, pre cast wall & roof panels.
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Text Books:

1. Construction Materials, D. N. Ghose Reprint 2023, McGraw Hill.
2. Engineering Materials, S. C. Rangwala 44th Edition (2025), Charotar.
3. Building Construction, S. P. Arora & Bindra 5th Edition (2025), Dhanpat Rai.
4. Building Construction, S. C. Rangwala 35th Edition (2025), Charotar.
5. Building Construction, Sushil Kumar 20th Edition (2026), Standard Publishers.

Reference Books:

1. Building Construction, B. C. Punmia 12th Edition (2025), Laxmi Publications
2. A to Z of Practical Building Construction, Sandeep Mantri 18th Edition (2024), Satya Prakashan
3. Construction Technology (Vol 1-4)*R. Chudley 13th Edition (2024), Routledge (ELBS)
4. Engineering Materials, R. K. Rajput Reprint 2024 S. Chand

Course Category : OE - I			Course Code:: BTCE25MD305B		
Course Title : Engineering Economics & Finance					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	02
02	--	20	20	60	

• **Course Objectives:**

1. To Analyze the Time Value of Money.
2. To Evaluate Equipment Economics.
3. To Master Financial Accounting Principles.
4. To Manage Project Financing.
5. To Assess Global Project Models.

• **Course Outcomes:**

CO1: Adopt as per principles of economics and financing

CO2: Analyze available alternatives and propose best suitable among them

CO3: Apply various models of financial management and accounting

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	2	-	-	-	-	1	1	-	1
CO2	1	-	2	-	-	-	-	1	-	-	1
CO3	1	-	1	-	-	-	-	-	-	-	1

SYLLABUS		
Unit I:	Fundamentals of Engineering Economics	[08 Hours]
	Engineering Economics, Time Value of Money, Cash Flow diagram, Nominal and effective interest – continuous interest, Single Payment Compound Amount Factor, Uniform series of Payments, comparing alternatives, Present worth Analysis, Annual worth Analysis, Future worth Analysis, Rate of Return Analysis, Break Even Analysis, Benefit/Cost Analysis	

Unit II:	Equipment Economics and Financial Accounting	[06 Hours]
	Economics of Project Parameters, Equipment Economics, Operating Costs, Buy, Rent and Lease Options, Replacement Analysis, Cost Estimates, Type of Estimates, Parametric Estimate, Management Accounting, Financial accounting principles, basic concepts, Financial statements, accounting ratios	
Unit III:	Project Financing, Taxation, and Depreciation	[08 Hours]
	Investment Evaluation and Financing Projects, Taxation, Depreciation, switching between different depreciation methods, Inflation, Sources of finance, equity, debit, securities, borrowings, debentures, Working capital requirement, financial institutes	
Unit IV:	Corporate Financial Management and Budgetary Control	[06 Hours]
	Financial Management, Introduction, Charts of Accounts, Balance Sheet, Financial Ratios, Working Capital Management, Budgeting and budgetary control, Performance budgeting. Profit & Loss, statement, Ratio analysis, Appraisal through financial statements, International finance forward	
Unit V:	Project Procurement and International Finance	[06 Hours]
	PPP in Projects Public Private Participation in Projects- PPP Models, BOOT, BOT, Joint Ventures, BOOT, BOT, Annuity, DBFO, External Commercial Borrowings, International Finance, FIDIC.	

Text Books:

1. Patel, B. M., (2000). Project management- strategic Financial Planning, Evaluation and Control, Vikas Publishing House Pvt. Ltd. New Delhi,
2. Shrivastava, U. K., (2000). Construction Planning and Management, Galgotia Publications Pvt. Ltd. New Delhi.
3. Collier C. and Gla Gola C. (1998). Engineering Economics & Cost Analysis, Addison Wesley Education Publishers.

Reference Books:

1. Van Horne, J.C. (1990). Financial Management and Policy, Prentice-Hall of India Ltd.
2. Taylor, G.A. (1968). Managerial and Engineering Economy. East-West Edition.
3. Walker, E.W. (1974). Essentials of Financial Management, Prentice Hall of India Private Limited, New Delhi.

Course Category : PCC	Course Code:BTCE25PC306L
Course Title : Strength of Material Lab	

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

- Course Objectives:**

1. To understand the fundamental behaviour of materials under tensile loading.
2. To understand the behaviour of mild steel under compressive loading.
3. To understand the behaviour of materials under shear loading.
4. To understand the behaviour of materials under bending (flexural loading).
5. To understand the behaviour of materials under sudden (impact) loading.

- Course Outcomes:**

At the end of this course, students will be able to:

CO1: Students will be able to perform a tensile test using a Universal Testing Machine (UTM).

CO2: Students will be able to determine compressive strength and deformation characteristics of mild steel.

CO3: Students will be able to understand and analyse shear stress–strain behaviour of materials..

CO4: Students will be able to perform flexure (bending) tests on beam specimens.

CO5: Students will be able to perform impact tests (Charpy/Izod) using standard impact testing machines.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	1	-	-	3	3	-	2
CO2	3	3	-	-	1	-	-	1	3	-	3
CO3	3	3	-	-	1	-	-	1	3	-	3
CO4	2	2	-	-	1	-	-	-	3	-	3
CO5	3	3	1	-	2	-	2	1	3	-	2

SYLLABUS

List of Practical's to be performed

1. Tension Test on ferrous and non-ferrous alloys (Mild steel).
2. Compression Test on mild steel.
3. Shear Test on Mild steel (single shear tests).
4. Flexure Test on timber and cast iron beams.
5. Graphical solution Method for principal stress problems.
6. Impact Test on mild steel, brass, and cast iron specimens.

Course Category : PCC	Course Code: BTCE25PC307L
Course Title : Surveying Lab.	

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

• **Course Objectives:**

1. Use the Dumpy level, Theodolite along with chain/tape, compass on the field.
2. Use of Total station and Digital Planimeter
3. Use of plane table survey
4. Apply field procedures in basic types of surveys, as part of a surveying team.
5. Employ drawing techniques in the development of a map.

• **Course Outcomes:** After completion of the course students will able to

CO1: Understand Use the Dumpy level Theodolite on the field.

CO2: Understand Total station and Digital Planimeter

CO3: Undersrtand various plane table surveys in the field.

CO4: Know the field procedures in surveys.

CO5: Know the drawing techniques in the development of a map

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	3	2	-	2	-	-	-	1	-	3
CO2	2	3	2	-	2	-	-	-	1	-	3
CO3	1	3	3	-	2	-	-	-	1	-	-
C04	2	3	2	-	2	-	-	-	1	-	-
C05	2	3	1	-	2	-	-	-	3	-	-

SYLLABUS	
1.	Study and use of dumpy level, auto level etc.& Determine elevation of various points by Dumpy level.
2.	Study of Reciprocal levelling.
3.	Study of Theodolite.
4.	Measurement of Horizontal angle by various methods by use of Theodolite.
5.	Measurement of Vertical angle by use of Theodolite.
6.	Methods of plane table survey.
7.	Study and use of Total Station.
8.	Use of Digital Planimeter, and use of Digital Planimeter for measurement of areas.
9.	Study and use of Minor instruments.

Course Category : OE - I	Course Code:BTCE25OE308L
Course Title : Building Construction Lab	

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

• **Course Objectives:**

1. To study lines, symbols for the preparation for detailed drawing.
2. To study different types of foundation for construction work.
3. To understand brick and stone masonry for construction work.
4. To know different types of door and window and their components.
5. To learn different types of trusses and staircase.

• **Course Outcomes:**

At the end of this course, students will be able to:

- CO1:** Assemble, build and test components like English Bond and Flemish Bond brick walls, as well as simple stone masonry.
- CO2:** Identify and construct various building elements, including doors, windows.
- CO3:** Implement safe practices during construction activities, sketches, and detailed drawing books.
- CO4:** Understand the functionality of sub-structures (foundations) and superstructures (columns, beams, roofs).
- CO5:** Develop practical skills to mark layout plans for framed structures, including setting out building foundations .

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	3	2	-	-	-	-	-	1	-	-
CO2	-	3	3	-	-	-	-	-	1	-	-
CO3	-	3	1	-	-	-	-	-	1	-	-
CO4	-	3	1	-	-	-	-	-	1	-	1
CO5	-	3	-	-	-	-	-	-	1	-	1

SYLLABUS

List of Practical to be performed (Sketch Book consisting of free hand proportional scale sketches for items to be drawn on drawing sheets as mentioned below.)	
1.	Lettering, Symbols, Types of lines and dimensioning as per IS 962.
2.	Foundations: - Isolated, Combined Footings, Under Reamed Piles, Rafts.
3.	Types of Stone Masonry: Elevation and Sectional Drawings.
4.	Types of Brick masonry: Elevation and Sectional Drawings.
5.	Types of Doors: Elevation and Sectional Drawings.
6.	Types of Windows: Elevation and Sectional Drawings, Standard Aluminum Sections.
7.	Types of Stairs: Plan and Sectional Drawings.
8.	Types of trusses

Course Category : OE - I	Course Code:BTCE25OE308L
Course Title : Engineering Economics and Finance	

Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

- Course Objectives:**

- To Analyze the Time Value of Money.
- To Evaluate Equipment Economics.
- To Master Financial Accounting Principles.
- To Manage Project Financing.
- To Assess Global Project Models.

- **Course Outcomes:**

CO1: Adopt as per principles of economics and financing

CO2: Analyze available alternatives and propose best suitable among them

CO3: Apply various models of financial management and accounting

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	2	-	-	-	-	1	1	-	1
CO2	1	-	2	-	-	-	-	1	-	-	1
CO3	1	-	1	-	-	-	-	-	-	-	1

SYLLABUS

Assignments based on syllabus

Course Category : HSSM			Course Code: BTCE25HM309		
Course Title : Case Study/EDP Programme / Start Up Activity					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR (hrs/week)	MSE	CA	ESE	02
--	04	--	50	--	

Syllabus

Evaluation of Case Study/EDP Programme / Start Up Activity undergone by students during Semester. A neat detailed report on activities carried out during training of any one selected has to be submitted, along with a presentation to evaluate the training work.

Course Category : HSSM				Subject Code: BTCE25HM310		
Course Title : Basics of Human Rights						
Teaching scheme		Examination scheme			Credit	
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	01	
02	--	--	50	--		
• Course Objectives:						
1.	To train the young minds facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture.					
2.	To give knowledge of the major "signposts" in the historical development of human rights, the range of contemporary declarations, conventions, and covenants.					
3.	To enable them to understand the basic concepts of human rights (including also discrimination, equality, etc.), the relationship between individual, group, and national rights.					
4.	To develop sympathy in their minds for those who are denied rights.					
5.	To make the students aware of their rights as well as duties to the nation					
• Course Outcomes: Students will be able to						
CO1:	Students will be able to understand the history of human rights.					
CO2:	Students will learn to respect others caste, religion, region and culture.					
CO3:	Students will be aware of their rights as Indian citizen.					
CO4:	Students will be able to understand the importance of groups and communities in the society.					
CO5:	Students will be able to realize the philosophical and cultural basis and historical perspectives of human rights.					

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11
CO1	-	-	-	-	-	2	1	-	-	-	-	1
CO2	-	-	-	-	-	2	1	-	-	-	-	1
CO3	-	-	-	-	-	2	1	-	-	-	-	1
CO4	-	-	-	-	-	2	1	-	-	-	-	1
CO5	-	-	-	-	-	2	1	-	-	-	-	1

SYLLABUS		
Unit I:		[04Hours]
	The Basic Concepts: - Individual, group, civil society, state, equality, justice, Human Values, Human rights and Human Duties: - Origin, Contribution of American bill of rights, French revolution, Declaration of independence, Rights of citizen, Rights of working and exploited people.	
Unit II:		[06 Hours]
	Fundamental rights and economic programme, Society, religion, culture, and their inter relationship, Impact of social structure on human behavior, Social Structure and Social Problems: - Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labor.	
Unit III:		[4 Hours]
	Migrant workers and human rights violations, human rights of mentally and physically challenged, State, Individual liberty, Freedom and democracy, NGOs and human rights in India: - Land, Water, Forest issues	
Unit IV:		[06 Hours]
	Human rights in Indian constitution and law:- i) The constitution of India: Preamble ii) Fundamental rights iii) Directive principles of state policy vi) Fundamental duties v) Some other provisions.	
Unit V:		[04 Hours]
	Universal declaration of human rights and provisions of India, Constitution and law, National human rights commission and state human rights commission.	

Reference Books

1. Shastri, T. S. N., India and Human rights: Reflections, Concept Publishing Company India (P Ltd.), 2022.
2. Nirmal, C.J., Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India

Course Category : VEC			Course Code:BTCE25VEC311		
Course Title : Indian Constitution- Value Education					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	01
01	--	--	50	--	
• Course Objectives:					
1.	To create awareness about the Constitution of India and the essential values that are incorporated in it, i.e. Fundamental Rights, Fundamental Duties, DPSPs, etc				
2.	To learn, along with their development and mechanism, about the divisions of executive, legislative and judiciary				
3.	To learn the function of the seminal positions in the government, like Prime Minister, President and the Council of Ministers and the State Legislature				
4.	To Know how the municipal office, panchayat office etc. work for development of the society.				
5.	To understand the significance and function of the Election Commission.				
• Course Outcomes: Students will be able to					
CO1:	To know the importance and need of Constitution for a democratic government.				
CO2:	To follow the fundamental rights, duties and principles and become a good citizen.				
CO3:	To be aware and respect the seminal positions like Prime Minister, President, Chief Minister, Council of Ministers, Local Administration, etc.				
CO4:	To understand the function of Election Commission and importance of following it.				
CO5:	To understand the Importance of Secularism, Federalism, Democracy, Liberty, Freedom of Expression, Special Status of States, etc.				

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	2	-	1	3	2	-	-
CO2	2	2	-	-	-	-	2	-	3	-	1
CO3	-	-	-	2	1	1	-	1	-	-	3
CO4	-	2	3	-	1	-	-	-	-	-	-
CO5	-	-	1	2	-	2	2	1	3	-	-

SYLLABUS		
Unit I:	Introduction	[02 Hours]
	Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy	
Unit II:	Union Government and its Administration	[02 Hours]
	Structure of the Indian Union: Federalism, Centre- State, relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha.	
Unit III:	State Government and its Administration	[03 Hours]
	Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions	
Unit IV:	Local Administration	[03 Hours]
	District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Village level: Role of Elected and Appointed officials.	
Unit V:	Election Commission	[02 Hours]
	Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.	

Reference Books

1. Sastry, T. S. N., (2024). India and Human rights: Reflections, Concept Publishing Company India (P Ltd.)
2. Nirmal, C.J., (2022). Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India

Course Category : CEP			Course Code:BTCE25HM312		
Course Title : Field Visit/Special Study/ Internship/ Social Activity Project/ Community Initiative					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR(hrs/week)	MSE	CA	ESE	02
--	04	--	50	--	

Syllabus

Students are expected to undergo any one form **Field Visit/Special Study/ Internship/ Social Activity Project/ Community Initiative** or in combination of these. A neat detailed report on activities carried out during training is expected. Presentation and report of atleast any one selected by student shall be submitted for the evaluation of the subject.

SEMESTER - IV

Second Year Structure 26-27 as per NEP 2020

Semester IV											
Course Category	Category under NEP	Course Code	Course Title	Teaching Scheme			Evaluation Scheme				No. Of Credits
				L	T	P	CA	MSE	ESE	Total	
PCC	Programme Core Course	BTCE25PC401	Building Planning & Drawing	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC402	Concrete Technology	3	-	-	20	20	60	100	3
PCC	Programme Core Course	BTCE25PC403	Structural Mechanics -I	2	-	-	20	20	60	100	2
MDM	Multidisciplinary Minor Bucket	BTCE25MD404	MDM-II A. Transportation Engineering & Traffic Simulation B. MOOC / SWAYAM / NPTL	3	-	-	20	20	60	100	3
OD	Open Elective Bucket	BTCE25OE405	OPEN ELECTIVE - II A. Hydraulics Engineering B. Legal Aspect in Civil Engineering Contracts	2	-	-	20	20	60	100	2
(AEC)	Programme Core Course Lab. (AEC)	BTCE25AE406	Building Planning & Drawing Lab	-	-	2	50	-	50	100	1
(AEC)	Programme Core Course Lab (AEC)	BTCE25AE407	Concrete technology Lab	-	-	2	50	-	50	100	1
(VSEC)	Open Elective Course Lab (VSEC)	BTCE25AE408	OPEN ELECTIVE - II Lab.	-	-	2	50	-	50	100	1
(VSEC)	Vocational & Skill Enhancement Course	BTCE25VSE409	Workshop/Skill Activity/Course/Seminar	-	-	2	50	-	-	50	1
VEC	Value Education Course	BTCE25VEC410	Universal Human Values-II	3	-	0	50	-	-	50	3
EN	Entrepreneurship	BTCSE25HM411	Mini Project/ Case Study/EDP Programme/ Start Up Activity	-	-	4	50	-	-	50	2
VEC	Value Education Course	BTCE25VEC412	Life of Shri Sant Gadge Baba	1	-	0	0	-	-	0	AU
VEC	Value Education Course	BTCE25VEC413	Moral and Ethical Development	1	-	0	50	-	-	50	1
	Total			18	-	12	450	100	450	1000	23

SEMESTER-IV

Hindi Seva Mandal’s (Estd. 1950) Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal – 425203. Dist. – Jalgaon (M. S.)					
Course Category : PCC				Course Code:BTCE25PC401	
Course Title : Building Planning & Drawing					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03
03	--	20	20	60	
• Course Objectives:					
1.	To explain the fundamental building bye-laws and the legal procedure for obtaining plan sanctions.				
2.	To analyze the functional requirements of ventilation, air conditioning, and wind movement for indoor comfort.				
3.	To implement fire safety measures and escape strategies based on different occupancy fire loads.				
4.	To understand the technical layouts of essential building services like plumbing, electricity, and waste management.				
5.	To develop proficiency in architectural drafting, including working drawings and perspective views.				
• Course Outcomes: Students will be able to					
CO1:	Identify building types and navigate the legal requirements for building permit applications.				
CO2:	Design natural and artificial ventilation systems that optimize wind effect and thermal comfort.				
CO3:	Integrate fire-resistant construction and escape elements into building designs to ensure occupant safety.				
CO4:	Draft detailed service layouts for water supply, drainage, and solar heating systems.				
CO5:	Produce professional-grade working drawings and perspective projections for site execution and visualization.				
CO6:	Design functional and structural layouts for residential, educational, healthcare, and commercial buildings.				

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	-	-	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	-	-	1	-	1
CO3	2	2	-	-	-	-	-	-	1	-	1
CO4	1	2	-	-	1	-	-	-	1	-	-
CO5	2	2	-	-	-	-	-	-	1	-	-
CO6	1	1	-	-	1	-	-	-	1	-	1

SYLLABUS		
Unit I:	Fundamentals of Planning & Design	[08 Hours]
	a) Introduction of Unified Development Control and Promotion Regulations for Maharashtra State (UDCPR-2020, 25), importance, advantages. b) Introduction: Building definition and types of building as per occupancy, principles of planning of Residential buildings, plan sanctioning procedure, building bye laws & its necessity. c) Building services: Its importance, constructional requirements for different building services- like electrical, Plumbing services : Layout of water supply and drainage system, one pipe and two pipe system, storage & disposal arrangement, Septic tank, Garbage disposal arrangements, Sewage treatment plant.	
Unit II:	Residential Planning and Site Execution	[06 Hours]
	a. Introduction of layout, importance, advantages, open spaces, roads, area statement b. Planning and designing of Residential buildings (load bearing or frame Structure). c. Working drawings: Importance and use of all types of working drawings at site.	
Unit III:	Planning and Development of Buildings	[08 Hours]
	a) Planning and designing of Apartment (framed Structure only) as per UDCPR. b) Introduction to High-rise Building and its regulation as per UDCPR.	
Unit IV:	Social and Healthcare Infrastructure	[06 Hours]
	Planning and designing of Educational buildings, Hostel buildings, Library buildings, Restaurants, Hotels/lodging-boarding buildings, and Primary Health Centers/hospitals. (frame Structure only)	
Unit V:	Commercial and Civic Infrastructure	[06 Hours]
	Planning and designing of bus stand buildings, commercial complex buildings, bank buildings, post office buildings, Community/marriage halls, factory buildings. (frame Structure only)	

Text Books:

1. Building Drawing: With an Integrated Approach to Built Environment Shah, Kale, Pataki 5th Edition (2019/Reprint 2024), McGraw Hill.
2. Building Design and Drawing, Y. S. Sane Reprint 2023, Allied Book Stall, Pune.
3. Automation Systems in Smart and Green Buildings, V. K. in Revised Edition (2024), Khanna Publishers.
4. Building Science and Planning, S. V. Deodhar Reprint 2024, Khanna Publishers.
5. The Idea of Green Building, A. K. Jain, 2nd Edition (2024), Khanna Publishers.

Reference Books:

1. National Building Code (NBC) - SP 7B.I.S.NBC 2016 (Amended 2023), the definitive set of rules for building construction in India.
2. I.S. 962: Code of Practice for Architectural and Building Drawings B.I.S.1989 (Reaffirmed 2021), Standardizes symbols and abbreviations used in all civil drawings.
3. Handbook of Designing and Installation of Services in High Rise Buildings, V. K. Jain Revised Edition (2025), Technical reference for complex plumbing, fire, and HVAC systems.
4. Unified Development Control and Promotion Regulations for Maharashtra State, 2020 (UDCPR-2020).

Course Category : PCC				Course Code:: BTCE25PC402		
Course Title : Concrete Technology						
Teaching scheme			Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03	
03	--	20	20	60		
• Course Objectives:						
1.	Enable to learn various types and properties of ingredients of concrete					
2.	To learn fresh properties of fresh concrete.					
3.	To learn admixtures on the behavior of the fresh and hardened concrete.					
4.	Learning properties of harden concrete.					
5.	To Understand concrete design mix for various grades of concrete.					
• Course Outcomes: Students will be able to						
CO1:	Understand the various types and properties of ingredients of concrete					
CO2:	Understand the fresh properties of fresh concrete.					
CO3:	Understand effect of admixtures on the behavior of the fresh and hardened concrete.					
CO4:	Understand the fresh properties of harden concrete.					
CO5:	Formulate concrete design mix for various grades of concrete.					

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	2	-	-	3	2	-	-
CO2	2	2	-	-	-	-	-	-	3	-	1
CO3	-	-	-	2	1	1	-	1	-	-	3
CO4	-	2	3	-	1	-	-	-	-	-	-
CO5	-	-	1	2	-	2	-	1	3	-	-

SYLLABUS		
Unit I:	Ingredients of Concrete	[06 Hours]
	Cement-manufacturing process, physical properties, hydration of cement, hydration products, chemical compounds in cement, types of cement. Aggregates- classification of aggregates, physical properties, mechanical properties, fineness and gradation of aggregates using sieve analysis, tests on aggregates. Water-specifications of water to be used for concrete, quality of water for use in concrete.	
Unit II:	Properties of Fresh Concrete	[06 Hours]
	Nominal mix concrete, types of batching, mixing, transportation, placing including pumping and compaction techniques, workability, factors affecting workability, methods of measuring workability, segregation and bleeding, setting time, curing of concrete, types of curing, temperature effects on fresh concrete.	
Unit III:	Properties of Hardened Concrete	[08 Hours]
	Desired properties of concrete: strength, durability, characteristic strength, compressive, tensile and flexure strength of concrete, stress-strain relationship tests on concrete, modulus of elasticity, effect of w/c ratio and admixtures on strength, creep and shrinkage of concrete. Durability of concrete: minimum & maximum cement content, strength & durability relationship, exposure to different conditions, factors contributing to cracks in concrete, sulphate attack, alkali aggregate reaction.	
Unit IV:	Admixtures & Special concretes	[06 Hours]
	Admixtures -Role of admixture, classification and types of admixtures like accelerators, retarders, plasticizers, super plasticizers, mineral admixtures-fly ash, silica fume, ground granulated blast furnace slag. Special concretes – Lightweight concrete and its types, self-compacting concrete, high density concrete, fibre reinforced concrete, High Strength Concrete, High Performance concrete, geopolymer concrete and Ferro cement technique.	
Unit V:	Concrete Mix Design	[06 Hours]
	Factors Governing Mix Design, Methods of Mix Design. factors affecting the mix design, Methods of Expressing Proportions, Trial Mixes, Acceptance Criteria, Factors Causing Variations, Quality Measurement in Concrete Construction, Non-destructive Testing of Concrete-rebound hammer test, ultrasonic pulse velocity test.	

Text Books:

1. Gambhir M. L. “Concrete Technology”, Tata Mc-Graw Hill July 2025
2. Shetty M. S. “Concrete Technology”, S. Chand 2023
3. Krishnaswamy, “Concrete Technology”, DhanapatRai and Sons 2024

Reference Books:

1. Orchard, “Concrete Technology”, Applied Science Publishers
2. Neville A. M., “Concrete Technology”, Pearson Education
3. Neville A. M., “Properties of Concrete”, Pearson Education
4. Relevant Publications by Bureau of Indian Standards, New Delhi
5. IS:10262(2009), IS:456 (2009), IS 4926 (2003)

Course Category : PCC			Course Code: BTCE25PC403		
Course Title : Structural Mechanics - I					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	Tu (hrs/week)	MSE	CA	ESE	02
02	--	20	20	60	

• **Course Objectives:**

1. To learn various methods to estimate deflection of beams.
2. To learn Energy methods to solve structural system
3. To learn Compatibility methods to solve indeterminate structures.
4. To learn Determination of Continuous and end support moments of indeterminate beams and frames.
5. To learn slope deflection method for analysis of structures

• **Course Outcomes:**

- CO1:** Describe the concept of structural analysis, degree of indeterminacy.
- CO2:** Calculate slopes and deflection at various locations for different types of beams.
- CO3:** Identify determinate and indeterminate trusses and calculate forces in the members of trusses.
- CO4:** Perform the distribution of the moments the in continuous beam and frame.
- CO5:** Calculate the deformations in frames.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	-	-	1	3	3	-	-
CO2	2	3	2	-	-	1	-	1	3	-	1
CO3	1	-	-	-	1	1	-	1	3	-	3
CO4	1	2	3	-	1	-	-	-	3	-	2
CO5	3	3	1	2	-	2	2	1	3	-	1

SYLLABUS		
Unit I:	Beam Deflections	[06 Hours]
	Different structural systems, concept of analysis, basic assumptions, indeterminacy, choice of unknowns, Calculations of deflection for determinate beams by double integration, Macaulay's method, moment area method, conjugate beam method.	
Unit II:	Energy Principles	[06 Hours]
	Strain energy and strain energy density, strain energy in traction, shear, flexure and torsion - Castiglano's energy theorems, principle of virtual work, application of energy theorems for computing deflections in beams, Maxwell's reciprocal theorem, Williot Mohr diagrams	
Unit III:	Method of Consistent Deformation	[08 Hours]
	Analysis of indeterminate beams: Propped cantilever and fixed beams -fixed end moments and reactions for standard cases of loading. Analysis of continuous beams propped cantilevers, continuous beams - theorem of three moments - analysis of continuous beams settlement effects, thermal effect, Shear Force and Bending Moment diagrams for continuous beams,	
Unit IV:	Moment Distribution Method	[08 Hours]
	Concept, stiffness, relative stiffness, carry over factor, distribution factor. Analysis of continuous beams propped cantilevers, portal frames with and without sway by moment distribution method	
Unit V:	Slope Deflection Method	[08 Hours]
	Analysis of continuous beams, analysis of rigid frames, frames without sway and with sway, settlement effects, introduction to difficulties in frames with sloping legs and gabled frames	

Text Books:

1. Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill
2. Wang C.K., "Statically Indeterminate Structures", McGraw Hill
3. Vazirani V.N., Ratwani M.M ., "Analysis of Structures"
4. Khurmi R.S., "Theory of Structures", S Chand, Delhi
5. Punmia B.C., "Structural Analysis", Laxmi Publications.
6. S Ramamrutham "Theory of Structures", Dhanpat RAi Publications

Reference Books:

1. Timoshenko and Young, "Theory of structures", McGraw Hill
2. Norris C. H. and Wilbur J. B., "Elementary Structural Analysis", McGraw Hill
3. Kinney J. S., "Indeterminate Structural Analysis", Oxford and IBH
4. Hibbler R. C., "Structural Analysis", Pearson Publications, 9th Edition
5. Schodek, "Structures", Pearson Education, 7th edition

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MDM – II BUCKET SEM - IV

Course Category : MDM -II				Course Code: BTCE25MD404 A		
Course Title : Transportation Engineering & Traffic Simulation						
Teaching scheme			Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03	
03	--	20	20	60		
• Course Objectives:						
1.	To understand traffic flow theory and transportation systems					
2.	To analyze traffic characteristics and data					
3.	To learn traffic simulation models and software					
4.	To apply simulation for solving traffic problems					
5.	To promote sustainable transportation planning.					
• Course Outcomes:Students will be able to						
CO1:	Explain the fundamentals of transportation systems, traffic engineering, and road network components.					
CO2:	Analyze traffic characteristics such as speed, flow, density, and their interrelationships.					
CO3:	Apply traffic flow theories and models to solve real-world transportation problems.					
CO4:	Conduct and interpret traffic studies such as volume count, speed study, and origin-destination surveys.					
CO5:	Assess environmental and sustainability aspects in transportation planning.					

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	2	-	1	3	2	-	-
CO2	2	2	-	-	-	-	2	-	3	-	1
CO3	-	-	-	2	1	1	-	1	-	-	3
CO4	-	2	3	-	1	-	-	-	-	-	-
CO5	-	-	1	2	-	2	2	1	3	-	-

SYLLABUS		
Unit I:	Introduction	[06 Hours]
	Importance of various modes of transportation, Highway Engineering, Road Classification, Developments in Road Construction, Highway Planning, Alignment and Surveys.	
Unit II:	Geometric Design	[06 Hours]
	Geometric Design- Cross section elements, Sight distances, Horizontal alignment, Vertical alignment, Intersections, Construction of Pavements, Construction and Maintenance of Drainage, Road Arboriculture.	
Unit III:	Highway Materials	[06 Hours]
	Highway Materials: Soil – relevant properties, Various tests, Aggregates – strength, hardness, toughness, soundness, durability, shape, specific gravity, water absorption, Bituminous materials – Bitumen, Tar, and Asphalt – various properties, Design of Bituminous paving mixes-Marshall stability test.	
Unit IV:	Traffic Engineering & Road Accidents	[08 Hours]
	Traffic Characteristics, Speed, Journey Time and Delays, Vehicle Volume Counts, Origin and Destination Studies, Analysis and Interpretation of Survey Data, Traffic Operations, Design of Signals and Rotary intersections, Parking Space Design, Highway Lighting, Planning and Administration, Road Markings, Signs Road Accidents and Safety: Classification, Causes, Mitigation and Control Measures, Aspects of Safety in Usage of Roads, Type and Design of anti-crash barriers, Introduction to Intelligent Transport Systems (ITS).	
Unit V:	Pavement Design	[06 Hours]
	Basic Principles, Methods for different Types of Pavements, Design of flexible pavement using IRC: 37- 2012, Design of rigid pavement using IRC: 58-2011 Other modes of Transport Introduction to Railways, Airways, Waterways, Pipeline Transportation, Classification, Requirements, Comparative Studies	

Text Book:

1. Khanna and Justo, “Highway Engineering”, Nemchand & Bros., Roorkee
2. Khanna S.K., “Highway Engineering”,
3. Arora N. L., “Transportation Engineering”
4. Bindra and Arora, “Highway Engineering”, Standard Publishers
5. Vazirani V.N. and Chandola S.P., “Transportation Engineering”, Vol I Khanna Publishers, N. Delhi
Vazirani V.N. and Chandola S.P., “Transportation Engineering”, Vol II Khanna Publishers, N. Delhi
ISBN NO: N/A
6. Shahani P.B, “Road Techniques” Khanna Publishers, N. Delhi ISBN NO: 978-81-7409-197-1
PRICE 149/-
7. Kadiyali L.R, “Traffic Engineering and Transport Planning”, Khanna Publishers, N. Delhi, ISBN
NO: 978-81-7409-220-X

Reference Books:

1. Geometric Design of Modern Highways’, E & FN SPON Ltd., London.
2. Khistry, C.J., “Transportation Engineering – An Introduction’, Prentice Hall of India Ltd.
3. Agor R., “Surface Transportation (Railways and Highways)”, Khanna Publishers, N. Delhi ISBN
NO: 978-81-7409-273-1

Course Category : MDM - II			Course Code::BTCE25MD404 B		
Course Title : MOOC / SWAYAM / NPTL					
Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	03
03	--	20	20	60	
MOOC/SWAYAM/ NPTEL - Student may select Civil Engineering course either from MOOC/SWAYAM/ NPTEL pool or any other approved reputed source. The submission of course completion certificate is mandatory .					

Course Category : OD			Course Code:BTCE25OE405 A		
Course Title : Hydraulics Engineering					
Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	02
2	0	20	20	60	

• **Course Objectives:**

1. To introduce and give explanation of fundamentals of Hydraulics Engineering and give fundamental knowledge of fluid with its properties, behavior, forces on various surfaces .
2. To develop understanding about Kinematics of fluid flow and equation used for analysis of dynamic fluids.
3. To provide students with a comprehensive understanding of Laminar & Turbulent flow.
4. To study pumps and its application
5. To introduce the importance of fluid Flow in Pipes and determine the losses in a flow system.

• **Course Outcomes:**

CO1: Explain fundamental properties of fluids and calculate pressure.

CO2: Deeply understanding of fluid kinematics and dynamics.

CO3: Analyze laminar and turbulent flow characteristics, apply boundary layer theory,

CO4: To understand concept of pumps.

CO5: Analyze head loss and energy loss in pipes, solve pipe network.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	-	-	1	3	3	-	-
CO2	2	3	2	-	-	-	-	1	3	-	1
CO3	-	-	-	-	1	1	-	1	3	-	3
CO4	2	2	3	-	1	-	-	-	3	-	2
CO5	3	3	1	2	-	2	2	1	3	-	1

SYLLABUS		
Unit I:	Fluid Statics	[06 Hours]
	Fluid properties and their role in fluid motion, concept of continuum, Types of fluids and their characteristics, Fluid Pressure – Pascal’s Law and its measurement, Hydrostatic pressure on plane and curved surfaces, Buoyancy- Centre of buoyancy, stability of submerged and floating bodies, metacenter, metacentric height and its determination.	
Unit II:	Kinematics & Dynamics of Fluid Flow	[08 Hours]
	Fluid Kinematics -Types of fluid flows, Continuity equation for one-two- and three-dimensional flows, Velocity and Acceleration, Velocity potential and Stream function, Fluid Dynamics – Equation of motion, Euler’s equation, Bernoulli’s equation and practical applications of Bernoulli’s equation: Venturi meter, Orifice meter and Pitot tube, Momentum Equation, Concept of Navier-Stokes equation.	
Unit III:	Laminar & Turbulent Flow	[08 Hours]
	Laminar Flow – Concept ,Importance, limit Laminar flow between parallel, stationary and moving plates, Flow through tube. Turbulent Flow – Concept ,Importance, limit, Shear stress in turbulent flow and turbulent velocity profiles in fully developed pipe flow, Prandtl mixing length theory, Nikuradse's experiment. Concept of Lift and Drag.	
Unit IV:	Pump & its application	[06 Hours]
	Pumps: Classification, component parts, working of centrifugal pump, performance characteristics, pump selection, common troubles & remedies, introduction to different types of pumps: reciprocating, multi stage jet, air lift, submersible pump.	
Unit V:	Flow through Pipes	[08 Hours]
	Concept of Flow through,Pipes,Head loss due to friction –Darcy-Weisbach equation, H.G.L. and T.E.L., Loss of energy in pipes, Pipe connecting two reservoir in series and parallel, Water Hammer in pipes-rigid and elastic water column theory, Surge tanks function and types, Introduction to Moody’s chart, Nomograms and other pipe diagrams	

Text Books:

- 1 Hydraulics and Fluid Mechanics including Hydraulics Machines by Dr. P. N. Modi and Dr. S. M.Seth, Standard Book House. ISBN: 978-81-89401-26-9
- 2 A Textbook of Fluid Mechanics and Hydraulic Machines by Dr. R. K. Bansal, LaxmiPublications.ISBN: 978-81-31808-15-3
- 3 Introduction To Fluid Mechanics by Philip J. Pritchard, John Wiley & Sons, INC. ISBN: 978-04-70547-55-7
- 4 Theory and Applications of Fluid Mechanics by K. Subramanya, McGraw-Hill Higher Education.ISBN: 978-00-74603-69-7
- 5 Fluid Mechanics including Hydraulic Machines by A. K. Jain, Khanna Publishers. ISBN: 978-81-74091-94-9

Reference Books:

- 1 Introduction to Fluid Mechanics & Fluid Machines by S. K. Som& G. Biswas, Tata McGraw-Hill.ISBN: 978-00-71329-19-4
- 2 Fluid Dynamics by V. L. Streeter, K. W. Bedford and E. B. Wylie, New York, McGraw-Hill.
- 3 Fluid Mechanics by K. L. Kumar, S. Chand publication.

Course Category : OD			Course Code: BTCE25OE405 B		
Course Title : Legal Aspect in Civil Engineering Contracts					
Teaching scheme		Examination scheme			Credit
Th(hrs/week)	Tu (hrs/week)	MSE	CA	ESE	02
2	0	20	20	60	

• **Course Objectives:**

1. To understand Indian contract act, Arbitration act and contract administration
2. To know bailment and FIDIC
3. To understand the labour laws
4. To study safety engineering and relevant act

• **Course Outcomes:**

CO1: Students will learn Indian contract act, Arbitration act and contract administration

CO2: Student will gain knowledge about bailment and FIDIC

CO3: Students will understand the labour laws

CO4: Students will be exposed to safety engineering and relevant act

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	-	-	1	3	3	-	-
CO2	2	3	1	-	-	-	-	1	-	-	1
CO3	-	-	-	-	1	1	-	1	3	-	3
CO4	2	2	3	-	1	-	-	-	-	-	-

SYLLABUS		
Unit I:	Professional Practice and Administration Contracts	[06 Hours]
	The standard form of building contracts, Indian contract Act, The right of building owner, Right of Contractor, Types of Civil Engineering contracts, RERA	
Unit II:	Bailment	[06 Hours]
	Nature of Transactions, Delivery of Bailee, care to be taken, Bailee's Responsibility, Termination, Bailment of pledges. Injunction: Types Temporary, Perpetual, Mandatory when referred, Indemnity and Guarantee: Difference between the two, The Contract of Guarantee and Indemnity,	
Unit III:	Industrial Acts and Labour Laws	[06 Hours]
	Indian factories Act, Industrial Dispute Act, Payment of Wages Act, Work Compensation Act, Trade Union Act, The Building and Other Constructions Workers' (Regulation of Employment and Conditions of Service) Act, 1996	
Unit IV:	Arbitration and Award	[06 Hours]
	Indian Arbitration Act, Arbitration Agreement, Conduct of Arbitration, Power and Duties of Arbitration, Rules of Evidence, E- Tendering, Preparation and publication of award, Methods of Enforcement impending and Awards.	
Unit V:	Safety Engineering	[06Hours]
	Sources, Classification, Cost of Accident and Injury Workmen's Compensation Act, Safety Programme, Safety Organization. Employers Liability Act, Employers Insurance Act, Safety and Health Standards Occupations Hazards, personal Protective equipments, preventive measures Factory Act, Fatal accidents	

Text Books:

1. Indian arbitration Act by B. S. Patil
2. Indian Contract Act.
3. Safety Engineering, Govt. of India Publication
4. Professional Practice, Roshan Namavati.
5. Legal Aspects of building and Engineering Contracts by B. S. Patil

Reference Books

6. Indian Contract Act Avatar singh
7. Indian contract Act Jhamb

Course Category : AEC		Course Code: BTCE25AE406	
Course Title : Building Planning & Drawing Lab			
Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

• **Course Objectives:**

1. To develop the ability to interpret and prepare detailed architectural and structural drawings for residential buildings.
2. To master the use of computer-aided drafting (CAD) software for creating precise building layouts.
3. To understand the functional requirements and spatial organization of various public buildings.
4. To gain technical knowledge regarding utility services, specifically water supply systems and foundation details.
5. To expose students to real-world construction practices through mandatory site visits and reporting.

• **Course Outcomes:**

At the end of this course, students will be able to:

CO1: To Design Functional Layouts.

CO2: To Generate Technical Documentation.

CO3: To Execute Quantity Calculations.

CO4: To Detail Structural & Service Elements.

CO5: To Analyze Public Building Typologies.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	2	3	-	-	-	-	-	-	-	1
CO2	1	2	1	-	-	-	-	-	-	-	1
CO3	1	2	1	-	-	-	-	-	-	-	1
CO4	1	2	2	-	-	-	-	-	-	-	1
CO5	1	2	1	-	-	-	-	-	-	-	1

SYLLABUS	
Term work shall consist of detailed report of in form of set of drawings mentioned below. In practice sessions, free-hand sketching in drawing book is expected.	
1.	Planning of a small residential buildings/bungalow/duplex/apartment from given data of framed structure as per Unified Development Control and Promotion Regulations for Maharashtra State, 2020 (UDCPR-2020, 2025)., to prepare AutoCAD drawing. - To draw detailed plan, Elevation and section. - Area statement. - To prepare Site plan with all details. - Schedules of openings. - Rainwater harvesting arrangements. - Water supply and drainage system.
2.	Line plans Various public buildings as per Unified Development Control and Promotion Regulations for Maharashtra State, 2020 (UDCPR-2020, 2025). (Any four types) using computer drafting software (AutoCAD).
3.	Visit report To conducting Technical Visit on Residential, Commercial, and Industrial project, detailed visit report to be prepared with photograph.

Course Category : AEC		Course Code: BTCE25AE407	
Course Title : Concrete Technology Lab			
Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

• **Course Objectives:**

1. To know different types of materials used in concrete
2. To know different parameters for fresh concrete.
3. To know properties of Aggregates and Admixture
4. To know concrete mix design.
5. To understand various testing of concrete.

• **Course Outcomes:** At the end of this course, students will be able to:

CO1: Analyze the properties of concrete and their verification.

CO2: Calculate different parameters for fresh concrete.

CO3: Understand properties of aggregates.

CO4: Design concrete mix.

CO5: Learn testing of concrete.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	1	1	-	-	3	2	-	-
CO2	2	3	-	-	-	-	3	-	-	-	-
CO3	-	-	-	2	1	-	-	-	-	-	2
CO4	1	2	-	-	-	-	-	-	-	-	3
CO5	-	3	1	2	-	-	2	1	-	-	2

SYLLABUS

- 1.** Testing of Cement: Consistency, Fineness, Setting Time, Specific Gravity, Soundness and Strength Test for Cement
- 2.** Testing of coarse Aggregates: Specific Gravity, Sieve Analysis, Impact test.
- 3.** Testing of fine Aggregates: Sieve Analysis, silt content
- 4.** Tests on fresh Concrete: Workability Tests: Slump, Compaction.
- 5.** Strength Tests on Concrete: Compression,
- 6.** Study of Concrete Mix Design by IS method
- 7.** Non-destructive Testing for Concrete

Course Category : VSEC		Course Code: BTCE25AE408	
Course Title : Hydraulics Engineering Lab			
Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

- **Course Objectives:**

1. Understand the concept of viscosity and its importance in fluid behavior and engineering applications.
2. Understand the concept of stability of floating bodies and its importance in marine and hydraulic engineering.
3. Understand the concept of pressure and its measurement in fluids.
4. Understand the concept of energy conservation in fluid flow & Study and verify Bernoulli's Theorem experimentally.
5. Understand the concept of frictional resistance in pipe flow and its impact on energy loss.
6. Understand the working principles of different flow measuring devices such as orifice meter, venturimeter, and mouthpiece.
7. Understand the working principle of a centrifugal pump and its components.

- **Course Outcomes:**

At the end of this course, students will be able to:

- CO1:** Explain the concept of viscosity and its role in fluid flow behaviour.
- CO2:** Explain the concept of stability of floating bodies and its practical significance.
- CO3:** Explain the concept of fluid pressure and different types of pressure (gauge, absolute, vacuum).
- CO4:** Verify the basic energy principles (Bernoulli's equation).
- CO5:** Explain the concept of frictional losses in pipe flow and their engineering significance.
- CO6:** Utilize the basic measurement techniques of fluid flow in orifice / mouthpiece / venturi meter /orifice meter.
- CO7:** Explain the working principle and components of a centrifugal pump.

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	1	1	-	-	3	3	-	2
CO2	3	3	-	-	1	-	-	2	3	-	2
CO3	3	3	-	-	1	-	-	2	3	-	3
CO4	3	2	-	-	1	-	-	-	3	-	2
CO5	3	3	1	-	2	-	2	1	3	-	2

SYLLABUS

List of Practical to be performed

1. Measurement of Viscosity of various fluids.
2. Determination of Meta centric height.
3. Measurement of pressure by Manometers.
4. Verification of Bernoulli's Theorem.
5. Tests on Centrifugal Pump.
6. Calibration of an orifice / mouthpiece / venturi meter / orifice meter.
7. Study of Hydraulic Jump.

Course Category : VSEC		Course Code: BTCE25AE408	
Course Title : Legal Aspect in Civil Engineering Contracts Lab			
Teaching scheme	Examination scheme		Credit
PR (Hrs/week)	CA (PR)	ESE (PR)	01
02	50	50	

- **Course Objectives:**

1. To understand Indian contract act, Arbitration act and contract administration
2. To know bailment and FIDIC
3. To understand the labour laws
4. To study safety engineering and relevant act

- **Course Outcomes:**

At the end of this course, students will be able to:

CO1: Students will learn Indian contract act, Arbitration act and contract administration

CO2: Student will gain knowledge about bailment and FIDIC

CO3: Students will understand the labour laws

CO4: Students will be exposed to safety engineering and relevant act

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	1	1	-	-	3	3	-	2
CO2	1	2	-	-	1	-	-	2	3	-	2
CO3	1	2	-	-	1	-	-	2	3	-	3
CO4	1	1	-	-	1	-	-	-	3	-	2

SYLLABUS

Assignments based on above syllabus.

Course Category : VSEC			Course Code: BTCE25HM409		
Course Title : Workshop / Skill Activity /Course/ Seminar					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR (hrs/week)	MSE	CA	ESE	01
--	02	--	50	--	

Syllabus

Students are expected to perform or attend Workshop/Skill Activity/Course/Seminar Term work shall consist of detailed report for chosen topic and output of final working proposed. Evaluation shall be based on work carried with presentation.

Course Category : VEC				Subject Code: BTCE25VEC410			
Course Title : Universal Human Values-II							
Teaching scheme			Examination scheme			Credit	
Th (hrs/week)		Tu (hrs/week)	MSE	CA	ESE	03	
03		--	--	-	50		
• Course Objectives:							
1.	To understand the importance of value education in technical and professional life.						
2.	To develop self-awareness and harmony within oneself.						
3.	To promote harmony in family, society, and professional relationships.						
4.	To understand the interrelationship between human beings and nature.						
5.	To cultivate ethical responsibility and holistic vision in engineering practice.						
• Course Outcomes: Students will be able to							
CO1:	Understand the significance of Universal Human Values and self-exploration.						
CO2:	Develop harmony within self by understanding human aspirations and needs.						
CO3:	Promote ethical and harmonious relationships in family and society.						
CO4:	Recognize the importance of sustainable development and environmental responsibility.						
CO5:	Apply ethical principles and holistic thinking in professional and personal life						

Mapping of Course Outcome with Program Outcomes

Course Outcome	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	1	–	–	2	1	2	1	1	–	2
CO2	–	–	1	–	–	2	1	2	1	1	–	2
CO3	–	–	2	–	–	3	1	3	2	2	1	2
CO4	–	–	2	–	–	2	3	2	1	1	–	2
CO5	–	–	2	–	–	3	2	3	2	2	1	3

SYLLABUS

Unit I:	Introduction to Value Education	[07 Hours]
	Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity, the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity, Current Scenario, Method to Fulfill the Basic Human Aspirations.	
Unit II:	Harmony in the Human Being (Self)	[07 Hours]
	Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to Ensure self-regulation and Health.	
Unit III:	Harmony in the Family and Society	[07 Hours]
	Family as the basic unit of human interaction, Values in human-human relationships: Trust, Respect, Affection, Care, Guidance, Gratitude, Justice and equality in society, Mutual happiness and mutual prosperity, Social responsibility of engineers.	
Unit IV:	Harmony with Nature and Existence	[07 Hours]
	Understanding nature as coexistence, Interconnectedness of human beings, society, and nature, Sustainable development, Ethical use of natural resources, Environmental responsibility of engineers, Role of technology in ecological balance.	
Unit V:	Holistic Vision of Life and Profession	[07 Hours]
	Ethical responsibility in engineering profession, Value-based decision making, Professional ethics and social accountability, Holistic vision of life, Role of engineers in nation building, Case studies related to ethics and values.	

TEXT BOOKS:

1. R. R. Gaur, R. Asthana, G. P. Bagaria, *A Foundation Course in Human Values and Professional Ethics*, Excel Books, New Delhi.
2. N. Tripathi, *Human Values*, New Age International Publishers.

REFERENCE BOOKS:

1. M. K. Dixit, *Human Values and Professional Ethics*, Vikas Publishing House.
2. S. B. Lall & N. N. Tripathi, *Value Education*, Vikas Publishing House.
3. Subhash Sharma, *Ethics in Engineering*, Galgotia Publications.

Course Category : EN			Course Code: BTCSE25HM411		
Course Title : Mini Project/ Case Study/ EDP Programme / Start Up Activity					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR (hrs/week)	MSE	CA	ESE	02
--	04	--	50	--	

Syllabus

Student shall choose a topic any one among **Mini Project/ Case Study/EDP Programme/ Start Up Activity** of his interest in consultation with faculty in the department. The topic for mini project may be related to Civil Engineering area and/or interdisciplinary area. Student shall attempt to collect necessary information and present a summary indicating comprehension of the topic and acquired depth of knowledge. It is desirable to obtain industry or community sponsorship. Simplified tools or devices may be presented in form of working model and a brief report stating development. A power point presentation shall also be submitted.

Course Category : VEC			Course Code: BTCE25VEC412		
Course Title : Life of Shri Sant Gadge Baba					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR (hrs/week)	MSE	CA	ESE	AU
01	--	--	--	--	

Course Description

This course presents the life, philosophy, and social contributions of Shri Sant Gadge Baba, a renowned social reformer of Maharashtra. It explores his early life, spiritual journey, reform movements, campaigns for cleanliness and education, and his efforts toward social equality. The course highlights his moral teachings and their relevance to modern society, particularly for students and young professionals.

Course Objectives

1. To understand the life and historical background of Shri Sant Gadge Baba.
2. To study his social reforms and methods of mass communication.
3. To analyze his contributions toward social equality, education, and cleanliness.
4. To examine his philosophy and moral teachings.

To appreciate his legacy and relevance in contemporary society.

Course Objectives

1. To understand the life and historical background of Shri Sant Gadge Baba.
2. To study his social reforms and methods of mass communication.
3. To analyze his contributions toward social equality, education, and cleanliness.
4. To examine his philosophy and moral teachings.

To appreciate his legacy and relevance in contemporary society.

Course Outcomes

CO1: Describe the early life and social background of Shri Sant Gadge Baba.

CO2: Explain his social reform movements and preaching methods.

CO3: Analyze his contributions to rural development, education, and social harmony.

CO4: Interpret the philosophical and ethical values from his teachings.

CO5: Evaluate his legacy and apply his values in professional and social life.

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

SYLLABUS

Unit I:	Early Life and Education	[05 Hours]
	Birth and Family Background, Childhood and Early Influences, Spiritual Inclinations and Education, Social Environment in Maharashtra during his Time	
Unit II:	Social Reforms and Preaching(	[05 Hours]
	Beginnings of Social Work, Preaching about Cleanliness, Education and Social Harmony, Methods of Reaching the Masses, Simple Stories and Folk Language for Mass Communication.	
Unit III:	Contributions to Society	[05 Hours]
	Campaigns for Cleanliness and Hygiene, Promoting Education and Literacy, Advocacy against Caste Discrimination and Superstitions, Influence on Rural Communities	
Unit IV:	Philosophy and Teachings	[05 Hours]
	Core Principles of Life and Work, Emphasis on Selfless Service and Humanity, Spiritual Messages in Daily Life, Moral and Ethical Values from Gadge Baba's Teachings.	
Unit V:	Legacy and Recognition	[05 Hours]
	Establishment of Gadge Baba Sansthan, Awards and Honors Received, Influence on Modern Social Work and Education, Lessons for Young Engineers and Students.	

TEXTBOOKS:

1. Shri Sant Gadge Baba: Jeevan ani Karya – Maharashtra State Textbook Bureau (Marathi)
2. Life and Teachings of Shri Sant Gadge Baba – Dr. S. S. Salunkhe

REFERENCE BOOKS:

1. Gadge Baba: Social Reformer of Maharashtra – V. R. Pandit
2. Sant Gadge Baba: Jeevan Darshan – N. S. Pawar
3. Maharashtra State Government Publications on Sant Gadge Baba

Course Category : VEC			Course Code: BTCE25VEC413		
Course Title : Moral and Ethical Development					
Teaching scheme		Examination scheme			Credit
Th (hrs/week)	PR (hrs/week)	MSE	CA	ESE	01
01	--	--	50	--	

Course Description

This course focuses on the development of moral reasoning, ethical awareness, and character building in personal and professional life. It introduces major theories of moral development, core ethical principles, and contemporary ethical challenges in education, technology, environment, and professional practice. The course emphasizes ethical decision-making, leadership responsibility, and the formulation of a personal code of ethics.

Course Objectives

1. To understand the concepts of morality and ethics and their significance.
2. To study major theories of moral and ethical development.
3. To examine fundamental principles guiding ethical life and decision-making.
4. To analyze ethical challenges in modern technological and professional contexts.
5. To develop ethical reasoning skills and a personal code of conduct.

Course Outcomes

CO1: Explain the concepts of morality, ethics, and their relationship with law and society.

CO2: Describe major theories of moral and ethical development and their applications.

CO3: Apply ethical principles in personal and professional decision-making.

CO4: Analyze contemporary ethical challenges in engineering, technology, and society.

CO5: Demonstrate ethical leadership and formulate a personal code of ethics.

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

SYLLABUS

UNIT I: Introduction to Morality and Ethics

Definition of Morality and Ethics, Importance of Moral Values in Personal and Professional Life, Sources of Ethical Values including Family, Society, Religion and Education, Relationship between Morality, Ethics and Law.

UNIT II: Theories of Moral and Ethical Development

Kohlberg's Theory of Moral Development, Piaget's Theory of Moral Judgment, Gilligan's Ethics of Care, Virtue Ethics and Character Building, Application of Theories in Daily Life

UNIT III: Principles of Moral and Ethical Life

Truthfulness, Honesty and Integrity, Responsibility and Accountability, Respect, Compassion and Empathy, Justice and Fairness, Role of Ethics in Decision Making.

UNIT IV: Moral and Ethical Challenges in Modern Life

Ethical Issues in Education and Professional Life, Technology and Ethics including Privacy, Cybersecurity and Artificial Intelligence, Environmental Ethics and Sustainable Living, Corruption, Dishonesty and Social Responsibility, Strategies to Overcome Ethical Dilemmas.

UNIT V: Application and Case Studies

Moral Decision-Making in Real-Life Situations, Case Studies on Ethical Dilemmas in Engineering and Technology, Leadership and Ethical Responsibility, Role of NGOs and Social Organizations in Promoting Ethics, Developing a Personal Code of Ethics

TEXTBOOKS:

1. F. L. Goodwin, *Moral and Ethical Development*, Routledge Publications
- R. Subramanian, *Professional Ethics and Human Values*, Oxford University Press

REFERENCE BOOKS:

1. M. Govindarajan, *Ethics in Engineering and Technology*, Prentice Hall
2. R. S. Naagarazan, *Human Values and Professional Ethics*, New Age International
3. L. Kohlberg, *Essays on Moral Development*, Harper & Row
4. M. Gilligan, *In a Different Voice*, Harvard University Press

NPTEL Course: Ethics, IIT Madras Prof. Sreekumar Nellickapilly

Link:- <https://nptel.ac.in/courses/109106117>