Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC A+ Accredited
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institute Affiliated to RTM Nagpur University, Nagpur)

Department of Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING

B.Tech. Civil Engineering

IV Semester

Teaching Scheme & Syllabus

Considering

National Education Policy (NEW NEP) – 2020

From

Academic Year 2025-26

Vision of Institute

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of Institute

- **M1:** To strive for rearing standard and stature of the students by practicing high standards of Professional ethics, transparency and accountability
- **M2:** To provide facilities and services to meet the challenges of Industry and Society
- **M3:** To facilitate socially responsive research, innovation and entrepreneurship
- **M4:** To ascertain holistic development of student and staff members by inculcating knowledge and profession as work practices.

Vision of the Department

To forge learning Center of Excellence in the field of Civil Engineering

Mission of the Department

- **M1:** To promote academic and ethical development while upholding high standards.
- **M2:** To provide advance facilities with the skills needed to face Industry and societal challenges.
- **M3:** To promote socially responsible research, innovation, and entrepreneurship in the field of Civil Engineering.
- **M4:** To foster the holistic development of both students and faculty members by inculcating a blend of knowledge and professional work methods for overall progress.

Program Educational Objectives (PEO)

- **PEO 1:** Analyze and design civil engineering structures while keeping social awareness and ethical responsibilities in mind.
- **PEO 2:** Demonstrate leadership abilities in supporting sustainable practices in Civil Engineering
- **PEO 3:** Exhibit a commitment to lifelong learning, staying updated on developing technologies and industry trends, and adjusting to the evolving world of Civil Engineering.
- **PEO 4:** Execute proficiency in creative problem-solving and innovation, demonstrating an entrepreneurial attitude within the context of Civil Engineering.

Program Outcomes (PO)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

10. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO)

- **PSO1:** Competency to manage large infrastructure projects while providing safe and cost-effective project execution, along with expertise of rapid construction and project management.
- **PSO2:** Plan, execute, manage, maintain and rehabilitate civil engineering systems and processes.
- **PSO3:** Apply innovative construction and management techniques to compete with modern structural design and construction within the budget and time frame.

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SCHEME OF INSTRUCTION & SYLLABI

Programme: B. Tech Civil Engineering

Scheme of Instructions: Second Year B. Tech. in Civil Engineering (As Per NEP 2020)

Semester – IV

SN	Sem	Type	BoS/ Dept	Sub Code	Subject	T/P	Contact Hours			Credits	% Weightage			ESE Duration	Total Marks
							L	P	Hrs.		CT/IA	CA	ESE		
1	IV	PCC	CE	BCE42401	Structural Analysis	T	3	0	3	3	30	10	60	3 Hrs.	100
2	IV	PCC	CE	BCE42402	Surveying	T	3	0	3	3	30	10	60	3 Hrs.	100
3	IV	PCC	CE	BCE42403	Concrete Technology	T	3	0	3	3	30	10	60	3 Hrs.	100
4	IV	MDM	ECE	BEC42406	Instrumentation & Sensor Technologies for Engineering Applications	T	2	0	2	2	14	06	30	2 Hrs.	50
5	IV	OEC		B$$424XX	Open Elective-II	T	2	0	2	2	14	06	30	2 Hrs.	50
6	IV	HSSM	CE	BCE42404	Project Management	T	2	0	2	2	14	06	30	2 Hrs.	50
7	IV	PCC	CE	BCE42405	Surveying - Lab	P	0	2	2	1	-	25	25	-	50
8	IV	VSEC	CE	BCE42406	Structural Software Training	P	0	4	4	2	-	50	50	-	100
9	IV	AEC	CE	BCE42407	Liberal Learning Module-4	P	0	2	2	1	-	50	-	-	50
10	IV	VEC	CE	BCE42408	Introduction to Earth Sciences	P	0	4	4	2	-	50	50	-	100
							15	**12**	**27**	**21**	**132**	**223**	**395**	**15 Hrs.**	**750**

Course Category	BSC/ ESC (Basic Science Course/ Engineering Science Course.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	Multidisciplinary courses	SEC (Skill Course)	Humanities Social Science & Management	Experiential Learning Courses	CC (Liberal Learning Courses
Credits (4th sem)	--	10	--	04	02	05	--	--
Cumulative Sum	16 / 13	20	--	10	06	14	02	04

PROGRESSIVE TOTAL CREDITS: 64+21=85

Chairperson	Vice Principal / Director Academics	Director Administration	Principal	June, 2025	4.00	Applicable for AY 2025-26 Onwards
				Date of Release	Version	

Program: Civil Engineering

List of **Program Electives** offered By Civil Engineering Department

Program Elective- I	Program Elective-II	Program Elective- III	Program Elective- IV	Program Elective- V
Semester V	**Semester VI**	**Semester VI**	**Semester VIII**	**Semester VIII**
BCE43506-Water Resources Engineering	BCE43606-Rural Water Supply and Sanitation	BCE43610- Building Construction Practice	BCE44702-Pavement Design	BCE44706-High Rise Structures
BCE43507-Water Quality Engineering	BCE43607-Environmental Laws and Policy	BCE43611- Advanced Building Construction Methods	BCE44703-Urban Transportation Planning	BCE44707-Industrial Structures
BCE43508-Surface Hydrology	BCE43608-Solid and Hazardous Waste Management	BCE43612- Structural Audit & Retrofitting of Structures	BCE44704-Airport Planning and Design	BCE44708-Prestressed Concrete
BCE43509-Flood Control & Drainage Engineering	BCE43609-Air and Noise Pollution Control	BCE43613- Cement Manufacturing Technology & Equipment	BCE44705-High Speed Rail Engineering	BCE44709-Earthquake Engineering

Program: Civil Engineering

List of **Open Electives** offered By Civil Engineering Department

Open Elective-I	Open Elective-II	Open Elective-III
Semester-III	**Semester-IV**	**Semester-V**
BCE42306: Green Structures and Smart Cities	BCE42409: Plastic Waste Management	BCE43510: Railways & Airport Engineering

Course Category	BSC (Basic Science Course)	ESC (Engineering Science Course.)	PCC (Programme Core courses	PEC (Programme Elective courses)	Multidisciplinary courses	VSEC (Skill Course)	Humanities Social Science & Management	Experiential Learning Courses	CC (Liberal Learning Courses	Semester Wise Credits
Semester -I	08	06	--	--	--	02	02	--	02	**20**
Semester -II	08	07	02	--	--	02	02	--	02	**23**
Semester -III	--	--	08	--	06	--	05	02	--	**21**
Semester -IV	--	--	10	--	04	02	05	--	--	**21**
Semester -V	--	--	11	03	06	--	--	--	--	**20**
Semester -VI	--	--	11	06	02	01	--	01	--	**21**
Semester -VII	--	--	10	07	04	--	--	03	--	**24**
Semester -VIII	--	--	--	--	--	--	--	16	--	**16**
Cumulative Sum	**16**	**13**	**52**	**16**	**22**	**07**	**14**	**22**	**04**	**166**

				June, 2025	4.00	Applicable for AY 2025-26 Onwards
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B.Tech. Civil Engineering - Second Year (Semester-IV)

BCE42401: Structural Analysis

Teaching Scheme		Examination Scheme	
Theory	3 Hrs./week	**CT-I**	15Marks
Tutorial		**CT-II**	15 Marks
Total Credits	**3**	**CA**	10 Marks
Duration of ESE: 3Hrs.		**ESE**	60 Marks
		Total Marks	**100 Marks**

Course Objectives:

1.	The course objective is to understand the concept of statically indeterminate structures and analyze fixed and continuous beams using the three-moment theorem, including the effects of support settlement.
2.	To teach the application of the slope-deflection method for analyzing indeterminate beams, continuous beams, and portal frames.
3.	To analyze continuous beams and simple portal frames using the Moment Distribution Method for solving statically indeterminate structures.
4.	To analyze rolling loads and draw influence line diagrams for reactions, shear forces, and bending moments in simply supported beams.
5.	To understand column buckling behavior and analyze stability using Euler's and Rankine's formulas for columns and beam-columns.

Course Contents

Unit I	Introduction of Statically indeterminate Structures, Concept of Static indeterminacy, Analysis of fixed and continuous beams by theorem of three moments, effects of sinking of support
Unit II	Slope defection method as applied to indeterminate beams & continuous beams portal frames.
Unit III	Analysis of Continuous Beams & Simple Portal frames using Moment Distribution Method.
Unit IV	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.
Unit V	Buckling of Columns and beams columns, Euler's and Rankine's formula.

Text Books

T.1	"Structural Analysis: A Matrix Approach" author by Pandit G.S and Gupta S.P., 2nd edition, Tata McGraw-Hill Publishing company LTD, New Delhi, 1997
T.2	"Structural Analysis-I" author by Bhavikatti S. S., 4th edition Vikas Publication
T.3	"Structural Analysis" author by Ghali ,A; Neville, A. M; Brown, T .G., 6th edition REPRINT, Taylor And Francis publication
T.4	"Structural Analysis", author by Vaidyanatnan, R and Perumal P, Vol – I & II, 3rd edition, Laxmi Publication, New Delhi, 2007.

Reference Books	
R.1	"Analysis of structures: Theory and Design Vol. 2" author by Vazirani V.N, Ratwani M.M. and S.K. Duggal, 2nd edition Khanna Publishers New Delhi 2009.
R.2	"Structural Analysis (volume II)" author byBhavikatti,4th edition, S.S Vikas publishing House LTD Delhi 2011
R.3	"Mechanical Behavior of Materials" author by Courtney, T. H., 2nd Edition McGraw-Hill publication, 2005.
R.4	"Basic Structural Analysis" author by Reddy C. S. 2nd edition Tata Mc graw Hill publication
Useful Links	
1	https://nptel.ac.in/courses/105/101/105101085/
2	https://nptel.ac.in/courses/105/105/105105166/
3	https://nptel.ac.in/courses/105/105/105105180/

	Course Outcomes	CL
BCE42401.1	**Apply** knowledge to determine the forces in determinate structures and indeterminate structures	3
BCE42401.2	**Analyze** the slope and deflection of beams and frames under structural loading conditions and use the approximate method for analysis of multistoried frame structures	4
BCE42401.3	**Apply** knowledge of Influence Line structural members for rolling loads	3
BCE42401.4	**Apply** stiffness method to analyze beams and plane frames.	3
BCE42401.5	**Apply** direct stiffness method to formulate, stiffness matrix, transformation matrix, load matrix to analyze plane truss.	3

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B.Tech. Civil Engineering - Second year (Semester-IV)

BCE42402: Surveying

Teaching Scheme		Examination Scheme	
Theory	3 Hrs./week	**CT-I**	15Marks
Tutorial	-	**CT-II**	15 Marks
Total Credits	**3**	**CA**	10 Marks
Duration of ESE: 3Hrs		**ESE**	60 Marks
		Total Marks	**100 Marks**

Course Objectives:

1.	To apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in surveying.
2.	To understand the concept of survey, its classification and principles.
3.	To use techniques, skills, and modern engineering tools necessary for engineering practice.
4.	To learn contouring, theodolite & plane table methods of surveying and their applications.
5.	To understand the basic concepts of modern surveying equipment.

Course Contents

Unit I	**Chain and Compass Traversing** Introduction: - Classification, division of survey, Principle of survey, Introduction to Chain Surveying, Compass Surveying: Prismatic Compass, true and magnetic bearing, local attraction, Compass traversing, traverse adjustment of closing errors.
Unit II	**Leveling:** Definitions, principles of leveling, reduction of levels, Classification of leveling, Curvature & Refraction corrections, Reciprocal leveling.
Unit III	**Contouring and Trignometrical Leveling** Contouring: Definitions, Characteristics, uses, and methods of locating contours, interpolation of contours. Trignometrical Leveling: Indirect leveling, elevation of a point with base of an object accessible and inaccessible (with instrument station in/not in the same vertical plane as the elevated object)
Unit IV	**Theodolite Surveying:** Theodolite: Introduction, Type of Theodolite, Temporary adjustment, Principle Axes and relationship, Measurement of horizontal and vertical angles, Traverse Computation: Consecutive and independent co-ordinates, adjustment of closed traverse, Area calculation by co-ordinate.
Unit V	**Plane Table Surveying & Advanced Instruments of Surveying** Plane Table Survey: Instruments and accessories, advantages and disadvantages, orientation, Methods of plane table surveying – radiation, intersection, traversing, resection, two-point and three-point problems in plane tabling. Computation of Area and Volume: Trapezoidal and Simpson's Rule, errors in plane table surveying. Introduction to Total Station, Remote sensing, Geographical Information System (GIS), Global Positioning System (GPS), Electronic Distance Meter (EDM), Google Earth, and their applications

Text Books	
T.1	Surveying and Levelling - Kanetkar and Kulkarni (Vol.I) Pune Vidyarthi Griha Prakashan, 2006 edition
T.2	Surveying and Levelling - Dr. B.C. Punmia (Vol. I) Laxmi Publications, 17th edition 2016
T.3	Surveying (Vol 1) – S. K. Duggal, McGraw-Hill, 5th edition 2019
T.4	Surveying and Leveling – N. N. Basak, Tata McGraw–Hill Education, 2nd edition 2017
Reference Books	
R.1	Surveying Fundamentals & Practices – Jerry A. Nathanson, Pearson Publication, 7th edition 2017
R.2	Surveying with Construction Applications – Barry & Dianne, Pearson Education India, 8th edition 2013
R.3	Construction Surveying and Layout – Wesley Crawford, Creative Construction Publishing, 3rd edition 2002
R.4	Surveying-I – D.G. Phadke, V.M. Thorat, Nirali Prakashan, 4th reprint edition
R.5	Surveying Fundamentals & Practices – Jerry A. Nathanson, Pearson Publication, 7th edition 2017
Useful Links	
1	https://nptel.ac.in/courses/105/107/105107122/

	Course Outcomes	CL
BCE42402.1	**Discuss** the basic concepts of surveying and use of conventional surveying equipment	2
BCE42402.2	**Implement** the basic principles, operation, handling & uses of advanced surveying equipment	3
BCE42402.3	**Sketch** the location map, contour map using surveying equipment	3
BCE42402.4	**Interpret** linear and angular measurements and elevations using Theodolite surveying	3
BCE42402.5	**Interpret** survey data for preparing drawings, plans or maps & to calculate their areas & volumes	3

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B.Tech. Civil Engineering - Second year (Semester-IV)

BCE42403: Concrete Technology

Teaching Scheme		Examination Scheme	
Theory	3 Hrs./week	**CT-I**	15 Marks
Tutorial	-	**CT-II**	15 Marks
Total Credits	**3**	**CA**	10 Marks
Duration of ESE: 3Hrs		**ESE**	60 Marks
		Total Marks	**100 Marks**

Course Objectives:

1.	Remember the constituents of concrete and understand the importance of concrete technology in Construction works where different test performed on concrete.
2.	Analyze the different test on concrete and aggregate. Determine properties of various ingredients of concrete. Understand the various non-destructive tests.
3.	Predict the applications of admixtures and the effect of process of manufacturing on different properties of concrete.
4.	Calculate strength of concrete and its durability by performing test on fresh and hardened concrete, understand shrinkage and cavitation phenomena.
5.	Remember the constituents of concrete and understand the importance of concrete technology in Construction works where different test performed on concrete.

Course Contents

Unit I	Introduction to related Indian standard of cement and aggregates. Constituents of cements, Chemistry of Cement, Hydration of cement. Water requirement, Physical properties and testing of cement. Effect of fineness, Initial, final and false setting of cement, Soundness test. Hardening and compressive strength, Grades and different types of cement, Aggregates: Coarse and fine aggregate, normal, light and heavy weight aggregates. Aggregate characteristic sand their significance in properties of concrete. Sampling, Particle shape and texture, Bond of aggregate, size &grading of aggregate, strength of aggregate. Mechanical properties and tests as per IS, bulking of sand. Crushed sand. Alkali aggregate reaction,
Unit II	Fresh Concrete: Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing, Workability and its Measurement, Factor affecting workability, setting time, Significance of w/c ratio, cohesiveness of concrete, Segregation, bleeding, voids, permeability. Hot weather concreting, Conveyance of concrete, placing of concrete, compaction, vibrators, curing of concrete, significance and methods, temperature effects on curing and strength gain, IS provisions, Maturity of concrete, Formwork for concrete- IS provisions. Introduction to Ready mix, pumped and self-compacting concrete. Introduction to relevant Indian standards, Underwater concreting.
Unit III	Strength of concrete: Strength gain, factors affecting compressive strength, Tensile and flexural strengths, relation between compressive and tensile strength. Failure modes in

	concrete, cracking in compression. Impact strength, fatigue strength, shear, elasticity, Poisson's ratio. Introduction to relevant Indian standards. Testing of hardened concrete: Compression test, cube strength and cylinder strength and their relation, effect of aspect ratio on strength. Flexural strength of concrete, determination of tensile strength, indirect tension test, splitting test, abrasion resistance, accelerated curing test. Introduction to relevant Indian standards. Non-Destructive test: Significance, rebound hammer, ultra-sonic pulse velocity test, Advanced concrete testing equipment. Introduction to relevant Indian standards.
Unit IV	Mix Design: Process, statistical relation between main and characteristic strength, variance, standard deviation, factors affecting mix properties, grading of aggregates, aggregate/cement ratio etc. Degree of quality control, design of mix by IS method, introduction to road Note No. 4 (BS) and ACI method, DOE method. Additives and admixtures: Types of admixtures, natural products, diatomaceous earth, calcined clays of shale, volcanic glasses, byproducts– pozzolana, fly ash, silica fume, rice husk ash, metakaolin, G.G. blast furnace slag, ad mixtures- air entraining, water reducing, accelerators, retarders, plasticizers and super plasticizers, permeability reducing, grouting agents, surface hardeners, Corrosion inhibitors & water proofing agents.
Unit V	Shrinkage: Early volume changes, drying shrinkage, mechanism and factors affecting shrinkage, influence of curing conditions, differential shrinkage, carbonation, creep- factors influencing, relation between creep and time, nature of creep, effect of creep. Durability of concrete: Significance, water as an agent of deterioration, permeability of concrete, sulphate attack and its control, sea water attack, acid attack, efflorescence, resistance to corrosion, abrasion and cavitations, process of rusting of steel, Special concrete: Self compacting concrete, High performance concrete, fiber reinforced & polymer concrete, Ferro cement, Shortcrete pumped concrete, Free flow concrete.
Text Books	
T.1	"Concrete Technology Theory and Practice "authored by M.S. Shetty 6th edition, S. Chand & Company, Limited, 2008
T.2	"Concrete Technology" authored by Gambhir M.L Tata McGraw-Hill Education,2004
T.3	"Properties of Concrete" authored by AM Neville ELBS, Pearson, 28 October 2011
T.4	"Concrete Technology" authored by A R Santhakumar, Oxford higher education,2006
Reference Books	
R.1	"Concrete Micro strucutres: Properties and materials" authored by PK Mehta and PJ Monterio, McGraw Hills Professional, 2013.
R.2	"Concrete Technology", authored by DF Orchard, Applied SciencesPublications,1976
R.3	**"**Concrete Technology and Good Construction Practices" authored by Y P Gupta, New age international publisher, 2013.
R.4	"Concrete Technology", authored by R.S. Varshney, Oxford and IBH,1982
Useful Links	
1	https://nptel.ac.in/courses/105/102/105102012/
2	https://nptel.ac.in/courses/105/104/105104030/

	Course Outcomes	CL
BCE42403.1	**Determine** the test on cement and aggregate which is used on the construction site.	3
BCE42403.2	**Analyze** workability tests on fresh concrete and various tests on hardened concrete.	4
BCE42403.3	**Understand** working of Nondestructive testing equipment.	2
BCE42403.4	**Apply** the knowledge of prepare mix design at different grade of concrete and understanding of application of admixture and its effect on properties of concrete.	3
BCE42403.5	**Predict** the effect of process of manufacturing on different properties of concrete.	2

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B.Tech. Civil Engineering - Second year (Semester-IV)

BEC42406: Instrumentation & Sensor Technologies for Engineering Applications

Teaching Scheme		Examination Scheme	
Theory	2 Hrs./week	**CT-I**	7 Marks
Tutorial		**CT-II**	7 Marks
Total Credits	**2**	**CA**	6 Marks
Duration of ESE: 2 Hrs.		**ESE**	30 Marks
		Total Marks	**50 Marks**

Course Objectives:

1.	Classify sensors and transducers based on working principles, physical phenomena, and application areas.
2.	Examine each transducer's performance attributes, such as frequency response, sensitivity, linearity, resolution, and accuracy.
3.	Discuss the role of smart sensors in real-time monitoring, data acquisition, and control systems in various engineering domains.

Course Contents

Unit I	Introduction: Definition of sensor/transducer-Block Diagram-elements of measurement system-classification of sensors/transducers-static characteristics-accuracy, precision, resolution, linearity, sensitivity, range, loading effect, threshold, dead time, dead zone, span. Errors in measurement: True value, static error, static correction, scale range and scale span, error calibration curve, readability, repeatability & reproducibility, drift and noise
Unit II	Resistive Transducers, Inductive Transducers, Capacitive Transducers, Piezoelectric Transducers, Optical Transducers: Types, Characteristics, Advantages & Disadvantages.
Unit III	Digital and Smart Sensors: Introduction to digital encoding transducer- digital displacement transducers-shaft encoder-optical encoder, Introduction to Smart Sensors, Overview in Applications of sensors in Civil Engineering.

Text Books

T.1	A. K. Ghosh, “Introduction to Measurements & Instrumentation”, III edition, PHI -2019
T.2	A. K. Sawhney & Puneet Sawhney, “A Course in Mechanical Measurements & Instrumentation”, Dhanpat Rai & Co. 2018
T.3	"Instrumentation and Sensors for Engineering Applications" by Arun Shukla and James W. Dally. The book was published by College House Enterprises, LLC, in 2016,

Reference Books

R.1	Raman Pallas-Arney& John G. Webster, “Sensors & Signal Conditioning”,2012.
R.2	D. Patranabis, “Sensors and Transducers” 2nd edition., PHI, 2013.
R.3	BC Nakra, KK Chaudhry “Instrumentation, Measurement and Analysis”, 2nd Edition, TMH 2019

Useful Links	
1	https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-ee32/
2	https://onlinecourses.nptel.ac.in/noc24_ee68/preview
3	https://onlinecourses.nptel.ac.in/noc23_ee95/preview

	Course Outcomes	CL
BEC42406.1	Analyze the components, working of a measurement system and sensors.	4
BEC42406.2	Assess key characteristics of transducers, including sensitivity and accuracy.	5
BEC42406.3	Relate practical experience in integrating, testing, digital and smart sensors.	4

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B.Tech. Civil Engineering - Second year (Semester-IV)

BCE42409: Plastic Waste Management (Open Elective-II)

Teaching Scheme		Examination Scheme	
Theory	2 Hrs./week	**CT-I**	7 Marks
Tutorial		**CT-II**	7 Marks
Total Credits	**2**	**CA**	6 Marks
Duration of ESE: 2 Hrs.		**ESE**	30 Marks
		Total Marks	**50 Marks**

Course Objectives:

1.	To provide students with a comprehensive understanding of plastics, their types, uses, and global impact.
2.	To analyze the environmental and health impacts of plastic waste, both globally and in India.
3.	To explore various strategies for plastic waste management and identify sustainable alternatives to plastic.

Course Contents

Unit I	Plastic: Introduction, Types, Uses and Global Statistics, Plastic Waste – Sources, Composition, Global and Indian Context.
Unit II	Plastic Waste Management Rules 2016 (India) and Global Rules & Regulations, Impact of Plastics on Marine Life, Effect on Wildlife, Human Health and Environment.
Unit III	Plastic Waste Management Practices – Use of Plastic waste in roads, construction & architecture, issues and challenges, Possible Alternate Materials to Plastics – Greener Alternatives, Plastics resource recovery, Recycling methods and Circular Economy.

Text Books

T.1	Plastics and the Environment, by Anthony L. Andrady (Ed.), Wiley Interscience, New York, 2003.
T.2	Plastic Recycling & Waste Management, by Dr. András Szeberényi, Bhgah Y. Adam, Er. Harish Sharma, Dr Dhivya A, JSR PUBLICATIONS (2023)
T.3	Plastic Waste Pollution and Mitigation Strategies, by Dr. Rani Bina, Dr. Anju Sharma, Discovery Publishing House Pvt. Ltd. (2023)

Reference Books

R.1	Medical, Municipal and Plastic Waste Management Handbook by NIIR Board of Consultants & Engineers
R.2	Dr. J.S.Anand, "Recycling & Plastics Waste Management" CIPET, 1997.

Useful Links

1	https://archive.nptel.ac.in/courses/105/105/105105184/

	Course Outcomes	CL
BCE42409.1	Identify types of plastics, their applications, and the global trends in plastic production & consumption.	2
BCE42409.2	Interpret the impact of plastic waste on environmental entities and the relevant regulations governing plastic waste management.	3
BCE42409.3	Evaluate plastic waste management practices, and propose alternative materials that can reduce plastic pollution.	5

H.O.D.
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T.G.P.C.E.T.Nagpur.

Vice Principal
(Academics)
TGPCET, NAGPUR

Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441 108
NAAC Accredited with A+ Grade
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B.Tech. Civil Engineering - Second year (Semester-IV)

BCE42404: Project Management

Teaching Scheme			Examination Scheme	
Theory	2 Hrs./week		**CT-I**	7 Marks
Tutorial			**CT-II**	7 Marks
Total Credits	**2**		**CA**	6 Marks
Duration of ESE: 2 Hrs.			**ESE**	30 Marks
			Total Marks	**50 Marks**

Course Objectives:

1.	To provide students with a comprehensive understanding of project management principles and methodologies.
2.	To equip students with the skills to effectively manage project teams and contracts.
3.	To enable students use the project management tools and techniques to plan and control projects.

Course Contents

Unit I	**Concepts of Project Management:** Concepts of projects, characteristics of project, Phases of project life cycle, Tools and techniques for project management, Computer based project management.
Unit II	**Organizing Human Resources and Contracting:** Delegation, Skills / abilities required for project manager, Authorities and responsibilities of project manager, Project organization, Contracts.
Unit III	**Tools and techniques of project management:** Bar (GANTT) chart, Networks – PERT and CPM, Applications, Basic steps in PERT/CPM.

Text Books

T.1	Project Management, 8th Edition by K. Nagarajan, ISBN: 9789386286024, New Age Publication.
T.2	Project Management, by R.B. Khanna, PHI Learning

Reference Books

R.1	Project Management, by Sanjiv Marwah, ISBN: 8177229729, Dreamtech Press Publication

Useful Links

1	https://onlinecourses.nptel.ac.in/noc24_mg01/preview

	Course Outcomes	CL
BCE42404.1	**Analyze** the characteristics of projects and identify the tools & techniques used in project management.	4
BCE42404.2	**Apply** project organizational structures and contract management principles to real-world scenarios.	3
BCE42404.3	**Analyze** project networks & identify critical paths using PERT and CPM techniques.	4

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BCE42405: Surveying Lab

Teaching Scheme		Examination Scheme	
Practical	2 Hrs./week	**CA**	25 Marks
Tutorial			
Total Credits	**1**	**ESE**	25 Marks
Duration of ESE:		**Total Marks**	**50 Marks**

Course Objectives:

1.	Familiarize the students with basic and advanced surveying tools.
2.	Understand the importance of precision and sources of errors in measurements.
3.	Develop teamwork and collaboration skills during group field assignments.
4.	Perform different types of surveys, such as leveling, traversing, contouring, and topographic surveys.
5.	Provide exposure to modern surveying tools.

	Course Contents	CO
1	Determination of area of given polygon by tape/chain and cross staff survey.	**CO1**
2	Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angles.	**CO2**
3	L - Section and cross section of road (One full size drawing sheet each for L-section and cross section)	**CO3**
4	Measurement of horizontal angles, vertical angles and horizontal distance between two inaccessible points using Theodolite.	**CO3**
5	Locating given building by plane table traversing (One full size drawing sheet	**CO4**
6	Locating given building by Theodolite traversing (One full size drawing sheet)	**CO4**
7	Determination of elevation of point by trigonometric leveling.	**CO3**
8	To draw Contour map of given area (One full size drawing sheet)	**CO5**
9	To give site Layout for given plan of building.	**CO5**
10	Measurement of distance using Electronic Distance Meter (EDM)	**CO5**
11	Location of coordinates by using GIS, GPS and Google Earth	**CO5**
12	Location of horizontal and Vertical coordinates using Total Station	**CO5**

Text Books

T.1	Surveying and Levelling - Kanetkar and Kulkarni (Vol.I), Pune Vidyarthi Griha Prakashan
T.2	Surveying and Levelling - Dr. B.C. Punmia (Vol. I & II), Laxmi Publications

Reference Books

R.1	Surveying and Leveling - Basak N. N.1st Edition, Tata McGraw–Hill Publishing company Ltd. New Delhi

Useful Links	
1	https://nptel.ac.in/courses/105/107/105107122/

	Course Outcomes	CL
BCE42405.1	**Demonstrate** ability to work in a team to carry out a survey of a small area using appropriate methods	3
BCE42405.2	**Apply** the basic principles, operation, handling & uses of the surveying equipment	3
BCE42405.3	**Interpret** the angle and distance measurement; and leveling procedures and apply them to field conditions	3
BCE42405.4	**Examine** the observation, computation and adjustment of a Traverse to carry out basics survey computation and adjustment	3
BCE42405.5	**Evaluate** survey data for preparing drawings, plans or maps	5

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B.Tech. Civil Engineering - Second year (Semester-IV)

BCE42406: Structural Software Training

Teaching Scheme		Examination Scheme	
Practical	4 Hrs./week	**CA**	50 Marks
Tutorial			
Total Credits	**2**	**ESE**	50 Marks
Duration of ESE:		**Total Marks**	**100 Marks**

Course Objectives:

1.	To Understand slope, deflection, and flexural rigidity (EI) in continuous beams.
2.	To Analysis beam behavior under different end conditions and calculate Euler's buckling load.
3.	To Evaluate horizontal thrust and influence lines for arches and portal frames.
4.	To Perform strain measurement and verify Maxwell's reciprocal theorem.
5.	To Develop skills in structural analysis using software for beams, frames, and trusses.

Course Contents

1	To find the slope and deflection of continuous beam.	**CO 1**
2	To find the value of Flexural rigidity (EI) for a given beams and compare with theoretical value	**CO 1**
3	To determine the moment required to produce a given rotation at one end of a beam when the other end is i) Pinned ii) Fixed	**CO 2**
4	To calculate the Eulers Buckling load in order to determine the behavior of different types of struts.	**CO 3**
5	To determine the horizontal thrust and to draw the influence line diagram for horizontal thrust of two hinged parabolic arch.	**CO 3**
6	To measure the strain in the cantilever beam with the help of acoustic resistance strain gauge.	**CO 3**
7	To verify the Maxwell's reciprocal theorem for beam.	**CO 2**
8	To determine horizontal thrust for indeterminate portal frame	**CO 2**
9	Analysis of a continuous beam using computer software.	**CO 4**
10	Analysis of a plane frame using computer software.	**CO 5**
11	Analysis of a plane truss using computer software.	**CO 5**

Text Books	
T.1	"Structural Analysis: A Matrix Approach" author by Pandit G.S and Gupta S.P., 2nd edition, Tata McGraw-Hill Publishing company LTD, New Delhi, 1997
T.2	"Structural Analysis-I" author by Bhavikatti S. S., 4th edition, Vikas Publication
T.3	"Structural Analysis" author by Ghali, A; Neville, A. M; Brown, T.G., 6th edition REPRINT, Taylor And Francis publication
T.4	"Structural Analysis", author by Vaidyanatnan, R and Perumal P, Vol – I & II, 3rd edition, Laxmi Publication, New Delhi, 2007.
Reference Books	
R.1	"Analysis of structures: Theory and Design Vol. 2" author by Vazirani V.N, Ratwani M.M. and S.K. Duggal, 2nd edition Khanna Publishers New Delhi 2009.
R.2	"Structural Analysis (volume II)" author byBhavikatti,4th edition, S.S Vikas publishing House LTD Delhi 2011
R.3	"Mechanical Behavior of Materials" author by Courtney, T. H., 2nd Edition McGraw-Hill publication, 2005.
R.4	"Basic Structural Analysis" author by Reddy C. S. 2nd edition Tata Mc graw Hill publication
Useful Links	
1	https://nptel.ac.in/courses/105/101/105101085/
2	https://nptel.ac.in/courses/105/105/105105166/
3	https://nptel.ac.in/courses/105/105/105105180/

	Course Outcomes	CL
BCE42406.1	**Analyze** the slope and deflection of continuous beam and flexural rigidity by MDM.	4
BCE42406.2	**Determine** the moment required to produce a rotation at one end of beam and verification of Maxwell Reciprocal Theorem.	3
BCE42406.3	**Determine** the behavior of strut by Euler's buckling load and measure horizontal thrust of two-hinged parabolic arch.	3
BCE42406.4	**Analysis** of continuous beam using Software.	4
BCE42406.5	**Analysis** of plane frame and truss using Software.	4

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BCE42408: Introduction to Earth Sciences

Teaching Scheme		Examination Scheme	
Practical	4 Hrs/week	**CA**	50 Marks
Tutorial			
Total Credits	**2**	**ESE**	50 Marks
Duration of ESE:		**Total Marks**	**100 Marks**

Course Objectives:

1.	To understand the basic principles of seismology and the internal structure of the Earth, enabling students to interpret seismic waves and their relationship with Earth's layers.
2.	To study the processes of sea floor spreading and plate tectonics, and analyze their role in shaping the Earth's geological features and causing natural phenomena like earthquakes and volcanic activity.
3.	To examine the causes, effects, and measurement of earthquakes, and develop a thorough understanding of seismic activities and how they can be predicted and assessed.
4.	To explore the processes of cloud formation and precipitation in the context of the hydrological cycle, and understand their significance for weather patterns and global water distribution.
5.	To analyze the environmental impact of human activities, focusing on marine and atmospheric pollution, ozone depletion, climate change, and the consequences of land use and energy consumption on the Earth's ecosystems.

	Course Contents	CO
1	Understand the Basic Concepts of Seismology & Internal Structure of Earth	**CO 1**
2	Describe the Sea Floor Spreading & Plate Tectonics	**CO 1**
3	Investigation of Earthquakes – Their Causes and Measurement	**CO 2**
4	Examination of Cloud Formation and Precipitation Processes (Hydrological Cycle)	**CO 3**
5	Demonstrate Marine and Atmospheric Pollution, Ozone Depletion	**CO 3**
6	Illustrate Climate Change, Greenhouse Gases, and Global Warming	**CO 4**
7	Analysis Physiographic Features and River Basins in India	**CO 2**
8	Analysis of the Impact of Use of Energy and Land on the Environment	**CO 4**

Text Books

T.1	Understanding Earth (5th edition) by Grotzinger, Jordan, Press and Siever, Freeman and Company
T.2	Environmental Geology, Keller, E, A., Prentice Hall, 9th edition, 2011
T.3	Aswathanarayana, U., Geoenvironment: an introduction

Reference Books

R.1	Geology Applied to Engineering by Terry West, Prentice Hall

R.2	Dynamic of Earth by Skinner and Porter
R.3	Structural Geology by M. P. Billings
R.4	Bell, F. G. Environmental Geology Horn & Scott, Geological Hazards
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc23_ce106/preview
2	https://nptel.ac.in/courses/105104156

	Course Outcomes	CL
BCE42408.1	**Comprehend** the basic concepts of seismology, Earth's internal structure, and the processes of sea floor spreading and plate tectonics.	**2**
BCE42408.2	**Analyze** the distribution of river basins and their significance in the geography of India	**4**
BCE42408.3	**Examine** the hydrological cycle and its role in maintaining Earth's water balance.	**4**
BCE42408.4	**Analyze** the environmental effects of pollution, climate change, and land use.	**4**

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