DEPARTMENT OF CIVILENGINEERING

MINUTES OF BOARD OF STUDIES MEETING, DECEMBER 2025 ALONG WITH ITS ANNEXURES

Minutes of Board of Studies Meeting held on 04th December 2025

The meeting of Board of Studies of the Civil Engineering department was held on 04th December, 2025 at 11:00 AM onwards in Seminar Hall - I. Following were present:

1. Dr. Sanjay Tiwari (Chairperson BoS & Head of the department, Civil Engg, MITS)
2. Dr. S. K. Jain (Professor, Civil Engg, MITS, Member, BoS)
3. Dr. M. K. Trivedi (Professor, Civil Engg, MITS, Member, BoS)
4. Prof. A. K. Saxena (Associate Professor, Civil Engg, MITS, Member, BoS)
5. Dr. Sunita Sharma (Associate Professor, Civil Engg, MITS, Member, BoS)
6. Prof. G. Bhadoriya (Assistant Professor, Civil Engg, MITS, Member, BoS)
7. Prof. Aditya K. Agarwal (Assistant Professor, Civil Engg, MITS, Member, BoS)

Following agendas were discussed & deliberated upon:

Item No. / CE - 1	**To confirm the minutes of previous BoS Meeting held in the month of June 2025** The minutes of previous BoS Meeting held on 04th June, 2025 are confirmed.
Item No. / CE – 2	**To review and finalize the scheme structure of B.Tech./B.Arch. II semester for the Batch admitted in 2025-26 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) structure** The scheme of II semester for B.Tech Civil Engineering for 2025-26 batch admitted students was discussed and finalized. Same is being attached in Annexure – I.
Item No. / CE – 3	**To review and finalize the syllabi of all courses of UG programmes - B. Tech. and B.Arch. II Semester (for batch admitted in 2025-26) along with their COs and CO-PO/PSO matrix.** The syllabi of all courses for B.Tech Civil Engineering II Semester for 2025-26 batch admitted students was reviewed and finalized. Same is being attached in Annexure – II.
Item No. / CE – 4	**To review and finalize the Experiment list/ Lab manual and project list under Micro Project-II for all the Laboratory Courses to be offered in UG programmes – B.Tech. and B.Arch. II Semester (for batch admitted in 2025-26) along with their COs and CO-PO/PSO matrix.** The experiment list for all the laboratory courses along with their COs and CO-PO/PSO matrix that are offered in B.Tech Civil Engineering II Semester was reviewed and finalized. The list of Micro Project – II along with COs and CO-PO/PSO matrix was also finalized. The experiment list and list of Micro Project – II is attached in Annexure – III.

Item No. / CE - 5	**To review and finalize the scheme structure of B.Tech./B.Arch. IV semester for the Batch admitted in 2024-25 academic session under the Madhav Institute of Technology & Science-Deemed University (MITS-DU) structure.** The scheme of IV semester for B.Tech Civil Engineering for 2024-25 batch admitted students was discussed and finalized. Same is being attached in Annexure – IV.
Item No. / CE - 6	**To review and finalize the syllabi of all courses of UG programmes - B. Tech. and B.Arch. IV Semester (for batch admitted in 2024-25) along with their COs and CO-PO/PSO matrix.** The syllabi of all courses for B.Tech Civil Engineering IV Semester for 2024-25 batch admitted students was reviewed and finalized. Same is being attached in Annexure – V.
Item No. / CE – 7	**To review and finalize the Experiment list/ Lab manual and project list under Macro Project-II for all the Laboratory Courses to be offered in UG programmes – B.Tech. and B.Arch. IV Semester (for batch admitted in 2024-25) along with their COs and CO-PO/PSO matrix.** The experiment list for all the laboratory courses along with their COs and CO-PO/PSO matrix that are offered in B.Tech Civil Engineering IV Semester was reviewed and finalized. The list of Macro Project – II along with COs and CO-PO/PSO matrix was finalized. The experiment list and list of Macro Project – II is attached in Annexure – VI.
Item No. / CE – 8	**To review and finalize the list of additional courses for Honours/Minors to be offered from SWAYAM/NPTEL/Institute MOOC based platform for UG programmes – B.Tech. and B.Arch., IV Semester (for batch admitted in 2024-25).** Following three (03) specialization tracks have been finalized for award of the degree with Honours for B.Tech Civil Engineering students (2024-25 admitted batch). Track 1. Structural Engineering Track 2. Environmental Engineering Track 3. Construction Technology & Management Following additional courses (track – wise) will be offered from SWAYAM/NPTEL for award of **Honours degree** in B.Tech IV semester. **Track 1. Structural Engineering** 1. H11240411, Structural Dynamics 2. H11240412, Development & Application of Special Concrete 3. H11240413, Applied Seismology for Engineers **Track 2. Environmental Engineering** 1. H11240421, Environmental Chemistry & Microbiology 2. H11240422, Environmental Quality Monitoring & Analysis

	3. H11240423, Environmental Fluid Mechanics **Track 3. Construction Technology & Management** 1. H11240431, Geophysical Exploration Methods 2. H11240432, Modern Construction Materials 3. H11240433, Construction Methods & Equipment Management Following additional courses will be offered from SWAYAM/NPTEL for award of **Minor degree** in B.Tech IV Semester. 1. M11240401, Basic Construction Materials 2. M11240402, Engineering Mechanics - Statics and Dynamics 3. M11240403, Introduction to Accounting and Finance for Civil Engineers
Item No. / CE – 9	**To propose/update the list of professional certification platforms and relating certifications with specific domain/areas of certification.** A proposed representative list of professional certification courses on various certification platforms was discussed and same is attached in Annexure – VII.
Item No. / CE – 10	**To review and finalize the scheme structure & syllabi of PG Programmes, II semester (admitted in 2025-26 session) along with their COs.** Civil Engineering Department is offering two PG Programme: (i) M.E. in Construction Technology & Management (ii) M.Tech in Structural Design The scheme structure for II semester for both these PG programme for the batch admitted in 2025-26 academic session was discussed and finalized. The syllabi for all courses for II Semester for both these PG programmes for batch admitted in 2025-26 academic session was also discussed and finalized. The finalized scheme and syllabi is attached in Annexure – VIII.
Item No. / CE – 11	**To review and finalize the syllabus/module content for Classified Novel Engaging Courses to be offered in PG programmes, II semester (2025-26 admitted batch).** The following courses are proposed as Classified Novel Engaging Course in II Semester of PG Programme 1. Fire Safety & Regulation in Building 2. Basic Statistical Concepts 3. Thesis and Research Paper Writing The module for these courses was finalized and the same is attached in Annexure – IX.
Item No. / CE – 12	**To review and finalize the courses and syllabi for all courses of PG Programmes including the System Development Projects (MCA/MBA), IV semester (2024-25**

	admitted batch) along with their Course Outcomes (COs). This Item Agenda is not applicable to the department. However the scheme of ME CTM IV Semester (for batch admitted in 2024-25 session) is attached in Annexure – X.
Item No. / CE – 13	**To review the CO attainments, identify gaps and suggest corrective measures for the improvement in CO attainment levels for the courses taught in second semester, January-June 2025 Session.** CO attainment calculations & gap analysis has been done for the courses taught in B.Tech Second Semester, January – June 2025 session. On the basis of the analysis it is observed that in some of the courses, the CO attainment level for COs is found to be below the set target, for those COs corrective actions have been suggested. The compiled report is attached in Annexure – XI.
Item No. / CE – 14	**To consider and review the curriculum feedback from various stakeholders, its analysis and impact report.** The curriculum feedback has been taken from various stakeholders for curriculum offered under MITS DU structure. The compiled report along with its analysis is attached in Annexure – XII.
Item No. / CE – 15	**BoS Agenda under RGPV Structure** The compiled compendium of BoS Agenda under RGPV structure is attached in Appendix – A.
Item No. / CE – 16	**Any other matter** None

The meeting ended with vote of thanks to the chair.

(Prof. Aditya K. Agarwal)
Member BoS

(Prof. G. Bhadoriya)
Member BoS

(Dr. Sunita Sharma)
Member BoS

(Prof. A. K. Saxena)
Member BoS

(Dr. M. K. Trivedi)
Member BoS

(Dr. S. K. Jain)
Member BoS

(Dr. Sanjay Tiwari)
Head of Department & Chairperson, BoS

Summary of Board of Studies Meeting held on 04th December 2025

COURSES WHERE SYLLABUS REVISION WAS CARRIED OUT
(Session: January – June 2026)

Course name	Course Code	Year/Date of introduction	Year/Date of revision	Percentage of content added or replaced	Agenda Item No.	Page No.
Surveying	11251201	09/12/2024	04/12/2025	15.5%	3	2, 6, 7
Concrete Technology	11251203	09/12/2024	04/12/2025	5%	3	2, 6, 11
Fluid Mechanics – I	11251205	09/12/2024	04/12/2025	10%	3	2, 6, 13
Transportation Engineering - I	11242201	02/06/2023	04/12/2025	15.5%	6	3, 33, 34
Structural Analysis – II	11242205	01/12/2023	04/12/2025	18.75%	6	3, 33, 42

Summary of Board of Studies Meeting held on 04th December 2025

NEW COURSES ADDED
(Session: January - June 2026)

Course name	Course Code	Activities/contents which have a bearing on increasing skill and employability	Agenda Item No.	Page No.
Macro Project - II	11242210	Macro Project based learning	7	3,34,50
Development & Application of Special Concrete	H11240412	Special Concrete like micro concrete, high strength concrete	8	3
Applied Seismology for Engineers	H11240413	Seismic hazard analysis	8	3
Environmental Quality Monitoring & Analysis	H11240422	Methods for sampling/processing/analysis, Monitoring of environmental parameters	8	3
Environmental Fluid Mechanics	H11240423	Plumes in unstratified & stratified medium	8	3
Geophysical Exploration Methods	H11240431	Electrical Resistivity Methods, Radar Techniques	8	3
Design of Bridges	72251201	Design different type of bridges	10	4,64,65
Design of Prestressed Concrete Structure	72251202	Analysis of prestressed members, Design of anchorage zones in post-tensioned members	10	4,64,66
Earthquake Resistant Design	72251203	Seismic Design of structure	10	4,64,67
Design of Tall Buildings	72251204	Analysis and design of tall buildings	10	4,64,68
Design Lab	72251205	Design of Buildings using STAAD Pro Software	10	4,64,69

ANNEXURE – I

Scheme Structure for B.Tech Civil Engineering II Semester (2025-26 admitted batch students)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)
NAAC Accredited with A++ Grade

Department of Civil Engineering
Scheme of Evaluation
B. Tech. II Semester *(Civil Engineering)*

(for batch admitted in academic session 2025-26)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional									
1.	11251201	DC	Surveying	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	11251202	DC	Strength of Material	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11251203	DC	Concrete Technology	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11251204	DC	Fluid Mechanics – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11251205	BSC	Matrices & Calculus	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
6.	11251206	DLC	Building Materials & Construction Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11251207	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11251208	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11251209	PBL	Micro Project-II[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11251210	ESC	Engineering Foundation	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	11251211	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
13.	SIP1XXXX	SIP	Skill Internship Program (Soft Skills)	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	-
Total				**125**	**125**	**100**	**150**	**510**	**150**	**1160**	**12**	**04**	**12**	**24**	-	-	-
14.	11251212	MAC	Sustainability & Environmental Science	-	-	-	-	100	-	100	-	2	-	GRADE	Blended	SO	-
15.	11251213	MWS	Mandatory Workshop on Career Planning & Goal Setting at Department Level											GRADE	Interactive	MCQ	-

Summer Semester of six-eight weeks duration will be conducted for makeup of I & II semester examination.

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

** These credits will be transferred from Skill Internship Program (Soft Skills).

[#]Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	4	0	0	0	2	1	1	1	0	0	1	1	1

Mode of Learning							Mode of Examination							Total Credits
Theory		NEC	Lab				Theory				Lab		NEC	
Face to Face	Online	Interactive	Face to Face	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1	1	3	3			15		4	4	1	24
62.5%		4.17%	4.17%	4.17%	12.5%	12.5%			62.5%		16.67%	16.67%	4.17%	Credits %

Recommended in the Board of Studies Meeting of Department of Civil Engineering held on 4 December 2025

ANNEXURE – II

Syllabus for B.Tech Civil Engineering II Semester (2025-26 admitted batch students)

Course Code: 11251201

Course Name: Surveying

L	T	P	Credit
3	0	0	3

Course Objective:

The course aims to provide knowledge of surveying instruments and techniques for measuring distance, direction, and elevation; to develop skills in field surveying and setting-out works; and to introduce the application of curves and specialized surveying methods.

SYLLABUS

Unit I Fundamentals of Surveying

Introduction to surveying, their objectives, classification, methods and principles, measurement of distance and angle. Types of scales, linear measurement and their methods, errors in measurements.

Unit II Levelling & Contouring

Method of Levelling- differential, fly, profile, cross-section, reciprocal & trigonometric levelling. Contour lines and their characteristics, contour interval, horizontal equivalent, contour gradient, grade contours. Measurement of area and volume.

Unit III Tachometry & Traversing

Principles and instruments used in tachometry, methods of theodolite traversing, plotting and adjustment, omitted measurement in traverse, plane table surveying, elements of Total Station traversing and data adjustment.

Unit IV Curves

Curve surveying, their use, elements of circular curves, methods of setting out curves, obstacles and special problems, compound curves, reverse curves, transition curves, vertical curve, computation and setting out.

Unit V Modern Surveying Techniques

Geographic Information System (GIS) and Global Positioning System (GPS), aerial surveying technique: UAV-based LiDAR survey, thermal & multispectral survey, use of Differential GPS in surveying, smart surveying technologies.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2023
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 2019
3. Surveying Volume – I & II, S. K. Duggal, McGraw Hill Publication, 2020
4. Advanced Surveying: Total Station, GPS, GIS, Remote Sensing, Drone and Hydrographic Surveying, Satheesh Gopi, R. Sathikumar & N. Madhu, Pearson India, 2025.

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition 2001
2. Surveying & Levelling, N N Basak, McGraw Hill Publications, 2015
3. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999

4. Plane & Geodetic surveying Vol. I & II, David Clark & J Clendinning, Constable & C. London, 2017

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Explain basic concepts, methods and measurements in surveying.

CO2: Apply levelling techniques and generate contour maps with area/volume estimation.

CO3: Perform tachometric and theodolite traversing and adjust traverse data.

CO4: Analyze and set out different types of horizontal and vertical curves.

CO5: Evaluate modern geospatial surveying techniques for their effectiveness in accurate data acquisition and mapping.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1	–	–	1	–	1	1	-	-
CO2	3	3	1	2	1	-	1	1	–	1	1	1	1
CO3	3	3	2	3	2	-	–	1	1	1	1	1	-
CO4	3	3	2	2	1	–	1	1	–	2	1	-	1
CO5	3	2	1	2	3	1	1	1	1	2	2	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251202

Course Name: Strength of Materials

L	T	P	Credit
2	1	0	3

Course Objective:

To understand the concepts of simple and compound stress & strain; behavior of elastic material in bending, shear and torsion; behavior of column with different end condition; stress and strain in pressure vessel and plasticity.

SYLLABUS

Unit I:

Stress and Strains: Concept of Elastic body, stress and strain. Hooke's law various types of stress and strains. Elastic constants and their relation Stresses in compound bars, composite and tapering bars, temperature stresses.

Unit-II:

Two-dimensional stress system: Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses, Theories of failure.

Pressure Vessels: Thin cylinders and spheres. Stress due to internal pressure. Change in diameter and volumes.

Unit-III:

Theory of simple bending: Concept of pure bending and bending stress, equation of bending, Neutral axis, Section-Modulus, Bending stress distribution across a section, Shear Stresses in Beams, beams of uniform strength, shear centre, strain energy.

Unit-IV:

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow circular shafts. Combined bending and torsion.

Columns and Struts: Euler's buckling load for uniform section, various end conditions. Slenderness Ratio. Merchant Ranking formulae, Eccentric loading on columns.

Unit-V:

Plasticity: Concept of Plasticity, Stress-strain diagram for Elastic-Plastic, Plastic bending, Plastic modulus, Yield deformation.

Text Books:

1. Strength of Materials, Sadhu Singh, Khanna Publishing, 11th edition 2024
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 2025
3. Strength of Materials, R.K. Bansal, Laxmi Publication; 7th edition 2024

Reference Books:

1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials Vol. I & II, B.C. Punmia, Laxmi Publication, 10th edition 2025
3. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 11th edition, 2023
4. Mechanics of Materials, J.M. Gere & B.J. Goodno, Cengage Publisher, 2023

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Apply the concepts of stress and strain.

CO2: Apply the concept of two dimensional stresses.

CO3: Apply the theory of simple bending and shear stresses in beams.

CO4: Evaluate the pure torsion in shaft and columns & struts with different end conditions.

CO5: Apply the concept of plasticity.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	1	-	-	-
CO2	3	3	2	2	-	-	-	-	-	1	-	-	-
CO3	3	3	2	2	-	-	-	-	-	1	-	-	-
CO4	3	3	2	2	1	1	-	-	2	2	-	-	2
CO5	3	3	2	2	1	1	-	1	2	2	2	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251203

Course Name: Concrete Technology

L	T	P	Credit
2	1	0	3

Course Objective:

To equip students with a comprehensive understanding of the properties, production, testing, and mix design of concrete, enabling them to specify, produce, and control the quality of concrete for durable and sustainable construction.

SYLLABUS

Unit-I Components of Concrete:

Cement: Chemical composition of cement, Hydration of cement, Types of Portland cement as per IS and ASTM classification, Fly ash; use of pozzolanas.

Aggregates: General classification of aggregates, natural and artificial aggregates, particle shape and texture, bond of aggregate, strength of aggregate, Mechanical properties of aggregate, specific gravity, Bulk density, porosity and absorption of aggregate, moisture content of aggregate, Bulking of sand Deleterious substances in aggregates, organic impurities. Soundness of aggregates.

Admixtures: Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticizers.

Unit-II Fresh and Hardened Concrete:

Fresh Concrete: Workability of concrete, factors affecting workability, measurement of workability using slump test, Compaction factor test, Flow test, Vee-Bee Test, Ball penetration test, Segregation and Bleeding of concrete, Mixing of concrete, Vibration of concrete, Different types of mixers and vibrators.

Hardened Concrete: Mechanical properties of concrete, Stress and strain characteristics of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Fire resistance of concrete, Thermal properties of concrete.

Unit-III Testing & Quality Control of Concrete:

(a) Compression tests-cube test, Cylinder test, effect of end conditions on specimen and capping. Flexure test, splitting test, influence of size of specimen on strength, rebound hammer test, penetration resistance test, Pull-out-test, ultrasonic pulse velocity test.

(b) Field control for Quality of Concrete, Advantages of Quality Control, Statistical quality control, Measure of variability & its applications, Quality management in concrete construction.

Unit-IV Concrete Mix Design:

Basic considerations, Factors in the choice of mix proportions, Design of standard concrete mixes by IS code methods.

Unit-V Special Concretes:

Vacuum Dewatering– Underwater Concrete, Special Form Work, Polymer Concrete, Plum Concrete, Self-Compacting Concrete, Light weight concrete.

Text Books:

1. M.L Gambhir, Concrete Technology, McGraw Hill Publications, 6th edition, 2025.
2. M.S Shetty & A K Jain, Concrete Technology Theory & Practice, S. Chand Publishers, 8th edition, 2019
3. Neville M., Properties of Concrete, ELBS, PHI Publishers, 1999
4. D.F. Orchard, Concrete Technology, App Science Publishers

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Explain the basic components of concrete.

CO2: Analyze properties of fresh and hardened concrete.

CO3: Apply quality control measures in concrete construction.

CO4: Design concrete mixes using standard guidelines.

CO5: Evaluate the use of special concrete for advanced applications.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	2	-	2	-	-	-	-	-	2	-
CO2	2	2	2	2	-	2	-	-	1	1	-	2	-
CO3	2	2	2	2	2	2	1	1	1	1	1	2	1
CO4	3	2	3	2	2	2	1	2	2	2	2	3	1
CO5	2	2	2	2	-	2	-	-	1	2	1	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251204

Course Name: Fluid Mechanics – I

L	T	P	Credit
2	1	0	3

Course Objective:

To develop a strong foundational understanding of fluid properties, fluid statics, kinematics, and dynamics, enabling students to analyze basic fluid behavior in engineering systems. The course aims to build competency in applying continuity, momentum, and energy principles, understanding laminar flow, and using dimensional analysis and similitude for model studies. It also introduces students to modern flow visualization techniques and IoT-based flow, pressure, and level monitoring, preparing them for advanced hydraulic analysis.

SYLLABUS

Unit - I

Fluid Properties: Introduction and scope of Fluid Mechanics, Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus and pressure.

Fluid Statics: Pressure at a point, Pascal's law, Hydrostatic law, Absolute and gauge pressure, manometers: simple & differential manometers, Hydrostatic forces on plane surfaces (basic), Buoyancy, center of buoyancy, metacentric height, stability of floating/ submerged bodies.

Unit-II

Fluid Kinematics: Types of fluid flow: ideal & real, steady/unsteady, uniform/non-uniform, one, two and three-dimensional flow, Flow descriptions: pathlines, streamlines, streaklines, stream tubes, Continuity equation, rotational/irrotational flow, velocity potential, stream function, circulation, stagnation point.

Unit-III

Fluid Dynamics: Equations of motion, Euler's equation, Bernoulli's equation-derivation & applications, Velocity and flow measurement: Orifices, mouth pieces, orifice meter, venturimeter, weirs and notches.

Momentum Principles: Momentum equation and applications: pipe bends, nozzles, and elementary vane problems with simple velocity triangles

Unit-IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham- π theorem, dimensionless numbers. Similarity laws: geometric, kinematic, dynamic (essentials only).

Laminar Flow: Introduction to fluid flow, Reynolds experiment, concept of laminar–transition–turbulent regimes, Reynolds number, laminar flow through circular pipes and between parallel plates (basic relations only). Laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.

Unit – V

Modern Visualization: Basics of flow visualization: principles and simple applications of Particle Image Velocimetry (PIV) and ultrasonic methods.

Smart Fluid Monitoring: Introduction to smart monitoring in fluid systems: need for real-time flow, level, and pressure monitoring. Basic working principles of modern sensors: pressure sensors, ultrasonic level sensors, electromagnetic flow meters.

Text Books

1. Hydraulics & Fluid Mechanics including Hydraulic Machines, Modi & Seth, Standard Book house, Delhi, 22nd edition, 2019
2. Fluid Mechanics: Fundamentals and Applications, Yunus A. Cengel, John M. Cimbala, McGraw Hill Education India, New Delhi, 4th edition, 2019

Reference books

1. Fluid Mechanics and Hydraulic Machines, R.K. Bansal, Laxmi Publications, New Delhi, 11th edition, 2025
2. Fluid Mechanics including Hydraulic Machine, A.K. Jain, Khanna Publishers, Delhi, 12th edition 2024

Courses Outcomes

Upon completion of the course, a student will be able to

CO1: Explain fundamental fluid properties, hydrostatic laws, pressure measurement principles, and stability of floating and submerged bodies.

CO2: Illustrate various types of fluid flow using kinematic descriptions such as streamlines, pathlines, continuity equation, velocity potential, stream function, and flow nets.

CO3: Apply Euler's and Bernoulli's equations along with momentum principles to compute flow parameters and evaluate discharge using standard flow-measurement devices.

CO4: Analyze dimensionless terms, similarity criteria, and laminar flow solutions in pipes and between plates to predict flow behavior under varied hydraulic conditions.

CO5: Demonstrate modern flow visualization techniques and IoT-based smart sensing systems for monitoring flow, pressure, and level in hydraulic applications.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1	2	1	–	1	1	1	-	-
CO2	3	3	2	2	2	2	1	–	1	2	1	-	-
CO3	3	3	2	2	2	2	1	–	1	2	1	-	1
CO4	3	3	2	3	2	2	–	1	1	2	1	-	-
CO5	2	2	1	2	3	3	2	1	1	2	3	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251205

Course Name: Matrices & Calculus

L	T	P	Credit
3	0	0	3

Course Objective:

- To learn types of matrices and their properties
- To learn the concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form
- To expose the concept of ordinary and partial differentiation
- To find maxima and minima of function of two and three variables.
- To evaluate multiple integrals and their applications

SYLLABUS

Unit I: Matrices-I

Types of Matrix, Hermitian and skew Hermitian matrix, unitary matrix, Matrix Rank of a matrix by Echelon Form and Normal Form, Inverse of Non-singular matrix by elementary transformation, solution of system of Homogeneous and non-homogeneous equations by elementary transformation, Consistency of equation.

Unit II: Matrices-II

Linear dependence of vectors, Eigenvalues and Eigenvectors with their properties, Cayley Hamilton theorem and its application to finding inverse of matrix, Diagonalization of a matrix

Unit III: Differential Calculus -I

nth Derivative, Leibnitz's theorem, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables.

Unit IV: Differential calculus-II

Taylor's and Maclaurin's Theorems, Expansion of function of several variables, Jacobian, properties of Jacobian, Approximation of errors, Extrema of functions of several variables (Maxima and Minima of function of one and two variables), Lagrange's method of multipliers (Simple applications).

Unit V: Integral Calculus

Beta and Gamma function and its properties, transformation of Beta function, Gamma functions, transformation of Gamma function, relation between Beta and Gamma function, Double and Triple integrals, Change of order of integration, Application of Integration: (i) By Double integrals compute the area of irregular shapes and bounded regions, (ii) By Triple integrals compute work done by non-uniform force fields.

Recommended Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advanced Engineering Mathematics, Narosa Publishing House Pvt. Ltd, 5th Edition (2016).

4. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
5. B.V. Ramana: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

Courses Outcomes

Upon completion of the course, a student will be able to

CO1: Demonstrate the applications of matrices.

CO2: Apply various matrix in engineering problems.

CO3: Solve problems of differential calculus.

CO4: Deduce applications of differential calculus in basic engineering problems

CO5: Use integration techniques to determine the solution of various complex problems

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	1	-	-	-	-	-	1	-	-	-
CO2	3	2	1	1	1	-	-	-	1	1	1	-	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	1	-	-	-
CO5	3	1	-	-	1	-	-	-	1	1	1	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251212

Course Name: Sustainability & Environmental Science

L	T	P	Credit
0	2	0	GRADE

Course Objective:

To equip students with a comprehensive understanding of environmental science, pollution control, sustainability, and global frameworks, enabling them to analyze environmental challenges and contribute to sustainable solutions through informed decision-making and responsible practices.

Syllabus:

Unit I:

Introduction to Environmental Science: definition, importance and its components. Ecosystem and its components. Water cycle, carbon cycle, food chain, energy flow in ecosystem. Current state of environment in India and world; Underlying reasons (root causes) of modern environmental degradation (social, psychological, cultural). Introduction to Environmental pollution: air, water, noise, soil, thermal and radioactive.

Unit II:

Environmental Pollution and Management: air, water, noise, soil, thermal and radioactive. Causes, impacts, pollution control techniques and mitigation strategies. Solid waste management: Principles of waste management, different components of waste management system and introduction to management of hazardous waste like e-waste, plastic waste. Global environmental Issues: Climate change, global warming, ozone layer depletion, urban heat island

Unit III:

Environmental policies and laws in India: Environmental Protection Act, Water Act, Air Act. **Overview of global environmental policies and frameworks:** Kyoto protocol, Montreal protocol, COP summits. Introduction to clean development mechanism, carbon credit, carbon trading. Environmental audit.

Unit IV:

Sustainability concepts: definition, importance, pillars of sustainability (economic, environmental, and social). Sustainable development. Overview of UN Sustainable Development Goals (SDGs) and their global relevance. Concept of circular economy, resource efficiency, energy conservation, green buildings and sustainable manufacturing.

Unit V:

Sustainable Energy solutions: New energy sources: need of new sources, different types of new energy sources, application of hydrogen energy, ocean energy sources, and tidal energy conversion. Concept, origin and power plant of geothermal energy. Renewable energy sources like water, wind etc. Overview of sustainable materials and construction practices. Introduction to sustainable transportation systems and sustainable water infrastructure.

Recommended Books:

1. D. K. Asthana, Meera Asthana, A Text Book of Environmental Studies, S Chand & Co., New Delhi.

2. S. K. Dhameja, Environmental Engineering & Management, S K Kataria & Sons, New Delhi

3. C. S. Rao, Environmental Pollution Control Engineering, C.S. Rao, New Age International Publishers

4. A. K. Gupta, Environmental Sustainability and Green Technologies, PHI Learning.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1. Explain the fundamental concepts of environmental science, including ecosystems and the causes of environmental degradation.

CO2. Analyze the sources, causes, and impacts of air, water, and solid waste pollution and propose appropriate mitigation strategies.

CO3. Evaluate the effectiveness of environmental policies and global frameworks in addressing environmental challenges.

CO4. Explain the concepts of sustainability and sustainable development goals.

CO5. Apply various solutions for achieving sustainable development.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	1	-	-	-	-	-	-
CO2	2	2	2	1	1	2	3	1	1	-	1	1	1
CO3	-	-	1	1	-	1	2	2	1	1	1	-	1
CO4	-	-	-	-	-	-	2	2	1	1	2	-	1
CO5	2	2	2	1	-	1	3	2	2	2	2	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

ANNEXURE – III

Experiment List / List of Micro Project – II for B.Tech Civil Engineering II Semester (2025-26 admitted batch students)

Course Code: 11251206

Course Name: Building Materials & Construction Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

I. TEST ON FINE & COARSE AGGREGATES

1. Gradation of aggregates.
2. Determination of specific gravity.
3. Bulking of sand.
4. Compacted and loose bulk density of fine aggregate.

II. TEST ON CEMENT

1. Determination of fineness modulus of cement.
2. Determination of specific gravity.
3. Determination of Consistency.
4. Determination of Initial & Final setting time.
5. Soundness Test of Cement.
6. Compressive strength test of Cement.

III. TEST ON CONCRETE

1. Test for Slump.
2. Test for Compaction factor.
3. Test for Compressive strength - Cube & Cylinder.

IV. TEST ON BRICKS

1. Test for compressive strength of bricks.
2. Test for Water absorption of bricks.
3. Determination of Efflorescence of bricks.

Course Outcomes:

Upon completion of the course, a student will be able to

CO 1: Analyze the properties of fine and coarse aggregates

CO 2: Evaluate concrete workability and strength

CO 3: Assess the quality of bricks for construction.

CO 4: Understand the durability and performance of building materials

CO 5: Apply testing knowledge to construction practices

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	1	2	2	2	-	2	2	2	1	2	1
CO2	2	1	-	3	2	2	1	2	2	2	2	2	1
CO3	1	1	-	2	2	2	-	2	2	2	1	1	1
CO4	1	1	1	2	2	2	-	2	2	2	1	1	1
CO5	1	-	1	2	2	2	1	2	2	2	1	2	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251207

Course Name: Problem Solving Through Python Programming

L	T	P	Credit
0	0	2	1

Course Objectives:

- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Setting up the Python environment (Anaconda, Jupyter Notebook), Basic syntax usage: variables, data types, and operators, First Python program, Control Structures: Conditional statements: if, elif, else, Looping constructs: for and while loops Nested control structures

Unit II

List/ Set/ Tuple operations: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.) Strings: Reverse, Palindrome, Character count, Replacing Character

Unit III

Matrix and Array: Define matrix and print, Arithmetic operation between Matrix,

Functions and Modules implementation: Defining and calling functions, Function parameters and return values, Scope and lifetime of variables, Importing and using modules, In-Built Functions, Recursion, Lambda function

Unit IV

Classes, and Objects: Create class and object, Self-parameter, Attribut and methods, Implement Inheritance and polymorphism.

File Handling: Read and write to files, Working with CSV and JSON file, Implement try-except blocks, Debug a piece of code

Unit V

GUI: Work with Canvas, draw geometric shapes, Fill colour, Creating Simple GUI, GUI packages, Tkinter, Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames, Widget window – Bg, Bd, Cursor, font, Fg, Command, Minimal Application

Reference Books:

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

LIST OF EXPERIMENT'S

1. Python Program to
    a. Generate a Random Number
    b. Convert Kilometers to Miles
    c. Check if a Number is Positive, Negative or 0
    d. Print the Fibonacci sequence
    e. Find ASCII Value of Character
    f. Shuffle Deck of Cards
    g. Display Calendar
2. Python Program to
    a. Display the Fibonacci Sequence Using Recursion
    b. Find the Sum of Natural Numbers Using Recursion
    c. Find the Factorial of Number Using Recursion
    d. Convert Decimal to Binary Using Recursion
3. Python Program to Add Two Matrices, Transpose a Matrix, Multiply Two Matrices
4. Python Program to
    a. Check Whether a String is Palindrome or Not
    b. Remove Punctuations from a String
    c. Sort Words in Alphabetic Order
5. Python Program to Illustrate Different Set, Tuple, and List operations.
6. Python Program to Iterate Over Dictionaries Using for Loop
7. Python Program to Catch Multiple Exceptions in One Line
8. Python Program to Copy a File
9. Python Program to Get Line Count of a File
10. Python Program to Find All Files with .txt Extension Present Inside a Directory
11. Python Program to Return Multiple Values from a Function
12. Write a Python program to create a person class. Include attributes like name, country, and date of birth. Implement a method to determine the person's age
13. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.

14. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items and calculating the total price.

15. Create Python GUI using Tkinter

a. Displaying Text and Images with Label Widgets

b. Displaying Clickable Buttons with Button Widgets

c. Getting User Input with Entry Widgets

d. Getting Multiline User Input with Text Widgets

e. Assigning Widgets to Frames with Frame Widgets

f. Adjusting Frame Appearance with Relief

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Implement Python built-in functions and control statements.

CO2: Implement Python user-defined functions and classes.

CO3: Create Python GUI.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	1	2	3	-	-	-	2	1	-	-	-
CO2	1	2	1	2	3	-	-	-	2	1	-	-	-
CO3	2	2	2	3	3	-	1	-	2	3	2	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251209

Course Name: Micro Project – II

L	T	P	Credit
0	0	2	1

LIST OF MICRO PROJECTS

1. Calculation of Area by offset with reference to chain line.
2. Determine height of an object by trigonometrical levelling.
3. Traversing by Theodolite and tape.
4. Conduct a profile levelling and cross-sectioning for a portion of proposed road.
5. Conduct a fly levelling to transfer Bench mark from one station point to another proposed station point.
6. Traversing by using Total station.
7. Locate building with respect to chain line by taking offsets.
8. Campus Mapping Using Total Station / Auto Level
9. Levelling and Contour Map of a Playground
10. Study of ready mix concrete
11. Comparative study on workability of different grade of concrete
12. Study of green concrete
13. Study of light weight concrete
14. Study of concrete workability using super plasticizers
15. Study on durability of concrete in aggressive environments
16. Effect of Water-Cement Ratio on Concrete Strength
17. Use of Chemical Admixtures (Water Reducers) in Concrete
18. Partial Replacement of Cement with Fly Ash
19. Non-Destructive Testing of Concrete using Rebound Hammer
20. Influence of Aggregate Size and Shape on Concrete Strength
21. Study of Concrete Workability using Different Tests
22. Concrete Mix Design Using IS 10262:2019
23. Investigation of the stability of floating objects, create charts comparing metacentric heights.
24. Study hydraulic similitude and scale modeling for different types of submerged bodies
25. Perform dimensional analysis for fluid systems like flow over spillways or pipe flow.
26. Study and classify flow regimes (laminar, transitional, and turbulent) for different engineering applications.
27. Analyze the variation of viscosity with temperature for different fluids and its impact on pipeline design.
28. Prepare a case study or report on how specific fluid properties (e.g., viscosity, surface tension,

vapor pressure) influence the design of engineering systems like pipelines, pumps, or hydraulic systems.

29. Computation of capillary rise for different liquids in tubes of various diameters.
30. Develop an understanding of flow types and streamline behavior by visualizing the flow patterns and drawing streamlines.
31. Determination of energy losses in pipes
32. Design and calibration of a simple U-tube manometer for pressure measurement
33. Design and testing of a small-scale Venturi meter using PVC pipes
34. Demonstration of IoT-based water level monitoring using ultrasonic sensor + Arduino
35. Measurement of flow using an ultrasonic sensor and comparison with theoretical discharge
36. Smart water supply monitoring using basic sensors (flow/pressure)
37. Determination of deflection of beams under various load conditions
38. Determine the impact of different material using Charpy impact test.
39. Determine the impact of differential material using Izod impact test.
40. Determine the tensile strength of different grade of steel and draw stress-strain curve.
41. Determine the compression strength of different grade of steel.
42. Evaluate the buckling strength of columns with different end conditions.
43. Determine the flexural stress in steel beam.
44. Determine the bending strength of simply supported beam using one point loading.
45. Determine the bending strength of simply supported beam using two-point loading.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Develop proficiency in surveying techniques.

CO2: Design conventional and special concrete mixes for desired properties.

CO3: Analyze fluid properties and flow behavior through experiments and modelling.

CO4: Evaluate mechanical properties of different materials.

CO5: Develop the skills to prepare & present projects.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2	1	1	2	2	2	1	-	1
CO2	3	3	3	2	2	1	2	2	2	2	2	2	2
CO3	3	3	2	3	2	1	1	1	2	2	1	1	2
CO4	3	2	2	2	2	-	-	1	2	2	1	2	2
CO5	-	-	-	-	-	-	-	-	1	3	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251210

Course Name: Engineering Foundation

L	T	P	Credit
0	0	2	1

Course Objective:

The main objective of the course is to enable the students to become familiar with the key areas of physics that are fundamental to emerging technologies and impart knowledge about Quantum mechanics, Lasers, Fiber Optics, Holography, Superconductor, Nano materials, Dielectric materials.

Syllabus:

Unit I Quantum mechanics:

Planck's quantum hypothesis, Wave-particle duality of radiation, de-Broglie matter waves, Compton effect, Phase and group velocity, Heisenberg uncertainty principle and its applications.

Unit II Lasers:

Properties of lasers, the basic process of lasers, Population-inversion, classification of lasers, working of He-Ne, Ruby, Nd: YAG and CO_2 lasers, Applications of Lasers in Communication, Medical and Industry.

Unit III Fiber Optics:

Light guidance through optical fibers, the qualitative idea of critical and acceptance angle, types of fibers, numerical aperture, V-Number, intermodal &material dispersions in fiber.

UNIT IV Semiconductors & Nanomaterials:

Semiconductor basics P type-N type, Fermi function, Junction Diodes, LED and its working principle, Transistor.

Nanomaterials: Basic principle of nanoscience and technology, Quantum confinement effect and applications and Properties of quantum dots and Carbon nanotubes, Two-dimensional materials, Metal nanoparticles.

UNIT-V Dielectrics Materials:

Polar and Non-Polar Dielectrics, Dipole moment and Polarization, Dielectric constant& Polarization, Relation between electric field vectors E, P and D. applications of dielectrics.

Course Outcomes:

Upon completion of the course the student will be able to:

CO 1: Explain the quantum physics and applies it to the behavior of a system at the microscopic level and solve the problems.

CO 2: Interpret the requirements classification, properties and application of laser.

CO 3: Describe the basic concepts about optical fibers.

CO 4: Explain the principle, types, properties and application of semiconductors and nano-materials.

CO 5: Apply the knowledge of characteristic of Dielectrics and Piezoelectric materials.

LIST OF EXPERIMENT'S

At least 10 of the following experiments must be performed during the session.

S. No.	Aim of experiment
1	To determine the specific charge (e/m) of an electron by Thomson method.
2	To measure the planks constant using light emitting diode.
3	To determine the energy band gap of a given sample material.
4	To measure the dielectric constant of a substance by resonance method.
5	To study and verify the outputs of various logic gates
6	To study the input and output characteristics of a transistor in common BASE/Emitter/collector (anyone) configuration
7	To study the V-I characteristics of semiconductor diode
8	To study V-I Characteristics of LED
9	To determine the numerical aperture of given optical fiber using optical fiber kit.
10	To determine the wavelength of laser light with laser educational kit.
11	To measure the optical power attenuation in the given optical fiber.
12	To determine the V-number of given optical fiber using optical fiber kit.

Lab Course Outcomes: Upon completion of the course the student will be able to:

CO 1: Develop experimental skill required for application of physics in engineering.

CO 2: Operate different instruments specified in course safely and efficiently.

CO 3: Demonstrate the working principles in optics, semiconductors, Quantum Physics.

CO 4: Function as a member of a team for problem solving.

Lab Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	1	1	2	2	1	-	-	-	2	-	-	-
CO2	1	-	-	1	2	1	-	-	-	2	-	-	-
CO3	2	-	-	2	2	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	-	-	-	3	2	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251211
Course Name: Language Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using English language.
- It aims at teaching students to appreciate English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with structure of English language used in literature, functional varieties, figurative language, and verbal concomitance.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Course Contents:

Unit I: Communication [CO1, CO2]

Communication: Approaches, Elements, Verbal and Nonverbal Communication; Barriers to Communication; Johari Communication Window.

Unit II: Listening [CO1, CO2]

Listening: Factors Affecting Listening and Improving Listening.

Unit III: Speaking: [CO2, CO3, CO5]

Public Speaking & Delivering Presentation.

Unit IV: Reading: [CO3, CO4, CO5]

Reading Passages & Comprehension: Steps and Methods.

Unit V: Writing: [CO4]

Writing: Essentials of good writing; Drafting CV/biodata/Résumé)

***Reading Material for story and poetry is to be selected by concerned teacher in class.**

Language Laboratory:

The objective of the language lab is to expose students to a variety of listening and speaking drills. This would especially benefit students who are deficient in English and it also aims at confidence building for interviews and competitive examinations.

The Lab is to cover following syllabus.

1. Communication lab exercises as specified in Lab Manual
2. Listening skills (using Marc Hancock, CUP).
3. Speaking skills
4. Oral presentation.

Laboratory Tasks:

Lab Exercise No. 1 **Listening**
Learning Objectives: 1. The student will learn the correct pronunciation and acquire knowledge English sound system. 2. The student will understand the need of learning proper pronunciation and its help in picking context and spellings. 3. He will get a pre hand knowledge of TOEFL and IELTS exams. 4. The student will learn to differentiate between hearing and listening. 5. The student will learn to listen and identify sound, pick context, infer meaning, and to retain the sound 'heard.'
Referred books and tools: 1. English Pronunciation in Use by Marc Hancock 2. Listening Exercises from English Pronunciation in Use by Marc Hancock or assigned by teacher taking class on spot. 3. Material will be selected by the teacher taking respective class and used as exercises. (A Sample exercise is appended at last) 4. Oxford Advanced Learner's Dictionary [free online version]

Lab Exercise No. 2 **Vocabulary Exercise** **Word for Word**
Learning Objectives: 1. The student will learn to differentiate between words that look similar but are different in meaning and use. 2. The student will also learn to use such words in sentences so as to differentiate between these words.
Referred books and tools: 1. The exercise has been modelled on a book titled Word for Word by Clark Pointon published by OUP, India. 2. The students will also learn to form structures of a sentence.

Vocabulary Word for Word

Student is required to distinguish between these set of words on following basis:

- Part of speech
- Pronunciation
- Meaning

- Usage – using them in sentences
- Synonym
- Antonym

Lab Exercise No. 3

Speaking

Learning Objectives:

1. The student will get hands on practice on delivering a short speech or a talk.
2. The student will develop confidence while speaking.

Presentation: 01

Guidelines for delivering the Project:

Students will have to deliver a 10 Minute presentation preferably on Power Point.

1. He will be judged on basis of Presentation rubrics available in shared document folder for I Year students.
2. They can choose a topic of their choice but the same should be from the syllabi—from any paper under study in I/II Semester/I Year
3. The students will have to communicate the same to the teacher in advance before delivering the same, and get the topic approved. The teacher can change, modify, and suggest one instead.
4. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
5. The marks/grades for the same will be displayed on their moodle portal.
6. All students will also be required to submit the PPT (preferable uploading the same on google drive shared folder for the purpose).
7. The said activity has to be completed before the teaching ends.

Book Review: 02

Guidelines for delivering the Project:

Students will have to review a book namely, a novella, a travelogue, a memoir, Science text from short-listed books.

1. He will have to deliver a Presentation, Oral/PPT as per individual choice, in a prescribed format either online or offline as decided by the respective teacher.
2. Student will also have to submit a written report based on that.
3. There will be online sessions for each class by the teacher assigned to teach branch.
4. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
5. The marks/grades for the same will be displayed on their moodle portal.
6. All students will also be required to submit the PPT or the written assignment in doc/jpeg/pdf format (preferable uploading the same on google drive shared folder for the purpose).
7. The said activity has to be completed before the teaching ends.

8. The lists of books adopted by the students have to be one from the lists allocated for the purpose.
Rationale:
1. This will give students a practice how to deliver presentations on a variety of topics in his/her core stream.

Lab Exercise No. 4
Reading
Learning Objectives:
1. The student will get hands on practice on skimming and scanning. 2. The student will also learn role of language in communicating Meanings.
Referred books and tools:
1. The student will be provided passages to read. This will include: a. A passage from Science/Engineering text b. A short Story c. A Poem 2. Material will be adapted in discussion with the student by the teacher. Sample Examples Include: 1. Passage, The Language of Science (Open Source) 2. Story, Araby (James Joyce), The Fatalist (I B Singer), A Horse & Two Goats (R K Narayan) etc. 3. Poem / Song
Rationale:
1. The student will learn to differentiate how the use of words varies from a scientific to a literary text and how meanings are construed.

Course Outcomes:

Upon completion of the course the student will be able to:

CO 1: Speak clearly effectively and appropriately in a public forum to a variety of audiences and purposes. (LOT1)

CO 2: Prepare oral dialogues and arguments within the Engineering Profession effectively. (LOT2)

CO 3: Demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context. (LOT3)

CO 4: Read a variety of Text analytically to demonstrate in writing and/or speech the interpretation of texts. (HOT4)

CO 5: Interpret text written in English assessing the results in written and oral arguments using appropriate material for support. (LOT3)

Reference Books:

- Understanding Human Communication — By Ronald Alderman by OUP
- Communication Skills for Engineers — Pearson Education.
- Practical English Grammar by Thomson Martinet — Oxford University Press
- A Handbook of Language laboratory by P Sreekumar — Cambridge University Press.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	-	-	-
CO2	-	-	-	-	-	-	-	-	1	3	-	-	-
CO3	-	-	-	-	-	-	-	-	1	3	-	-	-
CO4	-	-	-	-	-	-	-	-	1	3	-	-	-
CO5	-	-	-	-	-	-	-	-	1	3	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

ANNEXURE – IV

Scheme Structure for B.Tech Civil Engineering IV Semester (2024-25 admitted batch students)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)

NAAC Accredited with A++ Grade

Department of Civil Engineering
Scheme of Evaluation
B. Tech. IV Semester *(Civil Engineering)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	11242201	DC	Transportation Engineering – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11242202	DC	Water Supply Engineering	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11242203	DC	Estimating Costing & Contracting	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11242204	DC	Geotechnical Engineering – II	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11242205	DC	Structural Analysis - II	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
6.	11242206	DLC	Transportation Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11242207	DLC	Geotechnical Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11242208	DLC	Civil Engineering Drawing Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
9.	11242209	SP	Semester Proficiency[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	11242210	PBL	Macro Project-II[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
12.	SIP3XXXX	SIP	Skill Internship Program	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	
			Total	125	125	100	150	440	120	1060	11	05	10	23	-	-	-
13.	11242211	MAC	Project Management, Economics & Financing	-	-	-	-	100	-	100	-	2	-	GRADE	Blended	SO	-
14.	11242212	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level											GRADE	Interactive	MCQ	-
			Summer Semester of six-eight weeks duration will be conducted for makeup of previous semester examination.														
			Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree														

[$]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[#]Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

** These credits will be transferred from Skill Internship Program.

BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	5	0	0	0	3	1	1	1	0	0	1	1	1

Mode of Learning							Mode of Examination							Total Credits
Theory		NEC	Lab				Theory				Lab		NEC	
Face to Face	Online	Interactive	Face to Face	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1		3	3			15		5	2	1	23
65.2%		4.35%	4.35%		13.05%	13.05%			65.2%		21.74%	8.71%	4.35%	Credits %

Recommended in the Board of Studies Meeting of Department of Civil Engineering held on 4 December 2025

ANNEXURE – V

Syllabus for B.Tech Civil Engineering IV Semester (2024-25 admitted batch students)

Course Code: 11242201

Course Name: Transportation Engineering - I

L	T	P	Credit
2	1	0	3

Course Objective:

To provide comprehensive knowledge of highway planning and geometric design; traffic characteristics and control; pavement materials and design; and to develop understanding of pavement construction, distress evaluation, maintenance, recycling, and road safety auditing.

SYLLABUS

Unit – I Highway Development and Planning

Highway development in India — necessity of highway planning; road development plans; classification of roads; road network patterns; highway alignment—factors affecting alignment; engineering surveys.

Unit – II Highway Geometric Design

Factors governing the design of geometric features, highway cross section elements, sight distance elements – stopping sight distance, overtaking sight distance and intermediate sight distance, design of horizontal alignment –super elevation, extra widening, transition curves Design of Vertical alignment – gradients, types of vertical curves.

Unit – III Traffic Studies

Spot speed and volume studies, Speed and Delay Studies purpose, cause of delay, methods of conducting speed and delay studies. Origin and destination Studies (O & D), parking and accident studies. Traffic capacity studies: volume, density, flow, basic practical and possible capacities, level of service, traffic control devices: traffic signs, signals, marking & islands, design of an isolated fixed time signal by IRC method. Design of intersection at grade & grade separation:

Unit -IV

Highway Construction Materials: Aggregates and their types, physical and engineering properties, fillers, bitumen and their characteristics, emulsions and cutbacks, basic tests on all materials.

Design of Flexible & Rigid Pavements: Introduction, flexible pavement, factors affecting design and performance, stress in flexible pavement, design of flexible pavement as per IRC, rigid pavements – components & functions, factors affecting design & performance of CC pavements, stress in rigid pavement, type of joints, dowel bar, tie bar and its functionalities.

Unit – V Pavement Rehabilitation, Recycling and Sustainable Highway Technologies

Pavement rehabilitation techniques (flexible and rigid pavement), recycling of bituminous pavements: need, benefit & types of recycling, smart & innovative highway technologies, introduction to road safety audit for pavements.

Text Books:

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand Pub., 10th edition, 2018
2. Highway Engineering, Gurucharan Singh, Standard Publishers, 5th edition, 2015
3. Principles & Practices of Highway Engineering, L R Kadiyali, N B Lal, Khanna Publishers, 2023

Reference Books:

1. Principles of Pavement Design, E.J. Yoder & M.W. Witzech, Wiley India, 2nd edition, 2011
2. Highway Engineering, O' Flaherty, Butterworth-Heinemann, 4th edition, 2002
3. Principles, Practice and Design of Highway Engg., S. K. Sharma, S Chand Publishers, 2015
4. Analysis and Design of Pavements, Haung, Pearson, 2nd edition, 2004

Course Outcomes

Upon completion of the course, a student will be able to

CO1: **Explain** the fundamentals of highway development, planning, road classification, alignment, and surveys.

CO 2: Apply geometric design principles for sight distance and horizontal and vertical alignment.

CO 3: Apply traffic study methods and design an isolated traffic signal.

CO 4: Analyze pavement material properties and design flexible and rigid pavements as per IRC.

CO 5: Analyze pavement rehabilitation needs and recommend appropriate recycling methods, smart highway technologies, and road safety audit measures.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1	1	1	1	1	1	1	3	1
CO2	3	3	2	1	1	–	1	1	–	1	1	3	1
CO3	3	3	2	2	2	1	1	1	1	1	1	3	1
CO4	3	3	2	2	2	–	1	1	–	1	1	2	3
CO5	3	3	2	2	1	1	2	1	1	2	1	2	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242202

Course Name: Water Supply Engineering

L	T	P	Credit
2	1	0	3

Course Objective:

To develop students' ability to assess water demand, analyze water quality, design and operate water treatment plants, water conveyance, and distribution systems, and apply modern technologies for delivering safe, reliable, and sustainable water supply services.

SYLLABUS

Unit I:

Water demand, design period, population forecasting methods, estimation of water requirement, sources of Water, source selection, underground water quality & quantity, characteristics of water, water borne diseases, standards for drinking water.

Unit II:

Water treatment flow diagram, design, construction, working of aerators, screens, plain sedimentation tank, coagulants & coagulation, flocculation, optimum dose of coagulants, filtration (Theory & types), Design, operation & construction of slow sand & Rapid sand gravity filters, pressure filters.

Unit III:

Disinfectants & method of disinfection, types of chlorination, Hardness, various methods of softening, Removal of colour, odor, Taste, Iron & manganese, algae removal, fluoridation / defluoridation, desalination, Reverse Osmosis, arsenic removal, membrane filtration techniques.

Unit IV:

Intake structures (location & types), conduits for transporting water, forces on conduits, types of pressure pipe, joints, corrosion of pipe (causes & control), pipe appurtenances, pumping of water, types of pumps, Economical diameter of rising main, pumping stations, Requirement of good distribution system, layout of distribution, methods of distribution, Distribution reservoir and calculation of its capacity, appurtenances used in distribution networks, water supply & plumping system in building.

Unit V:

Building Water Supply – hydraulic considerations, Analysis of pipe networks (Hardy cross method, Equivalent pipe method), Introduction to water GEM for design of pipe network, Smart water system – district metering areas, CDMA, SCADA system, use of IoT in water supply & distribution system, system operation – leak detection, water supply in high rise buildings and in rural areas.

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Analyze water demand and water quality characteristics.

CO2: Design different components of conventional water treatment systems.

CO3: Apply suitable water treatment techniques for removal of hardness, contaminants, and pathogens.

CO4: Design water supply and distribution networks based upon the need of society.

CO5: Apply fundamental principles to assess the operation, performance, and use of smart technologies in water supply systems and IoT-based monitoring.

Text Books:

1. Water Supply Engineering, B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2022
2. Water Supply Engineering, S. K. Garg, Khanna Publishers New Delhi, 2023

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2022
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition, 2012
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, Revised 2024 edition.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	-	2	2	2	1	1	1	2	1
CO2	3	3	3	2	2	2	2	2	2	3	2	2	2
CO3	2	3	2	2	-	2	2	2	2	2	1	2	-
CO4	3	3	3	2	3	2	2	2	2	3	2	3	3
CO5	2	2	2	2	2	2	2	1	2	2	2	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242203

Course Name: Estimating Costing & Contracting

L	T	P	Credit
2	1	0	3

Course Objective:

To develop the skills required to calculate quantities for various civil engineering works such as buildings, roads, and canals; compute earthwork; understand detailed specifications; perform rate analysis; learn different estimation methods; comprehend valuation processes and rent fixation; and understand contracting procedures.

SYLLABUS

Unit I Introduction of Estimating:

Purpose and importance of estimates, principles of estimating, methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet, bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit II: Details of Items:

Specifications of materials and works: Types of Specifications, General specifications for Class A, B & C type of building, Detailed specifications of important items of work.

Rate Analysis: Task for average artisan, various factors involved in the rate of item, material and labour requirement for various trades, preparation for rates of important items of work, current schedule of rates (C.S.R)

Unit III: Estimates

Preparing detailed estimates of various types of buildings, R.C.C Works, Culverts, earth work calculations for roads and Canals, contingencies and work charge establishment, use of computational tools for preparing estimates.

Unit IV: Valuation

Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate of interest, methods of valuation, rent fixation of buildings

Unit V: Modern Contract Management Practices

Contract management: contract types, essential contract documents, general and special conditions, payment terms, liquidated damages, penalty provisions, dispute-resolution mechanisms. Roles and responsibilities: engineer, contractor, client. Modern practices: Digital Tools in Contract Management, real-time project tracking, contemporary industry systems.

Text book

1. Estimating & costing in civil engineering, B.N. Dutta, UBS Publishers, 29th revised edition 2025
2. Estimating & Costing, S.C. Rangwala, Charotar Publishing House, 18th edition 2023

Reference books

1. Estimating & Costing for Civil Engg., G.S. Birdie, Dhanpat Rai Publications, 6th edition 2014
2. Estimating & Costing specification & valuation in civil engineering, M. Chakraborti, 2006

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Estimate quantities and prepare basic estimates for civil works.

CO2: Interpret specifications and analyze rates for various items of work.

CO3: Prepare detailed estimates for buildings, RCC works, and earthwork.

CO4: Evaluate property value using standard valuation methods.

CO5: Explain core contract procedures, stakeholder roles, and modern digital tools for effective contract management.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	1	-	2	1	2	-	2	2	2	1
CO2	2	-	-	1	1	2	1	2	-	2	3	2	2
CO3	2	2	-	2	2	2	2	2	2	2	3	1	2
CO4	2	3	-	2	1	2	2	-	2	2	2	1	2
CO5	2	1	1	2	3	1	2	2	1	2	2	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242204

Course Name: Geotechnical Engineering – II

L	T	P	Credit
2	1	0	3

Course Objective:

To introduce the basic concepts, analysis methods and design principles of shallow and deep foundations, retaining structures, slopes and dynamically loaded foundations so that students can select and proportion suitable foundation systems for typical civil engineering projects using relevant IS codes.

SYLLABUS

Unit I: Lateral Earth Pressure and Retaining Structures and Subsurface Exploration

Concept of earth pressure at rest, active, and passive states; assumptions of Rankine and Coulomb theories. Earth pressure diagrams for level and inclined backfill, the effect of surcharge, and the water table. Types and basic proportioning of gravity and RCC cantilever retaining walls; stability checks for sliding, overturning, and bearing capacity. Objectives and planning of soil exploration; methods of boring and sampling, SPT and plate load test for foundation design; outline of soil investigation report.

Unit II: Shallow Foundations – Bearing Capacity and Settlement

Types of shallow foundations – isolated, strip, combined, and raft footings; selection based on soil and loading. Ultimate bearing capacity (Terzaghi type expressions for general shear failure only); influence of water table (use of correction factors). Allowable bearing pressure considering factor of safety and simple settlement considerations; concept of tolerable and differential settlement.

Unit III: Deep Foundations – Pile and Well Foundations

Classification of piles according to function, material, and installation; concept of load transfer in piles. Estimation of load-carrying capacity of a single vertical pile in sand and clay using static formulae (IS 2911). Purpose and layout of pile groups, group efficiency (simple concepts only); introduction to pile load tests and interpretation. Basic components and applications of well/caisson foundations for bridges.

Unit – IV Slope Stability

Types of slopes and typical modes of failure; stability analysis of finite slopes in c–φ soils. Simple stability checks for embankment and cutting slopes; typical preventive and remedial measures such as drainage improvement, flattening and use of retaining systems.

Unit – V Emerging Practices and Special Foundations

Introduction to reliability and risk considerations in selection of foundation type. Pile–raft foundations for high-rise buildings and bridge piers, foundations for transmission towers and wind turbines for urban redevelopment projects. Overview of use of FEM-based software for settlement and stability assessment and brief Indian case studies showing the choice of ground improvement and foundation system for challenging sites.

Courses Outcomes

Upon completion of the course, a student will be able to

CO1: Explain lateral earth pressure conditions and basic subsurface exploration methods and check the basic stability of retaining walls.

CO2: Determine ultimate and allowable bearing capacity of shallow foundations for typical loading and soil conditions.

CO3: Estimate load carrying capacity of single piles and outline the behaviour of pile groups and well foundations.

CO4: Perform simple stability checks for slopes and plan essential steps of a soil exploration programme for foundations.

CO5: Describe recent developments in foundation engineering practice, including ground improvement options, special foundations and the role of numerical tools andcase studies for challenging sites.

Text Books

1. Punmia, B. C., Jain, A. K. and Jain, A. K.; Soil Mechanics and Foundations, 18th Edition, Laxmi Publications, New Delhi, 2023.
2. Arora, K. R., Soil Mechanics and Foundation Engineering, 7th Reprint Edition, Standard Publishers Distributors, New Delhi, 2019.
3. Murthy, V. N. S., Textbook of Soil Mechanics and Foundation Engineering: Geotechnical Engineering Series, 1st Edition, CBS Publishers, New Delhi, 2017

Reference Books

1. Coduto, D. P., Yeung, M. R., and Kitch, W. A., "Geotechnical Engineering: Principles and Practices," Pearson Education.
2. Craig, R. F., and Knappett, J. A., "Craig's Soil Mechanics," CRC Press.
3. IS 6403, IS 8009, IS 2911, IS 2974, IS 1893 and other relevant Indian Standard codes for foundation design.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	1	1	-	-	-	1	2	-	2	1
CO2	3	3	3	2	2	1	-	-	-	2	1	3	1
CO3	3	3	3	2	2	1	-	-	1	2	1	3	2
CO4	3	2	2	3	1	1	1	-	1	2	-	2	1
CO5	2	3	2	2	3	1	1	1	1	2	1	2	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242205

Course Name: Structural Analysis – II

L	T	P	Credit
3	0	0	3

Course Objective:

To develop an understanding of the moment distribution method for analysis of sway frames, Kani's method for beam and frame, analysis of multi-storey frame for gravity and lateral loads, matrix methods, concepts of plastic analysis and Pre-Engineered Building.

SYLLABUS

Unit-I

Moment distribution method in analysis of frames with sway, Analysis of box frames, analysis of beams and frames by Kani's methods.

Unit-II

Analysis of tall frames, Calculation of various loads including wind and earthquake loads, Introduction to Code provisions for lateral loads. Approximate analysis of multistorey frames for vertical and lateral loads.

Unit-III

Matrix Method of Structural Analysis: Force method and displacement method.

Unit-IV

Plastic analysis of beams & frames. Plastic Theory, Plastic Hinge, Shape Factor, Plastic Moment, Plastic Analysis, Collapse load for Beam and Frame.

Rolling Load and Influence Lines

Maximum SF & BM curves for various types of Rolling loads, EUDL, Influence Lines for determinate structural beams, Trusses, Three Hinged Arches.

Unit-V

Analysis of Pre-Engineered Building. Introduction to use of software for modeling, analysis and post-processing.

Courses Outcomes

Upon completion of the course, the student will be able to

CO1: Analyze the beams and frames using moment distribution method and Kani's method.

CO2: Analyse the various loads on framed structures using codal provisions.

CO3: Analyze the beams and frames using force and displacement method.

CO4: Analyze the beam and frame using plastic analysis.

CO5: Analyze the Pre-Engineered building.

Text Books:

1. Intermediate structural analysis, Wang C.K., McGraw Hill India 2017

2. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
3. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 2025

Reference Books:

1. Elementary Structural Analysis, Norris C.H., Wilbur J.B. McGraw Hill International.
2. Matrix Methods of Framed Structures, Weaver W & Gere J. M., CBS Publishers, Delhi
3. Structural Analysis, Aslam Kassimali, Cengage Publisher, 2015
4. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	2	-	-	-	-	1	1	-	-	-
CO2	3	3	2	2	-	-	-	-	1	1	-	2	2
CO3	3	3	2	2	-	-	-	-	1	1	-	-	-
CO4	3	3	2	2	-	-	-	-	1	1	-	-	1
CO5	3	3	2	2	2	2	1	2	2	2	2	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242211

Course Name: Project Management, Economics & Financing

L	T	P	Credit
0	2	0	GRADE

Course Objectives:

To provide knowledge about project attributes and planning essentials, develop project networks, make rational decisions for project completion, utilize resources effectively, and understand the basics of project finances and management.

SYLLABUS

Unit I:

Project Planning: Introduction to Project Management, Difference between Project and Production, Attributes of a Project: Time, Cost, Quality and Safety. Stakeholders of a Project, Project life cycle. Project Planning: Types of Project Plans and feasibility.

Unit II:

Project Network logic: Project Networking and work flows, Activity duration and methods of estimating activity duration – One time estimate three time estimates, Duration estimation procedure. Use of Bar Charts, Mile stone charts and networks, Network representation schemes: Activity on Arrow and Activity on Node Networks (A-o-A & A-o-N), Logic behind developing project network and simple network calculations, Critical paths and floats.

Unit III:

Decision making through networks: CPM, PERT & PDM: Use of network in Decision Making: Importance of critical path, Monitoring the progress and updating the project plan. Use of floats in Resource smoothening, Introduction to Precedence Diagramming Method (PDM), Different lag and lead relations in terms of SS(Start to Start), SF(Start to Finish), Finish to Start(FS), and Finish to Finish(FF) and composite relations.

Unit IV:

Project Cost Control: Breakeven analysis in planning stage, Direct and indirect cost, slope of direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization. Escalation & Variation in prices.

Unit V:

Projects Financing: Introduction to project financing; Role of governments in financing projects, Funder and Concessionaire: Economic multiplier effects of Projects; Means of financing-public finance and private finance, Granting authority: World Bank Group, IMF,ADB, Micro and Small Enterprises Funding Scheme (MSME), Elementary understanding of Procurement of infrastructure projects through Public Private Partnership (PPP) route, Build Operate Transfer (BOT), Build Operate Own & Transfer (BOOT); Stakeholders' perspectives, Lifecycle of PPP projects, Micro & Macro economics concepts and its application in Project Financing.

Course Outcomes: At the end of the course student will be able to

CO 1: Know the attributes of project and its different phases.

CO 2: Develop the project network based on work breakdown structure and estimation of activity durations.

CO 3: Analyze the project network and make decide the various alternates.

CO 4: Evaluate the optimum cost of project for assigned deadlines.

CO 5: Understand the different options to arrange the finances to complete it within stipulated time.

Text-Books:

1. Project Management Scheduling PERT and CPM by Dr. B.C. Punmia, K.K. Khandelawal
2. PERT & CPM Principles and Applications by L.S. Srinath, Affiliated EWP Pvt. Ltd.
3. Project Planning and Control by Albert Lester, Fourth Edition Elsevier Butterworth-Heinemann.

Reference Books:

1. A Management Guide to PERT/CPM With GERT/PDM/DCPM and Other networks by Jerome D. Wiest, Ferdinand K. Levy, Prentice Hall.
2. Project Management with CPM and PERT by Joseph J . Moder, Cecil R . Phillips, Van Nostrand Reinhold Company

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	1	2	1	-	-	-	-	2	-	1
CO2	3	3	2	2	2	2	1	2	1	2	2	-	1
CO3	3	3	-	3	3	2	-	-	1	1	2	-	1
CO4	3	3	-	2	2	2	-	-	1	1	2	-	1
CO5	2	1	1	2	1	1	-	-	-	1	2	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

ANNEXURE – VI

Experiment List / List of Macro Project – II for B.Tech Civil Engineering IV Semester (2024-25 admitted batch students)

Course Code: 11242206

Course Name: Transportation Engineering Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Marshall Stability Value for Bitumen.
12. Classified Traffic Volume Study

Course Outcomes:

Upon completion of the course, a student will be able to

CO 1: Measure key aggregate properties through standard strength and shape tests.

CO 2: Determine subgrade strength using the CBR test

CO 3: Evaluate consistency and physical properties of bituminous materials.

CO 4: Assess stability and flow characteristics of bituminous mixes using the Marshall test.

CO 5: Conduct and interpret classified traffic volume studies.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	1	2	2	1	-	1	2	2	1	2	2
CO2	2	2	1	2	2	1	2	1	2	2	1	2	2
CO3	2	2	1	2	2	1	2	1	2	2	1	2	2
CO4	2	2	2	2	2	2	2	1	2	2	1	3	3
CO5	2	2	2	2	2	2	1	2	2	2	1	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242207

Course Name: Geotechnical Engineering Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. Specific Gravity Tests.
2. Liquid Limit, Plastic Limit, Shrinkage Limit Tests and Moisture Content Determination using Oven Drying Method.
3. Grain Size Analysis – Mechanical Method.
4. Grain Size Analysis – Hydrometer Method.
5. In-Place Density tests – Core Cutter Method, Sand Replacement Method.
6. Permeability Tests: Constant Head and Falling Head Method.
7. Compaction Test.
8. Unconfined Compression Test.
9. Direct Shear Test.
10. Triaxial Shear Test (UU, CU and CD tests)
11. Vane Shear Test.
12. Consolidation Test.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Determine index properties and classify soils.

CO2: Evaluate compaction and field density.

CO3: Determine engineering properties (permeability, consolidation, shear strength parameters).

CO4: Analyze laboratory data to draw meaningful conclusions about soil behaviour and apply the results to solve practical geotechnical engineering problems.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	-	2	-	-	-	1	1	-	-	3	-
CO2	3	2	1	2	1	-	1	1	1	-	-	3	-
CO3	3	2	2	3	1	-	1	1	2	1	-	3	1
CO4	2	3	3	3	2	2	2	2	2	2	1	3	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242208

Course Name: Civil Engineering Drawing Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. One drawing sheet containing typical foundations and footings prepared using AutoCAD.
2. One drawing sheet containing doors, windows and ventilators using AutoCAD with standard symbols and conventions.
3. One drawing sheet containing lintels, trusses and arches etc. using AutoCAD.
4. Sketches of various building components such as floors, roofs and roof coverings.
5. Sketches of staircases and related details.
6. One drawing sheet showing detailed planning of a single-room residential building.
7. One drawing sheet showing detailed planning of a multi-room residential building.
8. Preparation of drawing sheets of a residential building using AutoCAD.
9. Preparation of a drawing sheet of an institutional building using AutoCAD.
10. Preparation of a drawing sheet of a commercial building using AutoCAD.
11. Preparation of a drawing sheet of a small hospital building using AutoCAD.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Draw standard details of basic building components such as foundations, footings, doors, windows, lintels, trusses and arches.

CO2: Prepare plans, elevations and sections of typical residential, institutional and commercial buildings.

CO3: Use AutoCAD efficiently for developing civil engineering drawings with proper layers, dimensions and annotations.

CO4: Compile complete drawing sheets for different types of buildings suitable for submission and execution at site.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	2	1	1	-	-	2	1	2	-	2	-
CO2	2	-	3	1	1	-	1	2	1	2	-	2	-
CO3	2	-	2	2	3	-	1	1	1	2	-	2	-
CO4	2	-	3	2	2	1	-	-	2	3	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11242210

Course Name: Macro Project – II

L	T	P	Credit
0	0	2	1

LIST OF MACRO PROJECTS

1. Design of Various Components of Water Supply Scheme as per CPHEEO Manual
2. Water Conservation Study for Industrial / Institution
3. Design of WTP for rural area
4. Design of rain water harvesting system for residential area
5. Impact of Climate Change on water resources
6. Water Conservation measures for Education Institute
7. WTP design for urban area
8. Design of water distribution system for rural area
9. Augmentation of existing water supply scheme
10. Optimization / Size of OHT by adjusting pumping hours
11. Hydraulic modelling of Water Supply System
12. Design of storm water drainage for urban areas
13. Prepare a Integrated Water Supply Master Plan for a Growing City (30-Year Design Period).
14. Assessment and Selection of Sustainable Surface & Groundwater Sources for a District.
15. Study of existing water supply & distribution scheme available for Gwalior city and suggest improvement in it.
16. Study of new water treatment plants in the city.
17. Smart Water Distribution Network Design using WaterGEMS with DMA Creation
18. Leak Detection & NRW (Non-Revenue Water) Reduction Strategy using IoT & SCADA
19. Hydraulic Modeling and Rehabilitation of an Old Urban Pipe Distribution Network
20. Plan a Sustainable Rural Water Supply Model using Community Participation & Low-Cost Treatment technique.
21. Estimate of a G+1 Residential Building
22. Estimation & Costing of a G+2-storey Apartment
23. Estimation of a Hostel Building Including Services
24. Comparative Cost Analysis: Flexible vs. Rigid Pavement
25. Estimation for Canal Bank Protection Works
26. Estimate of Rigid Pavement for an Urban Road Section
27. Estimation of a School Building / Institutional Building
28. Determination of Permeability of Different Soil Types Using Constant & Falling Head Test
29. Effect of Relative Density on Shear Strength Parameters of Sand Using Direct Shear Test

30. Effect of Natural Fiber Content and Fiber Length on the Compaction Behaviour and California Bearing Ratio (CBR) Strength of Reinforced Soil.
31. Evaluation of Improvement in Plasticity Characteristics and Swelling Behaviour of Expansive Soil Stabilized Using Waste Materials.
32. Study on Standard Penetration Test (SPT) N-Values and Its Correlation with Soil Bearing Capacity
33. Correlation Between SPT N-Value and CBR of Subgrade Soil for Pavement Design
34. Comparative Study of Soaked vs Unsoaked CBR Value of Subgrade Soil
35. Consolidation Characteristics of Clay and Settlement Estimation Using oedometer Test
36. Correlation Between Field Density & CBR Value for Highway Subgrade Construction
37. Traffic Volume Study & Peak Hour Identification using Metro Count
38. Speed Profile Analysis of a Local Road using Metro Count
39. Evaluation of Bituminous Mix Properties Using the Marshall Stability Test
40. Designing a flexible pavement using IIT PAVE software as per IRC 37:2018 guidelines
41. Study of pavement distresses in flexible and rigid pavement
42. Evaluation of Subgrade Strength Using CBR Test and its Impact on Pavement Thickness.
43. Evaluation of Speed Hump Effectiveness on Vehicle Speeds Using Metro Count
44. Analyze the portal frame with sway using moment distribution method.
45. Analyze the portal frame with sway using Kani's method.
46. Analyze the multi-storey frame for wind load using Portal method.
47. Analyze the multi-storey frame for earthquake load using Portal method.
48. Analyze the multi-storey frame for wind load using Cantilever method.
49. Analyze the multi-storey frame for earthquake load using Cantilever method.
50. Analyze the multi-storey frame for gravity load using approximate method.
51. Analyze the Pre-Engineered building.

Course Outcomes:

The students will be able to:

CO1: Design sustainable water supply systems and propose conservation strategies by applying standard codes, analytical tools, and environmental principles to address real-world challenges in urban and rural contexts.

CO2: Analyze traffic and pavement systems and evaluate material properties using advanced tools and standardized laboratory methods to design and propose effective transportation infrastructure solutions in accordance with IRC guidelines.

CO3: Prepare detailed estimates, cost analyses, and comparative statements for various civil engineering structures and infrastructure projects by applying standard methods of measurement, current schedule of rates, and economic principles to determine their financial viability.

CO4: Evaluate the fundamental engineering properties and behavioral characteristics of different soils by performing standard laboratory and field tests, and analyze the effects of stabilization and varying conditions on soil performance for geotechnical design.

CO5: Analyze beams, frames, tall structures, and Pre-engineered buildings using classical, matrix, and plastic analysis methods along with software tools to assess their behavior under gravity and lateral loads.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	3	2	2	2	2	2	2	2	2
CO2	3	3	2	3	2	1	1	2	2	2	2	2	2
CO3	3	3	3	2	1	-	-	2	2	2	1	3	2
CO4	3	3	2	3	2	1	1	2	2	2	1	2	2
CO5	3	3	2	2	2	-	-	1	2	2	1	1	1

1 - Slightly; 2 - Moderately; 3 – Substantially

ANNEXURE – VII

Representative list of professional certification platforms and relating certifications with specific domain/areas of certification

List of Professional Certification Courses

S. No.	Course Name	Duration	Web link
1.	Microsoft Project Management Professional Certificate	4 Months	https://www.coursera.org/professional-certificates/microsoft-project-management
2.	DeepLearning.AI Data Analytics Professional Certificate	4 Months	https://www.coursera.org/professional-certificates/data-analytics
3.	IBM Project Manager Professional Certificate	3 Months	https://www.coursera.org/professional-certificates/ibm-project-manager
4.	IBM Data Analytics with Excel and R Professional Certificate	3 Months	https://www.coursera.org/professional-certificates/ibm-data-analyst-r-excel
5.	IBM Data Science Professional Certificate	4 Months	https://www.coursera.org/professional-certificates/ibm-data-science
6.	IBM Full Stack Software Developer Professional Certificate	5 Months	https://www.coursera.org/professional-certificates/ibm-full-stack-cloud-developer
7.	Concrete Multi-Storey Building – System Design	35–40 hours	https://www.coursera.org/specializations/concrete-multi-storey-building-system-design
8.	Estimating and Bidding in Construction Specialization	40 Hours	https://www.coursera.org/specializations/estimating-and-bidding-in-construction
9.	Basics of Finite Element Analysis – I	8 Weeks	https://elearn.nptel.ac.in/shop/nptel/basics-of-finite-element-analysis-i/?v=13b5bfe96f3e
10.	Digital Land Surveying And Mapping	8 Weeks	https://elearn.nptel.ac.in/shop/nptel/digital-land-surveying-and-mapping-dlsm/?v=13b5bfe96f3e
11.	Building Smarter: BIM in Practice Specialization	40 Hours	https://www.coursera.org/specializations/building-smarter-bim-in-practice
12.	Managing Major Engineering Projects Specialization	60 Hours	https://www.coursera.org/specializations/managing-major-engineering-projects
13.	SOLIDWORKS 3D CAD for Education Specialization	40 Hours	https://www.coursera.org/specializations/practice-solidworks-3d-cad
14.	Mechanization in Construction Specialization	40 Hours	https://www.coursera.org/specializations/mechanization-in-construction
15.	Metro Rail Systems and Construction Specialization	40 Hours	https://www.coursera.org/specializations/metro-rail-systems-and-construction
16.	Infrastructure for Transportation Systems Specialization	40 Hours	https://www.coursera.org/specializations/infrastructure-for-transportation-systems
17.	Autodesk Certified Professional in Civil 3D for Infrastructure Design	6 Months	https://www.autodesk.com/certification/all-certifications/civil-3d-infrastructure-design-professional

18.	Autodesk Certified Professional in AutoCAD for Design and Drafting	6 Months	https://www.autodesk.com/certification/all-certifications/autocad-design-drafting-professional
19.	Autodesk Certified Professional in Revit for Structural Design	6 Months	https://www.autodesk.com/certification/all-certifications/revit-structural-design-professional
20.	DelftX: Decision Making Under Uncertainty: Introduction to Structured Expert Judgment	6 Weeks	https://www.edx.org/learn/decision-making/delft-university-of-technology-decision-making-under-uncertainty-introduction-to-structured-expert-judgment
21.	EPFLx: Intro to Traffic Flow Modeling and Intelligent Transport Systems	7 Weeks	https://www.edx.org/learn/engineering/ecole-polytechnique-federale-de-lausanne-intro-to-traffic-flow-modeling-and-intelligent-transport-systems
22.	WBGx: e-Learning Course on Urban Rail Development	7 Weeks	https://www.edx.org/learn/railway-engineering/world-bank-group-e-learning-course-on-urban-rail-development
23.	USMx: Revit for Structural Engineers	6 Weeks	https://www.edx.org/learn/structural-engineering/university-system-of-maryland-revit-for-structural-engineers?index=product&queryId=4bfad62f78cea629465d2554e43f898e&position=20
24.	PurdueX: Design of Urban Water Management Structures	6 Weeks	https://www.edx.org/learn/engineering/purdue-university-design-of-urban-water-management-structures?index=product&queryId=0ba15895fdf215f2dac61bbd63c91adc&position=63
25.	DelftX: Railway Engineering: An Integral Approach	6 Weeks	https://www.edx.org/learn/railway-engineering/delft-university-of-technology-railway-engineering-an-integral-approach?index=product&queryId=8df8c46dac4d29dc6f7b91b2fadc5bcd&position=1

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Department of Civil Engineering

Scheme of Evaluation

M. E. II Semester *(Construction Technology & Management)*

(for batch admitted in academic session 2025-26)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional					L	T	P				
1.	51251201	DC	Project Economics & Financing	25	25	20	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	51251202	DC	Construction Cost Management	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
3.	51251203	DC	Contract Management	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	512512XX	DE	**Departmental Elective[*] (DE-2)**	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	51251204	SPC	Repair, Rehabilitation & Retrofitting of Structures (SPC-2)	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
6.	51251205	DLC	**Computational Lab [#]**	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
7.	51251206	SLP	**Seminar/Presentation[$]**	-	-	-	-	70	30	-	-	100	-	-	4	2	Mentoring	SO	-
8.	51251207	NEC	**Classified Novel Engaging Course (Activity Based Learning)** Fire Safety & Regulation in Building	-	-	-	-	-	50	-	-	50	-	1	-	1	Interactive	SO	-
Total				100	100	100	120	140	110	25	75	750	12	04	08	20	-	-	-

MCQ: Multiple Choice Question **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[*] This course will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility). The course can be related & relevant to other domain as well.

[#] During lab, students have to perform practical/assignments/minor projects related to the courses of respective semester using recent technologies / languages / tools etc.

[$] Seminar/Presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2[*] *(through SWAYAM / NPTEL /MOOC)*		
S. No.	**Course Code**	**Course Name**
1.	51251208	Strategies for Sustainable Design
2.	51251209	Construction Method & Equipment Management
3.	51251210	Geosynthetics & Reinforced Soil Structure

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab		NEC	Theory			Lab	NEC	
Face to Face	Online	Mentoring	Experiential	Interactive	PP	MCQ	OB	SO	SO	
12	3	2	2	1	12	3		4	1	20
60%	15%	10%	10%	5%	60%	15%		20%	5%	Credits %

Recommended in the Board of Studies Meeting of Department of Civil Engineering held on 4 December 2025

Course Code: 51251201

Course Name: Project Economics & Financing

L	T	P	Credit
3	0	0	3

Course Objective:

To provide a comprehensive understanding of managerial economics in the construction industry, including demand analysis, forecasting, time value of money, cost of capital, budgeting, project selection and evaluation, project financing, risk management, and accounting processes.

SYLLABUS

Unit-I

Basic Economic Theories: Principles of managerial economics. Economic theories. Demand analysis and forecasting. Demand elasticity. Cost and production analysis. Production function. Pricing decisions. Policies & practice.

Unit-II

Money: Time value of money. Different methods & comparisons. Cash flow, discounted cash flow, cash flow forecasting. Financial ratios and statements. Cost of Capital.

Unit-III

Capital Budgeting: Working capital. Capital budgeting and performance budgeting. Break even analysis. Project selection. Project appraisals

Unit-IV

Project Financing: Means of Finance, Financial institutions in India, Policies of financial institutions, financial assistance, Special schemes, Project risk

Unit-V

Financial Accounting: Book keeping processes of construction industry. Accountancy cycle. Journals. Forms and ledgers etc. for accounting and monitoring labor, equipment and material costs. PWD accounting procedure and types of financial statements in Government.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Apply principles of managerial economics.

CO2: Perform demand analysis in construction sector.

CO3: Analyze capital budgeting components to support effective financial decision-making in construction and management projects.

CO4: Evaluate various project financing options, policies, for financial planning and decision-making.

CO5: Apply fundamental financial accounting principles to interpret financial statements, data, and support effective decision-making.

Reference Books:

1. Project Planning, Analysis, Selection, Financing, Implementation & Review by Prasanna Chandra, Publisher Tata McGraw-Hill Education.
2. Engineering Economics & Analysis, by Donald G Newnan, Publisher Oxford University Press.
3. Economic Theory and The Construction Industry by P. Hillebrandt, Publisher Palgrave Macmillan UK
4. Construction Economics: A New Approach by Danny Myers, Publisher Routledge
5. Construction and Project Management Theory And Practices by K.N. Jha, Publisher Pearson Education India
6. Construction Project Management: Planning, Scheduling and Controlling by K.K. Chitkara, Publisher Tata McGraw-Hill Education

Course Code: 51251202

Course Name: Construction Cost Management

L	T	P	Credit
2	1	0	3

Course Objective:

To enable students to analyze and optimize construction projects through trade-off analysis, multi-criteria and multi-objective decision methods, value engineering principles, and productivity improvement techniques for achieving cost-effective, efficient, and high-performance project outcomes.

SYLLABUS

Unit-I

Trade off Analysis in construction project: Development of Network. Time-cost trade off curves. Non – convex discontinuous and discrete cost time trade – off curves. Crashing of projects. Resource-constrained project scheduling. Multi-objective trade-off problems. Introduction to deterministic, heuristic and meta-heuristics methods for making multi-objective trade-off. Siemen's method of project cost curve.

Unit – II

Multi criteria Decision Making Methods: Analytical Hierarchy Process, and its application in planning and management, Introduction to Fuzzy Set Theory and its Application in MCDM.

Unit-III

Multi-objective optimization methods: Single and multi-objective optimization problems. Pareto-optimality. Introduction to NSGA. Selection. Crossover. Mutation. Non-dominated Sorting. Differences among GA, MOGA, NSGA, NSGA-II. Particle Swarm Optimization. Particle and its position. Local best and global best position. Updating the position of particle. Multi-objective PSO.

Unit-IV

Productivity in Construction: Definition of Productivity. Productivity measurements. Productivity of production components, Labors, Equipment and Material Capital Productivity. Need for Productivity Planning – Short term and long term productivity planning, Productivity improvement approaches, Productivity Improvement techniques – Technology based, Material based, Employee based and Product based.

Unit-V

Value Engineering: Principles of value engineering in Project Management, Value engineering team, Value engineering technique, Job Plans, Role of value engineering in productivity, Life cycle costing and its applications.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Explain the concept of trade-off in construction.

CO2: Analyze the trade-off phenomenon in construction using MCDM.

CO3: Evaluate the multi-objective trade-off problems using metaheuristic methods.

CO4: Evaluate suitable productivity improvement approaches and techniques.

CO5: Apply the value engineering principles and life-cycle costing techniques to evaluate alternative project solutions.

Reference books

1. Golden, Bruce L., Wasil, Edward A., Harker, Patrick T. (Eds.) The Analytic Hierarchy Process, Springer.
2. Joseph J. Moder., PROJECT MANAGEMENT with CPM, PERT and Precedence Diagramming.
3. S. Rajasekaran. and G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic, and Evolutionary algorithms". Eastern Economic edition.
4. Kalyanamoy Deb, "Multi-objective optimization using evolutionary algorithms". Wiley.
5. Sumanth, D.J, Productivity Engineering and Management, TMH, New Delhi, 1990
6. Sudit, Ephraim F., "Productivity Based Management", Springer 1984
7. Alphonse Dell'Isola, "Value Engineering: Practical Applications for Design, Construction, Maintenance & Operations", R S Means Co., 1997.
8. Richard Park, "Value Engineering: A Plan for Invention", St. Lucie Press, 1999.

ANNEXURE – VIII

Scheme Structure & Syllabus for PG Programmes II Semester 2025-26 admitted batch students

Course Code: 51251203

Course Name: Contract Management

L	T	P	Credit
2	1	0	3

Course Objective:

To equip students with knowledge of quantity surveying, contract laws, claims and arbitration procedures, labor legislation, contract conditions, and modern construction contract models to ensure effective planning, administration, and legal compliance in construction projects.

SYLLABUS

Unit-I

Quantity Surveying: Basic principles of estimating. Construction costs. Different methods and stages of estimating. Specification of construction items and method of statement. Principles of rate analysis and valuation.

Unit-II

Claims and Arbitration: Indian contract act and arbitration act. Variations in work and conditions. Claims and disputes. Liquidated damages. Rights. Responsibilities and duties of client (Owner). Architect. Engineer. Contractor etc. Purchase order as contracts insurance contract and claims.

Unit-III

Legal Frame Work of Construction: Contract labors act 1970 and other acts and laws relating to labors management. Wages. Bonus and Industrial disputes.

Unit-IV

Contract Conditions: Important contract clauses. Terms of payments. Retention. Acceptance and final payment. Time of completion. Extension of time. Maintenance period etc.

Unit-V

Construction Contracts: BOT projects, Variation in BOT projects. Infrastructural projects, International contract rules and regulation.

Courses Outcomes:

Upon completion of the course, a student will be able to

CO1: Perform rate analysis of various construction items.

CO2: Differentiate between rights and responsibilities of Architect, Engineer, Contractor and Owner in a construction project.

CO3: Apply the provisions of various acts and laws applicable in construction.

CO4: Analyze essential different contract conditions and final settlement procedures.

CO5: Evaluate different contract models, and international contract regulations, and assess their applications in modern project delivery.

Reference Books

1. Construction Engineering and Management by S. Seetharaman, Publisher Umesh Pub.
2. Construction Planning and Management by B. Sengupta, Pub. Tata McGraw-Hill Education
3. Construction Project Management Theory And Practices by K.N. Jha, Pub. Pearson Education India
4. Construction Contracts by Jimmie Hinze, Publisher Tata McGraw-Hill Education
5. Estimating and Costing by B.N. Datta

Course Code: 51251204

Course Name: Repair, Rehabilitation & Retrofitting of Structures

L	T	P	Credit
3	0	0	3

Course Objective:

To understand the concept of repair, rehabilitation and retrofitting; various methodology for assessment of structure and methods for repair and retrofitting of structures

SYLLABUS

Unit 1:

Introduction to Repair, Rehabilitation and Retrofitting; Principles of Repair, Rehabilitation and Retrofitting; Terminology and Criteria for Repair, Rehabilitation and Retrofitting.

Unit 2:

Testing Methodology for RC Structures and Masonry Structures; Techniques for assessment of Structure Condition; Non-Destructive Testing.

Unit 3:

Various Techniques for Structural Repair; Materials for Repair; Repair and Retrofitting using FRP Materials.

Unit 4:

Methods for Repair and Retrofitting of RC Structure and Masonry Structure.

Unit 5:

Methods for Repair and Retrofitting of Heritage Structures; Case Studies.

Reference Books:

1. P. C. Varghese: Maintenance Repair & Rehabilitation & Minor Works of Buildings, PHI Learning Pvt. Ltd.
2. P. I. Modi and C. N. Patel: Repair and Rehabilitation of Concrete Structures, PHI Learning Pvt. Ltd.

Courses Outcomes:

Upon completion of the course, a student will be able to

CO1: **Understand** the terminology and principles for repair, rehabilitation and retrofitting.

CO2: **Apply** various methods for assessment of structures.

CO3: **Apply** various methods for repair of structures

CO4: **Apply** various methods for retrofitting of structures.

CO5: **Evaluate** various repairs and retrofitting technique.

Course Code: 51251205
Course Name: Computational Lab

L	T	P	Credit
0	0	4	2

Course Objective:

This lab course is aimed to make students familiar with the use of software in construction projects such as MATLAB, MS Excel, Primavera, BIM 4D.

List of Experiments:

1. Introduction to MATLAB and its application.
2. Error estimation and methods of roots finding.
3. Order of convergence of various methods using MATLAB.
4. Curve fitting and Interpolation using MATLAB.
5. Descriptive Analytics through Data Visualization using MS EXCEL.
6. Descriptive Analytics - Data statistics using MS EXCEL.
7. Diagnostic Analytics using MS EXCEL.
8. Primavera and its application in networking and scheduling.
9. Basics of BIM 4D.
10. Case study analysis using Primavera and BIM 4D

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Apply the concepts of MATLAB in problem solving.

CO2: Analyze the data using different tools of MS Excel.

CO3: Apply the concepts of PrimaVera, BIM 4D in project scheduling and management.

Course Code: 51251206

Course Name: Seminar / Presentation

L	T	P	Credit
0	0	4	2

Course Objective:

To enhance students' understanding of Construction Technology & Management by encouraging the study of diverse literature, fostering lifelong learning, and developing the soft skills necessary for effective presentation.

Syllabus

Any relevant topic related to Construction Technology & Management from within or beyond the syllabus through Swayam / NPTEL/MOOC.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Analyze contemporary issues in Construction management & its allied areas.

CO 2: Demonstrate good oral communication skills.

CO 3: Develop poster and power point presentations for effective communication.

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Department of Civil Engineering

Scheme of Evaluation

M. Tech. II Semester *(Structural Design)*

(for batch admitted in academic session 2025-26)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	72251201	DC	Design of Bridges	25	25	20	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	72251202	DC	Design of Prestressed Concrete Structure	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
3.	72251203	DC	Earthquake Resistant Design	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	722512XX	DE	**Departmental Elective[1] (DE-2)**	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	72251204	SPC	Design of Tall Buildings	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
6.	72251205	DLC	**Design Lab [2]**	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
7.	72251206	SLP	**Seminar/Presentation[3]**	-	-	-	-	70	30	-	-	100	-	-	4	2	Mentoring	SO	-
8.	72251207	NEC	**Classified Novel Engaging Course (Activity Based Learning)** Fire Safety & Regulation in Building	-	-	-	-	-	50	-	-	50	-	1	-	1	Interactive	SO	-
Total				100	100	80	120	140	110	25	75	750	12	04	08	20	-	-	-

MCQ: Multiple Choice Question **PP:** Pen Paper **SO:** Submission + Oral **OB:** Open Book

[1] This course will run through SWAYAM / NPTEL /MOOC based learning platform (with credit transfer facility). The course can be related & relevant to other domain as well.

[2] During lab, students have to perform practical/assignments/minor projects related to the courses of respective semester using recent technologies / languages / tools etc.

[3] Seminar/Presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students but assessment will be based on internal seminar presentation).

DE-2[1] *(through SWAYAM / NPTEL /MOOC)*

S. No.	Course Code	Course Name
1.	72251208	Finite Element Method
2.	72251209	Concrete Technology
3.	72251210	Retrofitting and Rehabilitation of Civil Infrastructure

Mode of Learning					Mode of Examination					Total Credits
Theory		Lab		NEC	Theory			Lab	NEC	
Face to Face	Online	Mentoring	Experiential	Interactive	PP	MCQ	OB	SO	SO	
12	3	2	2	1	12	3		4	1	20
60%	15%	10%	10%	5%	60%	15%		20%	5%	Credits %

Recommended in the Board of Studies Meeting of Department of Civil Engineering held on 4 December 2025

Course Code: 72251201

Course Name: Design of Bridges

L	T	P	Credit
3	0	0	3

Course Objectives:

To understand the types of bridges, design loads, analysis and design of different types of bridges.

SYLLABUS

Unit-I:

Introduction, Types of Bridges, Economic Span, Selection Suitable types of Bridges. Design Loads and their Distribution: Design Loads for Highways and Railway Bridges.

Unit-II:

Analysis of Deck Slabs and T-Beam Bridges. Load Distribution in multi-beam Bridges.

Unit-III:

Design of Deck Slab Bridge, T-Beam Bridge, Balanced Cantilever Bridge.

Unit-IV:

Design of Box girder Bridge, Arch Bridge and lattice girder railway bridge. Introduction to cable bridges

Unit-V:

Various types of bearings and their designs. Introduction to design of substructure. Introduction to Construction/Erection Methods.

Courses Outcomes:

Upon completion of the course, a student willbe able to

CO1: Apply knowledge of bridge types, economic span, and selection criteria to determine suitable bridge options and corresponding design loads.

CO2: Analyse the different bridges.

CO3: Design the deck slab and T-beam bridges.

CO4: Design the box girder, arch and lattice girder bridges.

CO5: Apply the concepts of bridge bearings, substructure design principles, and construction/erection methods to basic bridge substructure problems.

Reference Books

1. Design of Bridges, K. Raju, Oxford & IBH Publishing Company Pvt Ltd.
2. Essentials of Bridge Engineering, D. Johnson Victor, CBS Publisher.
3. Bridge Engineering, S. Ponnuswamy, Mc Graw Hill Publication.

Course Code: 72251202

Course Name: Design of Prestressed Concrete Structure

L	T	P	Credit
2	1	0	3

Course Objective:

To understand the concepts of prestressing, various methods, losses, analysis of members and design.

SYLLABUS

Unit-I:

Introduction, principle of prestressing, materials of prestressing, need for prestressing, Analysis of prestressed members. Prestresses Losses

Unit-II:

Slabs, Pre-tensioned and Post-tensioned beams, Design for flexure, bond, shear and torsion, IS code provisions.

Unit-III:

Design of anchorage zones in post-tensioned members, Stress pattern in anchorage zones, Transmission length, End zone reinforcement, stress distribution in end block

Unit-IV:

Composite beams - Analysis and design, Partial prestressing, non-prestressed reinforcements.

Unit-V:

Analysis of Cantilever and Continuous beams, Cable layout - Linear transformation - Concordant cables. Design of compression members and tension members.

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Apply the principles of prestressing, material properties, and loss calculations to analyze prestressed concrete members.

CO2: Design the beam and slabs in flexure, shear, bond and torsion.

CO3: Design the anchorage zones.

CO4: Design composite beam.

CO5: Design the members in compression and tension.

Reference books

1. Prestressed Concrete, K. Raju, Tata Mc Graw Hill.
2. Design of Prestressed Concrete Structure, T. Y. Lin
3. Prestressed Concrete, Sinha and Raj
4. Prestressed Concrete, R. H. Evans and R. S. Bennett

Course Code: 72251203

Course Name: Earthquake Resistant Design

L	T	P	Credit
2	1	0	3

Course Objective:

To understand the earthquake response of structures, philosophy of earthquake resistant design, design of RC structure, steel structure, masonry building and liquid storage tanks.

SYLLABUS

Unit-I:

Earthquakes and its Characteristics, Seismic waves, Magnitude and Intensity, Seismic Zoning, Seismic Microzonation, Site Effects

Unit-II:

Earthquake response of Structures, Equivalent Static Method, Response Spectrum Analysis and Time History Analysis.

Unit-III:

Philosophy of Earthquake Resistant Design, Seismic Design RC Flexure Member, Column & Structural Wall, Codal Provision and Ductile Detailing of reinforcement as IS13920.

Unit-IV:

Design of steel unbraced and braced frames. IS code provision

Unit-V:

Design of Masonry Buildings, Seismic Base Isolation.

Courses Outcomes:

Upon completion of the course, a student will be able to

CO1: Explain earthquake characteristics, seismic waves, magnitude and intensity, seismic zoning, microzonation, and site effects.

CO2: Analyse the structures using various methods.

CO3: Design the RC flexure member, column and shear wall.

CO4: Design the Steel Frame Members and Bracing.

CO5: Design the Masonry Buildings and Base Isolation.

Reference Books

1. Earthquake Resistant Design of Structures, Pankaj Agrawal & Manish Shrikhande.
2. Design of Masonry Building, A. S. Arya, Nem Chand & bros. Roorkee.
3. Design of Steel Structure, N. Subramaniya, Tata Mc Graw Hill
4. Seismic Design of RC Concrete and Masonry Building, T. Paulay and M.J.N. Priestly, Mc Graw Hill Publication

Course Code: 72251204

Course Name: Design of Tall Buildings

L	T	P	Credit
3	0	0	3

Course Objective:

To understand the design philosophy, Modelling for Analysis, Creep and Shrinkage Effects for Various Tall Buildings

SYLLABUS

Unit-I:

Introduction, Behaviour of tall buildings, Different Structural Systems, Design Philosophy, Wind Load, Earthquake Load, Sequential Loading.

Unit-II:

Modeling for Analysis – Approximate Analysis, Accurate Analysis and Reduction Techniques.

Unit-III:

Design of Braced Frames, Rigid Frame and Tubular Structures.

Unit-IV:

Design of Coupled Shear Wall Structure and Wall-Frame Structure,

Unit-V:

Stability of High Rise Structures, Creep and Shrinkage Effects.

Courses Outcomes:

Upon completion of the course, a student will be able to

CO1: Explain the design philosophy, structural systems, tall-building behavior, and various loads including wind, earthquake, and sequential loading.

CO2: Analyse the tall buildings using different methods.

CO3: Design the Braced Frames, Rigid Frames and Shear wall Structures.

CO4: Design the Coupled Shear Wall Structure and Wall-Frame Structure.

CO5: Apply the concepts of structural stability, creep, and shrinkage to evaluate the behavior of high-rise structures.

Reference Books

1. Tall Building Structures: Analysis and Design, B. S. Smith and A. Coull, Wiley.
2. Structural Analysis and Design of Tall Buildings, B. S. Taranath, CRC Press.

Course Code: 72251105
Course Name: Design Lab

L	T	P	Credit
0	0	4	2

Course Objective:

To practice the various softwares to analyze and design the Beam, Portal Frame and Multi-story Buildings including Octave and Staad Pro.

List of Experiments:

1. Analyse a two span continuous beam using Octave.
2. Analyze the portal frame using Octave.
3. Analyze the multi-story building for gravity load using Staad Pro.
4. Analyze the multi-story building for earthquake load using Staad Pro.
5. Analyze the multi-story building for wind load using Staad Pro.
6. Design the multi-story building using Staad Pro

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Analyze the Beam and Portal Frame using Octave.

CO2: Analyze the multi-story building using Staad Pro.

CO3: Design the multi-story building using Staad Pro.

Course Code: 72251206

Course Name: Seminar / Presentation

L	T	P	Credit
0	0	4	2

Course Objective:

To enhance students' understanding of Structural engineering & Design by encouraging the study of diverse literature, fostering lifelong learning, and developing the soft skills necessary for effective presentation.

Syllabus

Any relevant topic related to Structural engineering & Design from within or beyond the syllabus through Swayam / NPTEL/MOOC.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Analyze contemporary issues in Structural engineering & Design.

CO 2: Demonstrate good oral communication skills.

CO 3: Develop poster and power point presentations for effective communication.

ANNEXURE – IX

Syllabus/ Modules for Classified Novel Engaging Courses to be offered in II Semester of PG Programme for 2025-26 admitted batch students

Course Title: Fire Safety & Regulation in Building

Course Objective:

Understanding of Fire Hazards, Identify various fire protection systems and implement fire safety regulation

Course Content:

- Fire alarm system and their types
- Fire suppression agents
- Types of water distribution system
- System readiness
- Building fire hazards
- Fire safety in buildings: basic principles
- Fire safety management
- Codes and regulations

Course Outcomes:

CO1: Explain the working of fire alarm system, suppression system, and portable fire extinguishers.

CO2: Identify various types of water storage devices, type of pipe material and different valves used in water supply system

CO3: Apply fire safety principles, management and regulation in building

Course Name: Basic Statistical Concepts

Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of fundamental statistical concepts required for data analysis and informed decision-making. The course emphasizes descriptive and inferential statistical techniques, including measures of central tendency and dispersion, probability distributions, hypothesis testing, correlation, regression, and analysis of variance. Through practical exposure using Microsoft Excel, students will develop the skills to apply statistical tools, interpret results, and communicate findings effectively in real-world scenarios.

Course Contents:

- Types of Data
- Sampling and Sample Distribution
- Random Variables
- Probability Distribution
- Common Statistical Estimators: Measure of Central Tendency, Measure of Dispersion
- Normal and Standard Normal Distribution
- Confidence Interval
- Correlation Analysis
- Regression Models: Simple and Multiple Regression
- Goodness of Fit
- Hypothesis Testing and Use of p-value in Hypothesis Testing
- Type-I and Type-II Errors
- Independent and Paired Sample t-test
- F-test
- Chi-square Test
- ANOVA (Analysis of Variance)
- Non-parametric Tests: Mann-Whitney U Test, Wilcoxon Signed-Rank Test, Kruskal-Wallis H Test
- Time Series Analysis
- Outlier Detection and Treatment
- Data Visualization

Course Outcomes

CO1: Describe the foundational concepts of statistics, including types of data, sampling techniques, and probability distributions.

CO2: Calculate and interpret measures of central tendency, dispersion, and probability to summarize and understand datasets.

CO3: Analyze relationships among variables using correlation and regression techniques to identify patterns and trends.

CO4: Evaluate hypotheses through appropriate statistical tests such as t-tests, ANOVA, Chi-square, and non-parametric methods.

CO5: Interpret statistical findings through time series analysis, outlier detection, and effective data visualization.

Course Title: Thesis and Research Paper Writing

Course Objective:

To equip students with the knowledge and practical skills required to plan, conduct, document, and present scholarly research, enabling them to produce a well-structured thesis or research paper that meets academic and ethical standards.

Module 1: Foundations of Academic Research

- Types of academic research
- Formulating research questions and hypotheses
- Research ethics and plagiarism

Module 2: Literature Review and Referencing

- Conducting systematic literature reviews
- Annotated bibliographies
- Referencing styles (APA, MLA, Chicago, IEEE)
- Using citation tools (Mendeley)

Module 3: Research Methodology and Data Collection

- Designing research methodology
- Sampling techniques
- Data collection tools (interviews, surveys, experiments)
- Validity and reliability

Module 4: Data Analysis and Interpretation

- Analyzing qualitative and quantitative data
- Using statistical software (Origin Pro, Excel)
- Interpreting results in the context of research objectives

Module 5: Thesis and Research Paper Writing

- Structure and components of a thesis/research paper
- Academic writing style and tone
- Drafting, revising, and proofreading
- Submitting to journals and handling peer review

Course Materials:

- **Research Methodology: A Step-by-Step Guide for Beginners** – *Ranjit Kumar*

- **The Craft of Research** – *Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams*
- **Writing Your Thesis** – *Paul Oliver*

Course Outcomes (COs):

CO1: Demonstrate an understanding of academic research principles, including types, ethics, and the formulation of research questions.

CO2: Conduct a structured literature review and accurately apply referencing and citation practices.

CO3: Design appropriate research methodologies and implement effective data collection techniques.

CO4: Analyze and interpret research data using suitable tools and present results coherently.

CO5: Produce a well-organized thesis or research paper adhering to academic writing standards and publication requirements.

ANNEXURE – X

Scheme structure for PG Program (M.E. CTM)
IV Semester (2024-25 admitted batch students)

Scheme of Evaluation
M. E. IV Semester *(Construction Technology & Management)*

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	51242201	DLC	Dissertation	-	-	-	-	350	150	500	-	-	32	16	Interactive	SO	-
Total				-	-	-	-	350	150	500	-	-	32	16	-	-	-

ANNEXURE – XI

CO Attainment & Gap Analysis II Semester
January - June 2025

CO Attainment & Gap Analysis Jan – June 2025

Table.1: CO Attainment & Gap Analysis of I Year, II SEM

Course Code & Name	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
11241201: Surveying	CO 1	1.34	1.58	1.38	2.25	0.87	Not Attained	Conduct a remedial session on basic aspects of surveying
	CO 2	2.00	1.75	1.95	2.25	0.30	Not Attained	Provide additional exercises and practice problems
	CO 3	2.00	1.83	1.97	2.25	0.28	Not Attained	Field demonstration on different surveying methods
	CO 4	2.03	1.67	1.96	2.25	0.29	Not Attained	Practice and a brief revision on control point techniques
	CO 5	1.13	1.83	1.27	2.25	0.98	Not Attained	Conduct a remedial session on advanced topics
11241202: Strength of Materials	CO 1	1.00	2.07	1.21	2.25	1.04	Not Attained	More Numerical practice on stress–strain calculations.
	CO 2	1.00	1.98	1.20	2.25	1.05	Not Attained	Provide additional solved examples
	CO 3	1.00	1.89	1.18	2.25	1.07	Not Attained	Conduct a quick revision and more assignments to be given

	CO 4	1.00	1.96	1.19	2.25	1.06	Not Attained	More Practice problems on torsion formulas and pressure vessel stress.
	CO5	0.77	1.86	0.99	2.25	1.26	Not Attained	Conduct a remedial session
11241203: Concrete Technology	CO 1	1.36	2.17	1.52	2.25	0.73	Not Attained	Conduct a brief revision session on the basic components and functions of concrete.
	CO 2	1.47	2.13	1.60	2.25	0.65	Not Attained	Provide additional practice on interpreting test results
	CO 3	1.71	2.04	1.78	2.25	0.47	Not Attained	Provide quick demonstration of key quality control procedures
	CO 4	1.11	2.15	1.32	2.25	0.93	Not Attained	Provide extra problems on mix design
	CO 5	1.20	2.02	1.36	2.25	0.89	Not Attained	Prepare and share brief case studies on special concretes
11241204: Fluid Mechanics	CO 1	1.60	2.00	1.68	2.25	0.57	Not Attained	Conduct revision session on Basic aspects of Fluid properties
	CO 2	1.60	1.98	1.68	2.25	0.57	Not Attained	Provide extra practice problems
	CO 3	1.00	1.98	1.20	2.25	1.05	Not Attained	More problem-solving questions to be

								provided
	CO 4	1.60	1.96	1.67	2.25	0.58	Not Attained	Give additional explanation with examples
	CO 5	1.20	2.13	1.39	2.25	0.86	Not Attained	Share examples and practice problems
11241205: Matrices & Calculus	CO 1	2.04	2.35	2.10	2.25	0.15	Not Attained	More Assignments to be given
	CO 2	2.08	2.46	2.16	2.25	0.09	Not Attained	Give additional examples
	CO 3	1.94	2.39	2.03	2.25	0.22	Not Attained	Conduct a brief revision class
	CO 4	2.10	2.52	2.19	2.25	0.06	Not Attained	Arrange session for practice problems
	CO5	1.20	2.42	1.44	2.25	0.81	Not Attained	Provide additional exercises
11241206: Building Material & Construction Lab	CO 1	3.00	2.43	2.89	2.25	-0.64	Attained	
	CO 2	3.00	2.38	2.88	2.25	-0.63	Attained	
	CO 3	3.00	2.46	2.89	2.25	-0.64	Attained	
	CO 4	3.00	2.39	2.88	2.25	-0.63	Attained	
	CO 5	3.00	2.51	2.90	2.25	-0.65	Attained	
11241207: Python Solving through Python Programming	CO 1	3.00	2.58	2.92	2.25	-0.67	Attained	
	CO 2	3.00	2.47	2.89	2.25	-0.64	Attained	
	CO 3	3.00	2.36	2.87	2.25	-0.62	Attained	
	CO 4	3.00	2.55	2.91	2.25	-0.66	Attained	
11241208: Micro Project-II	CO 1	3.00	2.39	2.88	2.25	-0.63	Attained	
	CO 2	2.30	2.25	2.29	2.25	-0.04	Attained	
	CO 3	2.30	2.31	2.30	2.25	-0.05	Attained	

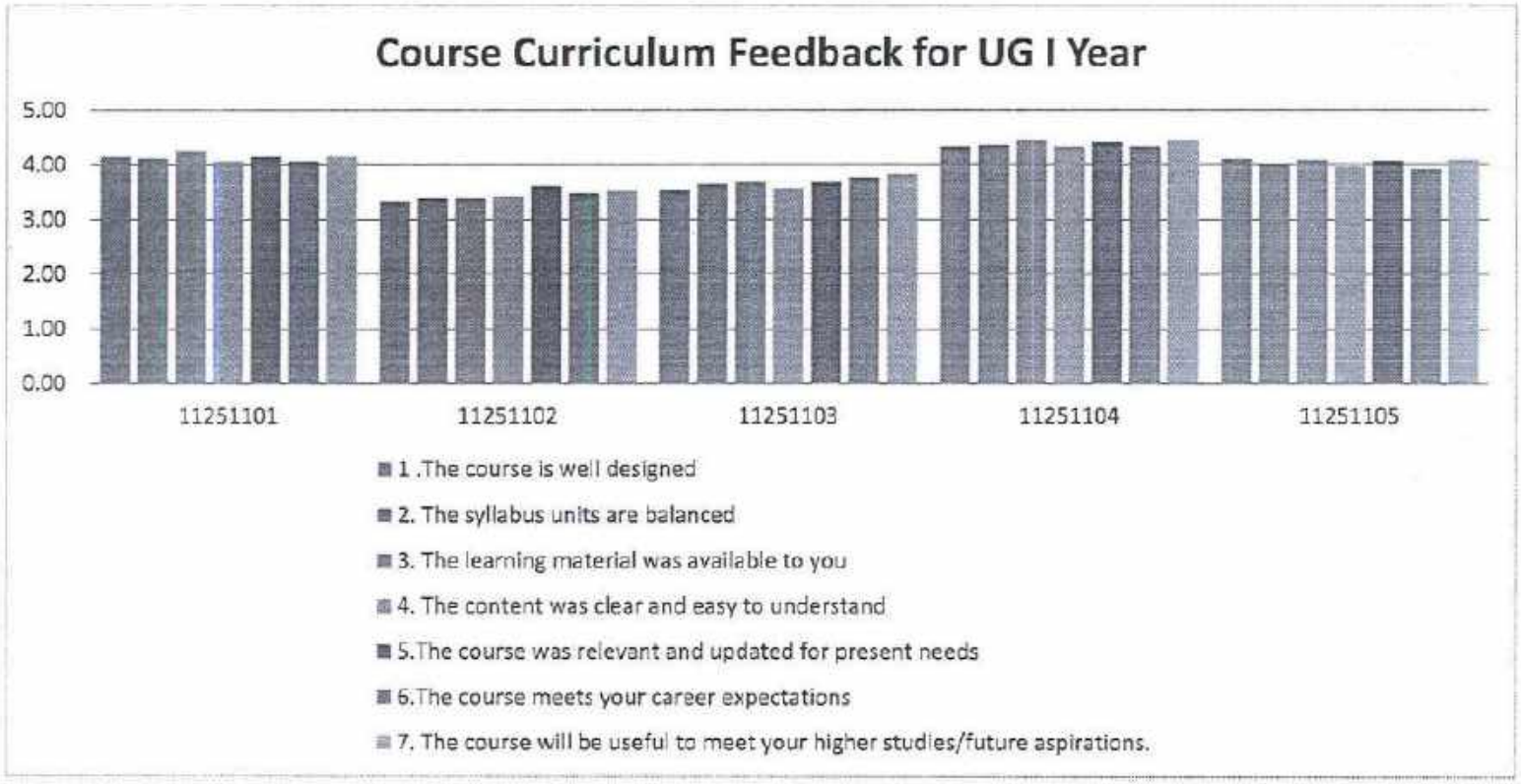
	CO 4	2.30	2.28	2.30	2.25	-0.05	Attained	
	CO 5	2.30	2.35	2.31	2.25	-0.06	Attained	
11241210: Engineering Physics	CO 1	2.30	2.40	2.32	2.25	-0.07	Attained	
	CO 2	3.00	2.61	2.92	2.25	-0.67	Attained	
	CO 3	3.00	2.71	2.94	2.25	-0.69	Attained	
	CO 4	3.00	2.78	2.96	2.25	-0.71	Attained	
	CO 5	3.00	2.64	2.93	2.25	-0.68	Attained	
11241211: Language Lab	CO 1	3.00	2.81	2.96	2.25	-0.71	Attained	
	CO 2	3.00	2.77	2.95	2.25	-0.70	Attained	
	CO 3	3.00	2.70	2.94	2.25	-0.69	Attained	
	CO 4	3.00	2.58	2.92	2.25	-0.67	Attained	
	CO 5	3.00	2.83	2.97	2.25	-0.72	Attained	
11241212: Sustainability & Environmental Science	CO 1	3.00	2.81	2.96	2.25	-0.71	Attained	Conduct a revision class
	CO 2	2.17	2.06	2.15	2.25	0.10	Not Attained	Provide case-based study
	CO 3	2.15	2.11	2.14	2.25	0.11	Not Attained	Share short summaries on topics
	CO 4	1.73	1.97	1.78	2.25	0.47	Not Attained	Conduct short explanatory session
	CO 5	1.20	2.06	1.37	2.25	0.88	Not Attained	Provide case studies

ANNEXURE – XII

Curriculum Feedback Analysis (MITS-DU structure)

CURRICULUM FEEDBACK ANALYSIS FROM STAKEHOLDERS

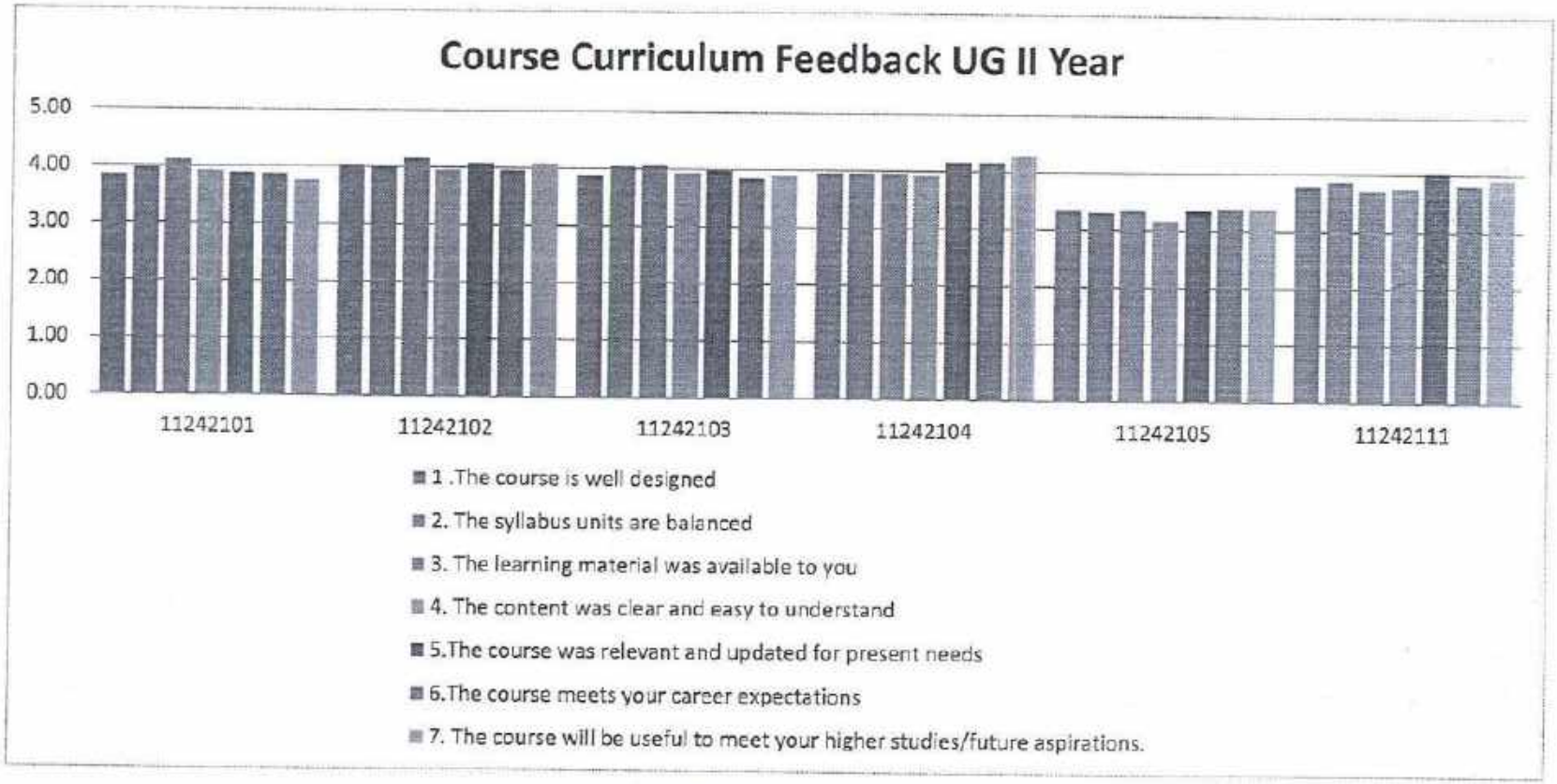
A1. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG First Year) – November. 2025



	11251101:Civil Engineering Materials & Construction	11251102: Computer Programming	11251103: Engineering Mechanics	11251104: Building Design & Drawing	11251105: Basic Electrical & Electronics Engineering
1 .The course is well designed	4.15	3.33	3.53	4.33	4.11
2. The syllabus units are balanced	4.13	3.38	3.65	4.35	4.00
3. The learning material was available to you	4.25	3.38	3.68	4.45	4.08
4. The content was clear and easy to understand	4.05	3.43	3.56	4.33	3.97
5.The course was relevant and updated for present needs	4.15	3.62	3.68	4.40	4.05
6.The course meets your career expectations	4.05	3.48	3.76	4.33	3.92
7. The course will be useful to meet your higher studies/future aspirations.	4.15	3.52	3.82	4.45	4.08

Subjects	Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?
	None	None	-

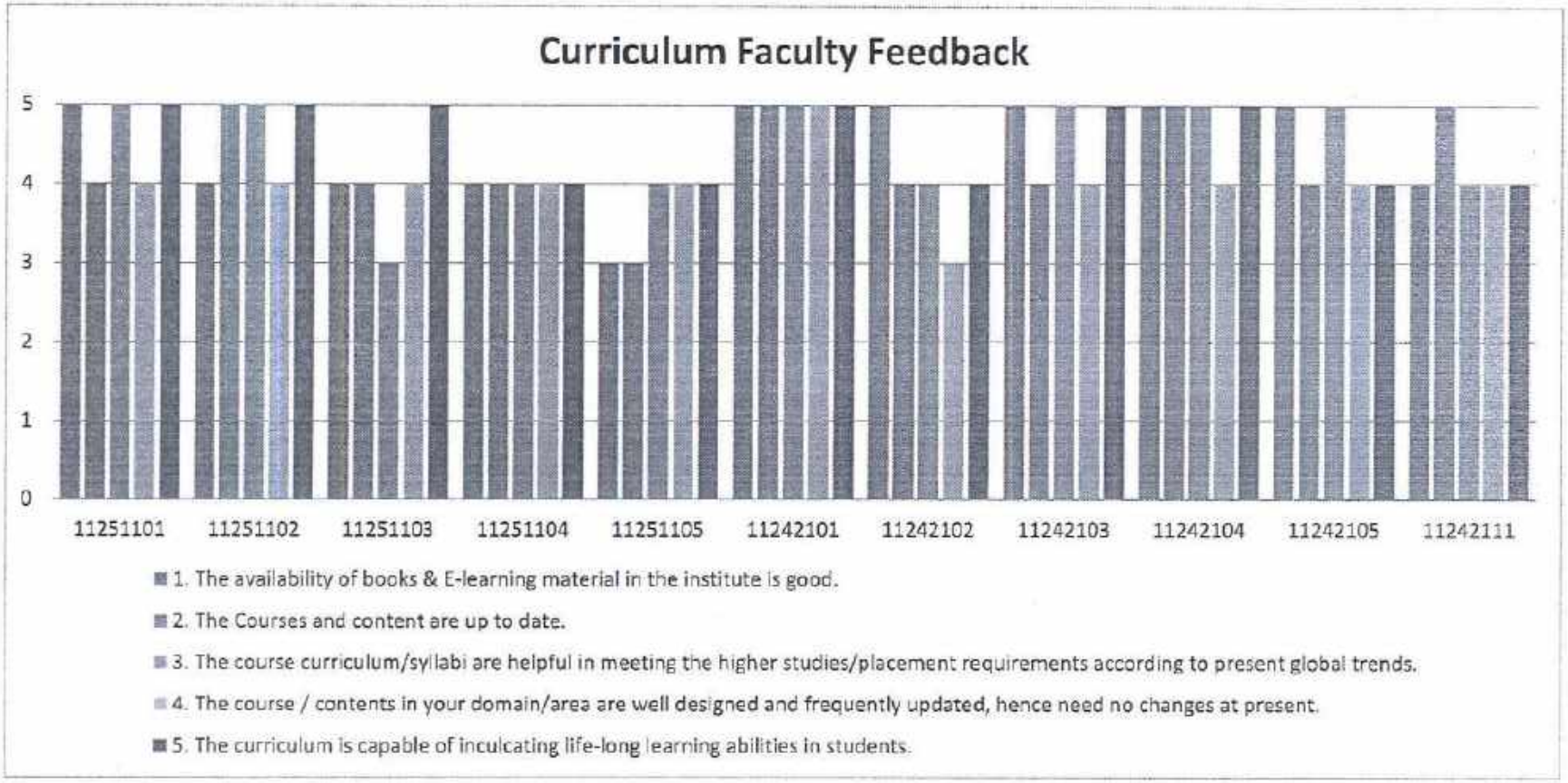
A2. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Second Year) – November. 2025



	11242101: Transform & Vector Calculus	11242102: Data Structures	11242103: Fluid Mechanics-II	11242104: Geotechnical Engineering-I	11242105: Structural Analysis-I	11242111: Cyber Security
1 .The course is well designed	3.85	4.04	3.88	3.96	3.35	3.79
2. The syllabus units are balanced	3.97	4.00	4.04	3.96	3.31	3.87
3. The learning material was available to you	4.11	4.16	4.06	3.96	3.35	3.72
4. The content was clear and easy to understand	3.92	3.96	3.94	3.92	3.15	3.77
5.The course was relevant and updated for present needs	3.89	4.08	3.98	4.17	3.35	4.03
6.The course meets your career expectations	3.88	3.96	3.86	4.17	3.38	3.81
7. The course will be useful to meet your higher studies/future aspirations.	3.77	4.08	3.90	4.29	3.38	3.92

Subjects	Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?
	None	None	-

A.3 CURRICULUM FEEDBACK ANALYSIS FROM FACULTY – November. 2025



Input received from faculty

Course level	Course	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.[If you feel some changes (new content to be added or outdated content to be removed) are needed]	5. The curriculum is capable of inculcating life-long learning abilities in students.	6. The environment of department/institute is conducive for innovative teaching and research.	7. The institute supports you in your initiatives for updating your knowledge/skills and in achieving career growth.
B. Tech	11251101: Civil Engineering Materials & Construction	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11251102: Computer Programming	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11251103: Engineering Mechanics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11251104: Building Design & Drawing	Yes	Yes	Yes	Yes	Yes	Yes	Yes

B. Tech	11251105: Basic Electrical & Electronics Engineering	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242101: Transform & Vector Calculus	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242102: Data Structures	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242103: Fluid Mechanics-II	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242104: Geotechnical Engineering-I	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242105: Structural Analysis-II	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Tech	11242111: Cyber Security	Yes	Yes	Yes	Yes	Yes	Yes	Yes

ANNEXURE – XII (b)

Action Taken Report based on Curriculum Feedback Received from Stakeholders

A. Action taken based on Curriculum Feedback received from Students

S. No.	Comments /Suggestions Received during Feedback	Action Taken
1	No additional suggestion was provided by students	N/A

B. Action taken based on Curriculum Feedback received from Faculty

S. No.	Comments /Suggestions Received during Feedback	Action Taken
1	Regarding Introduction of Honors track For MITS DU Students for BTech IV Sem (Through SWAYAM)	Faculty members' opinions were duly considered while Introducing the honors track.
2	Opinion regarding courses to be included under different track of Honors (Through SWAYAM) **Track-1 (Structural Engineering)** - Construction Methods & Equipment management **Track-2 (Environmental Engineering)** - Environmental Engineering - Fundamentals of Ecosystem Health and assessment **Track-3 (Construction Technology & Management)** - Concrete Technology - Traffic Engineering	The opinions of faculty members were duly considered while finalizing the courses for different Honors tracks, some of recommended courses were incorporated as Honors courses in the list.
3	Opinion regarding courses to be included as Minor (Through SWAYAM) - Geology and Soil Mechanics - Natural Hazards - Basic Construction Materials	Faculty members' opinions were duly considered while finalizing the courses for the Minor. Also, some of the recommended courses was incorporated as Minor courses in the list.