Department of Civil Engineering
Scheme of Evaluation
B. Tech. I Semester *CIVIL ENGINEERING*

(for batch admitted in academic session 2023-24)

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot				L	T	P				
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation									
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	3100011	BSC	Engineering Mathematics – I (BSC - 1)	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
2.	3110121	ESC	Computer Programming (ESC - 1)	50	10	20	20	40	30	30	200	2	1	2	4	Blended	AO	2 Hrs
3.	3100014	ESC	Engineering Graphics (ESC - 2)	50	10	20	20	-	-	-	100	1	2	-	3	Offline	AO	2 Hrs
4.	3110122	DC	Building Materials & Construction (DC - 1)	50	10	20	20	40	30	30	200	3	-	2	4	Blended	PP	2 Hrs
5.	3110123	DC	Engineering Mechanics (DC - 2)	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
6.	3100018	ESC	Engineering Graphics Lab (ESC – 3)	-	-	-	-	40	30	30	100	-	-	2	1	Offline	SO	-
	Total			**250**	**50**	**100**	**100**	**120**	**90**	**90**	**800**	**12**	**4**	**6**	**19**	**-**	**-**	**-**
7.	3000005	Natural Sciences & Skills	Environmental Engineering	50	10	20	20	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language, Credits of natural Sciences & Skills will be added in VI Semester.
MCQ: Multiple Choice Question   **AO:** Assignment + Oral   **OB:** Open Book   **PP:** Pen Paper   **SO:** Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits
Theory			Lab	Theory			Lab	
Offline	Online	Blended	Offline	PP	AO	MCQ	SO	
7		9	3	10	6		3	19
37%		49%	16%	51%	33%		16%	Credits %

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Department of Civil Engineering
Scheme of Evaluation
B. Tech. II Semester *CIVIL ENGINEERING*

(for batch admitted in academic session 2023-24)

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot				L	T	P				
				End Term Evaluation		Continuous Evaluation		End Sem. Exam	Continuous Evaluation									
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	3110221	DC	Surveying **(DC - 3)**	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	3110222	DC	Strength of Materials **(DC - 4)**	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
3.	3100021	ESC	Basic Mechanical Engineering **(ESC - 4)**	50	10	20	20	-	-	-	100	2	1	-	3	Blended	MCQ	1.5 Hrs
4.	3100022	ESC	Basic Electrical & Electronics Engineering **(ESC - 5)**	50	10	20	20	40	30	30	200	2	1	2	4	Blended	MCQ	1.5 Hrs
5.	3110224	ESC	Python Programming **(ESC - 6)**	50	10	20	20	40	30	30	200	2	1	2	4	Blended	AO	2 Hrs
6.	3110223	DLC	Survey Practice Lab **(DLC – 2)**	-	-	-	-	40	30	30	100	-	-	2	1	Offline	SO	-
		Total		250	50	100	100	160	120	120	900	11	4	8	19	-	-	-
7.	3000004	Natural Sciences & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs
			Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.															

$**Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject**

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language, Credits of natural Sciences & Skills will be added in VI Semester.

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

Mode of Teaching				Mode of Examination				Total Credits
Theory			Lab	Theory			Lab	
Offline	Online	Blended	Offline	PP	AO	MCQ	SO	
		15	4	6	3	6	4	19
		89%	21%	32%	15%	32%	21%	Credits %

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA
Deemed to be 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. III Semester

(for batch admitted in academic session 2023-24)

No.	Subject Code	Category Code	Subject Name	Theory Slot — End Term Evaluation — End Sem. Exam	Theory Slot — End Term Evaluation — $Proficiency in subject /course	Theory Slot — Continuous Evaluation — Mid Sem. Exam.	Theory Slot — Continuous Evaluation — Quiz/Assignment	Practical Slot — End Sem. Exam	Practical Slot — Continuous Evaluation — Lab Work& Sessional	Practical Slot — Continuous Evaluation — Skill Based Mini Project	Total Marks	L	T	P	Total Credits	Mode of Teaching	Mode of Exam	Duration of Exam
1.	3100025	BSC	Engineering Mathematics - II (BSC - 2)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
2.	3110321	DC	Fluid Mechanics - I (DC - 5)	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
3.	3110322	DC	Theory of Structure – I (DC - 6)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
4.	3110323	DC	Geotechnical Engineering (DC - 7)	50	10	20	20	40	30	30	200	2	1	2	4	Blended	MCQ	1.5 Hrs
5.	3110324	DC	Transportation Engineering (DC - 8)	50	10	20	20	40	30	30	200	2	1	2	4	Blended	MCQ	1.5 Hrs
6.	3110325	DLC	Self-learning /Presentation (SWAYAM/NPTEL/MOOC)*	-	-	-	-	-	40	-	40	-	-	2	1	Online + Mentoring	SO	-
7.	3110326	DLC	Skill Internship Project (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
			Total	250	50	100	100	230	130	90	950	10	5	14	22	-	-	-
9.	1000005	MAC	Project Management & Financing	50	10	20	20	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
10.	3000001	Natural Sciences & Skills	Engineering Physics (Applicable for both regular and Lateral entry admitted students)	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs
11.	3000005	Natural Sciences & Skills	Environmental Engineering (Applicable only for Lateral Entry admitted students)	50	10	20	20	30	10	10	150	2	-	-	GRADE	Blended	MCQ	1.5 Hrs

*compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation
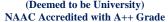
$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language, Credits of natural Sciences & Skills will be added in VI Semester.

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

Mode of Teaching					Mode of Examination					Total Credits
Theory			Lab/SIP	Seminar	NEC	Theory			Lab	SIP/SLP/NEC	
Offline	Online	Blended	Offline	Online Mentoring	Interactive	PP	AO	MCQ	SO	SO	
	15	5	1	1	9		6	3	4	22	
	68%	23%	4.5%	4.5%	41%		27%	13%	19%		Credits %

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

For batches admitted in academic session 2023– 24

S. No.	Subject Code	Category Code	Subject Name	Theory Slot - End Term Evaluation - End Sem Exam	Theory Slot - End Term Evaluation - $^\$$Proficiency in subject /course	Theory Slot - Continuous Evaluation - Mid Sem Exam	Theory Slot - Continuous Evaluation - Quiz/ Assignment	Practical Slot - End Sem Exam	Practical Slot - Continuous Evaluation - Lab Work & Sessional	Practical Slot - Continuous Evaluation - Skill Based Mini Project	Total Marks	L	T	P	Total Credits	Mode of Teaching (Offline/ Online)	Mode of Exam	Duration of Exam
1.	3100028	BSC	Engineering Mathematics – III (BSC-3)	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
2.	3110421	DC	Fluid Mechanics - II (DC - 9)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	3110422	DC	Theory of Structure - II (DC -10)	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP	2 Hrs
4.	3110423	DC	Water Supply Engineering (DC - 11)	50	10	20	20	40	30	30	200	2	1	2	4	Blended	PP	2 Hrs
5.	3110424	DC	Water Resources Engineering (DC – 12)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	3110425	DLC	Civil Drawing Lab (DLC – 3)	-	-	-	-	40	30	30	100	-	-	2	1	Offline	SO	-
7.	3110426	MC	Cyber Security	50	10	20	20	-	-	-	100	2	-	-	2	Online	MCQ	1.5 hrs
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
			Total	**300**	**60**	**120**	**120**	**130**	**60**	**60**	**850**	**13**	**5**	**6**	**21**	**-**	**-**	**-**
9.	3000002	Natural Science & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	Grade	Blended	MCQ	1.5 hrs
10.	1000001	MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ	1.5 hrs

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

$^\$$Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject
MCQ – Multiple Choice Questions, PP – Pen paper Mode, A+O – Assignment + Oral, SO – Submission + Oral
**Natural Sciences& Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language
(**Natural Sciences & Skills** treated as Mandatory Audit Courses from first to fourth semester and cumulative marks converted as a cluster of credits and awarded in the VI semester)
NOTE: Under Natural Science & Skills, Lateral Entry Admitted students have to appear for two courses in this semester: Engineering Chemistry & Language.

Mode of Teaching					Mode of Examination					Total Credits
Theory		Blended	Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended	Offline	Interactive	PP	A+O	MCQ	SO	SO	
7	2	9	2	1	16	-	2	2	1	21
33%	9%	43%	9%	5%	76%	-	9%	9%	5%	Credits %

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

2023 ONWARDS ADMITTED BATCHES

SEMESTER-I & II

Course Code: 3110122
Course Name: Building Materials & Construction

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To study the properties of concrete ingredients i.e. cement. Sand and coarse aggregate by conducting different tests.
2. To select of different types of admixtures to improve the properties of concrete for different field applications.
3. To conduct the field and laboratory tests on concrete in fresh and hardened state.
4. To provide knowledge about various types of bricks, stones, woods & timber, ferrous & nonferrous construction material & their applications.
5. To provide knowledge on design of foundation, including selection of appropriate foundation.
6. To understand laying & construction of brick & stone masonry and various methods of damp proofing etc.
7. To provide knowledge about stairs, floors & roofs in various types of buildings.

Syllabus:

Unit-I

Types of Foundation& its design: masonry construction, masonry classification, stone v/s brick masonry, joints in stone masonry, brick masonry (bonds in brick masonry, characteristics of bonds, type of bonds), typical structures in brickwork, Damp prevention (causes, effects, control & prevention techniques, material used for damp proofing), Anti termite treatment, water proofing treatment, Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit – II

Ingredients of Concrete**:** Portland cement Chemical composition of cement, Hydration of cement, setting of cement, tests on physical properties of cement. Types of Portland cement – Ordinary Portland cement – Rapid Hardening Portland cement – low heat Portland cement- Sulphate Resisting cement – Portland Blast furnace cement- Super Sulphated cement- Portland Pozzolana cement and Pozzolanas: Fly ash; use of pozzolanas, white cement, Expansive cements – High alumina cement.

Aggregates**:** General classification of aggregates, natural and artificial aggregates, particle shape and texture, 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, Soundness of aggregates, Alkali- aggregate reaction, Fineness modulus, Grading requirements.

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

Unit-III
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, process of concrete manufacturing.

Hardened Concrete**:** Compressive & Flexural strength of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Thermal properties of concrete.

Unit IV
Bricks (classification, characteristics, manufacturing, testing, and types). Stones (classification, Quarrying, seasoning characteristics, testing, selection & uses, preservation)**,** Wood & Timber (Classification, Structure & characteristics, seasoning and its methods, defects & diseases, preservation & various treatment testing), wood products and their applications

Unit V
Mortar (Classification, characteristics, functions of ingredients). Types of mortar and their uses grout, guniting, ferrous material (Pig iron, CI, Mild steel, wrought iron, stainless steel, compositions & proposition). Reinforced steel bars (classification, types, designation), Aluminium (its alloys & uses). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms), Paint varnishes & enamels (types, composition, method of application, defects)

Course Outcomes:
Upon completion of the course, the students will be able to:
CO1: Explain the basic elements of buildings, engg. materials & construction.
CO2: Evaluate the properties of various materials like cement, aggregate, concrete, admixture, brick, stone etc.
CO3: Distinguish the suitability of building materials in the construction of elements of buildings.
CO4: Evaluate various types of concrete in building construction accordingly.
CO5: Apply various techniques for finishing & protection works of various elements of building.

Text Books:
1. Concrete Technology, M. L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 5th edition 2013
2. Concrete Technology, M.S. Shetty, S. Chand Publications, 2006
3. Building Materials, M.L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 2017
4. Building Construction, B.C. Punmia, A.K. Jain, Laxmi Publishers New Delhi, 2016

Reference Books:
1. Properties of Concrete, Neville, ELBS, Pearson Education, 5th edition 2012
2. Building Material, S.K. Duggal, New Age Publishers, 4th revised edition 2012

List of Experiments:
1. Determination of properties of cement.
2. Determination of properties of sand.
3. Determination of properties of aggregate.
4. Determination of Fineness of cement.
5. Determination of consistency of cement.
6. Determination of workability of concrete by slump test.

7. Determination of workability of concrete by compacting factor apparatus.
8. Determination of workability by Vee Bee consistometer.
9. Determination of water absorption of bricks.
10. Determination of efflorescence of brick.
11. Field testing on bricks.
12. Determination of crushing strength of bricks.

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

CO 1: Determine the properties of cement, sand & aggregate as per IS code.

CO 2: Determine the workability of concrete for suitability of concrete mix in different construction works.

CO 3: Evaluate compressive strength of various concrete mixes.

CO 4: Determine physical properties of brick by experiment and practice accordingly.

CO 5: Examine the properties of the cement mortar for various elements of the buildings.

Suggestive List of Skill Based Mini Project:

1. Mix Design – (M20 & M25)
2. Fresh & Hardened Concrete Design.
3. Development of Innovative Building Materials like brick etc using waste materials.

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Course Code: 3110123
Course Name: Engineering Mechanics

	L	T	P	Credit
	3	0	0	3

COURSE OBJECTIVES:
1. To learn about basic laws of Mechanics and its application for different types of force systems.
2. To learn the Laws of friction and its applications
3. To study the applications of equilibrium concepts in Engineering problems.
4. To study about properties of areas like Centroid and Moment of Inertia.
5. To learn the basics of kinematics and Kinetics of particles and its applications in free vibration.

SYLLABUS

Unit-I
Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Introduction to force system in space; Equilibrium Concepts.

Unit-II
Equilibrium Problem involving Frictional forces, Friction: Laws of Coulomb friction, inclined plane; ladder friction; wedge friction, square threaded screws; belt friction; rolling resistance

Unit-III
Support Reactions, Analysis of plane Trusses, method of joints, method of Sections, Graphical method. Shear force and bending moment diagram for cantilever, simply supported and overhanging beam with concentrated, distributed load and Couple.

Unit-IV
Properties of areas: Centroid of plane areas, Moments of inertia, theorem of parallel axis and theorem of perpendicular axis; product of inertia of areas, polar moment of inertia, principal axes and principal moments of inertia.

Unit-V
Kinematics and Kinetics of particles: Particle dynamics; Free Vibrations of undamped Single Degree of Freedom system

COURSE OUTCOMES
On successful completion of teaching-learning and evaluation activities, a student would be able to
1. Apply basic laws of Mechanics for different types of force systems.
2. Apply the Laws of friction in engineering problems.
3. Apply the concept of equilibrium in statically determinate beams and trusses.
4. Determine the properties of areas for different shapes.
5. Apply the basics of Kinematics and Kinetics of particles in motion and undamped free vibration.

Text book:
1. R. C. Hibbeler, *Engineering Mechanics (Statics and Dynamics)*, Pearson EducationAsia Pvt. Ltd
2. RS Khurmi and N Khurmi, A Textbook of Engineering Mechanics, S. Chand and Co. Ltd.
3. R. K. Rajput, Engineering Mechanics, Dhanpat Rai Publications (P) Limited
4. J. L. Meriam and L.G. Kraige, *Engineering Mechanics (Static & Dynamics)*, JohnWiley

Reference books
1. F. P. Beer and E. R. Johnston, *Mechanics for Engineers (Static & Dynamics)*, McGraw Hill
2. S. P. Timoshenko, D. H. Young, and J. V. Rao, *Engineering Mechanics*, Tata-McGraw Hill.

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Course Code: 3000005
Course Name: Environmental Engineering

L	T	P	Credit	Mode of Teaching	Mode of End Sem Exam
2	0	0	GRADE	Blended	MCQ (1.5 Hrs)

Course Objectives:
1. To create awareness about various sources of energy and their applications.
2. To create awareness about various environmental issues and how to deal with those environmental issues.
3. To impart fundamental concepts in environmental engineering dealing with air, water and waste management.
4. To create awareness about sustainability concepts and need of sustainable development for development of society.
5. To create awareness about various environmental policies.

Syllabus:

Unit 1: Energy: Various forms of Renewable and non-renewable energy and their applications, Solar Energy, Hydro, wind, biomass, geothermal, tidal and nuclear energy, green energy, clean energy, role of energy in economic and social development.

Unit 2: Water Environment: Ecosystems & its components, Water Cycle, Water availability & uses, Water resources problems and its solutions, Water pollution problems, Water quality characteristics & standards, Introduction to water treatment mechanisms.

Unit 3: Air Environment: Air pollution, causes, global effects, climate change and its impact, Introduction to air pollution control measures, Carbon credit, Carbon trading, Clean Development Mechanism (CDM).

Unit 4: Waste Management: Introduction to management of municipal solid waste, E-waste and plastic waste, various initiatives in management of waste.

Unit 5: Sustainability: Introduction to the concept of sustainability & sustainable development, Sustainable development goals, TBM, Challenges for sustainable development.

Policies: Multi1atcral environmental agreements and Protocols – Kyoto Protocol, Montreal Protocol, Indian policies - Environment Protection Act 1986, Waste Management rules 2000.

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

CO 1. Explain the fundamental concepts of energy, ecosystems & environment.

CO 2. Recognize various environmental problems and their effects.

CO 3. Apply various air & water remediation methods.

CO 4. Apply waste management techniques.

CO 5. Apply the concepts of sustainability

Text Books:
1. D. K. Asthana, Meera Asthana, A Text Book of Environmental Studies, S Chand & Co., New Delhi.
2. P. Meenakshi, Elements of Environmental Science & Engineering, PHI, New Delhi

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3. M.M. Sulphey, M.M. Safeer, Introduction to Environment Management, PHI, New Delhi
4. S K Dhameja, Environmental Engineering & Management, S K Kataria & Sons, new Delhi

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Course Code: 3100020
Course Name: Basic Civil Engineering & Mechanics

	L	T	P	Credit
	3	0	0	3

Course Objectives:
1. To understand the utility of various types of building materials.
2. To understand the location, construction detail and suitability of various building elements.
3. To determine the location of object on ground surface.
4. To stabilize the position of various object.
5. To understand the effects of system of forces on rigid body in static conditions.
6. Analysis of determinate structure (beam & truss)

Syllabus:
Unit- I
Building Materials: Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

Unit- II
Surveying & Positioning: Introduction to surveying, Survey stations, Measurement of distances-conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal leveling.

Unit- III
Mapping & Sensing: Mapping details and contouring, Plane tables and related devices. Introduction of theodolite.Measurement of areas and volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

Unit- IV
Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent co-planner forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections. Frictional force in equilibrium problems.

Unit -V
Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Composite section, Radius of Gyration, Introduction to product of Inertia and Principle Axes.
Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

Course Outcomes:
Upon completion of the course, the students will be able to:
CO1: Explain concepts and terminologies of building materials, surveying and mechanics.
CO 2: Apply various methods for surveying and mechanics.
CO 3: Determine the location, area and volume of objects on ground surface.

CO4: Solve the problems of surveying and mechanics by using various methods.

CO5: Analyse the effects of system of forces on rigid bodies in static conditions.

Text Books:

1. Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
2. Building Material, B. C. Punmia, Laxmi Publications, 2016
3. A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013

Reference Books:

1. Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
2. Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
3. Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
4. Engineering Mechanics - Statics &Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
5. Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning, 1st edition, 2008.
6. Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

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Course Code: 3110221
Course Name: Surveying

L	T	P	Credit
3	0	0	3

Course Objectives:
1) To understand the working of Theodolite, Tacheometer and Total Station.
2) To understand the determination of distances, direction and elevation.
3) To understand the surveying techniques and their application in various fields.
4) To provide knowledge on setting out civil engineering works & detailed field surveying.
5) To understand various types of curves used in practice and concepts of hydrographic & photographic surveying.

Syllabus:

Unit I: Surveying Measurements
Introduction to surveying, their classification, methods and principles, Measurement of distance and direction. Introduction to Remote Sensing & LiDAR technology in Survey, Global Positioning System (GPS) and its application.

Unit II: Levelling & Contouring
Method of levelling, methods of reduction of level, Reciprocal and trigonometric levelling, Contouring and Plotting, Use of Contour maps, 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 Suverying.

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: Surveying Techniques
Systems and Principles of Triangulation, Baseline measurement and its extension, Total Station and its application in surveying, Introduction to Aerial Survey using UAV/ Drones, Introduction to photogrammetry and hydrographic survey.

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

CO1: Explain the techniques used for linear and angular measurements in surveying.

CO2: Explain the various concepts of levelling, contours and its application.

CO3: Apply various methods of surveying.

CO4: Analyse various techniques of controlling points.

CO5: Evaluate various methods for curve setting.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016
3. Surveying Volume – I & II, S. K. Duggal, McGraw Hill Publication, 2015

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition 2001
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999
3. Surveying & Levelling, N N Basak, McGraw Hill Publications, 2015
4. Plane & Geodetic surveying Vol. I & II, David Clark & J Clendinning, Constable & C. London, 2017

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V., Bhopal MP)
NAAC Accredited with A++ Grade

Course Code: 3110223
Course Name: Survey Practice Lab

L	T	P	Credit
0	0	2	1

Syllabus:

List of Experiments:

1. Measurement of distance using chain & tape of given survey area.
2. Measurement of direction by prismatic compass & surveyor's compass.
3. Exercise of flying levelling by dumpy level.
4. Profile Levelling & Cross Sectioning of Road using dumpy level.
5. Determination of R.L. of a point whose base is accessible & inaccessible by Trigonometrical levelling.
6. Prepare Contour map by using Grid Pattern & Tachometric Method.
7. Preparation of contour map by total station.
8. Determination of horizontal & vertical position of a point by Total Station & measurement of area.
9. Traversing by Total Station.
10. Measurement of horizontal and vertical angle by Vernier Theodolite.
11. Determination of height & distance by using Stadia method & Tangential tachometry
12. Preparaton of mapr of given survey field by Radiation and intersection method using Plane table.
13. Resection by Two point problem & Three point problem.
14. Setting out of a simple circular curve by using Rankine's method.
15. Setting out of a simple circular curve by using Offset from the chord produced or deflection distance.
16. Measurement of base line by using Substance Bar.

Course Outcomes:

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

CO 1: Follow the guidelines for field surveying.
CO 2: Follow the working principles of survey instruments for measurements.
CO 3: Measure horizontal & vertical angle by theodolite for traversing and levelling.
CO 4: Determine tachometric constants for linear measurements by tachometry.
CO 5: Create a simple circular curve by using Rankine's method for alignment
CO 6: Develop contour map by using tachometer & total station.

Suggestive List of Skill Based Mini Project:

1. Development of contour map using Total Station.
2. Setting out of Horizontal Curve using Total Station & Theodolite.
3. Area Volume calculations using Total Station.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition2001
2. Surveying Volume –II, S. K. Duggal, McGraw Hill Publication, 2015
3. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016

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NAAC Accredited with A++ Grade

Course Code: 3110222
Course Name: Strength of Materials

	L	T	P	Credit
	2	1	2	4

Course Objectives:

1) To understand the concepts of simple and compound stresses and strains.
2) To understand the behaviour of elastic materials in bending, shear and torsion.
3) To understand the stability behaviour of long columns under axial load.
4) To understand the power transmission by shift.
5) To understand stresses & strain developed in storage vessels
6) To calculate stresses / strain in statically indeterminate structures.

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.

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

Unit - II
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.

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

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

Unit-V
Deflection of statically determinate structure by Geometrical methods & Introduction of method of virtual work.

Course Outcomes:

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

CO 1: Apply the concepts of stress and strain.
CO 2: Apply theory of simple bending in beams.
CO 3: Apply the concept of pure torsion in shaft and determine the stresses in pressure vessels.
CO 4: Evaluate columns & struts with different end conditions.
CO 5: Analyse the structure using geometrical methods and virtual work to determine the deflection.

Text Books:
1. Strength of Materials, Sadhu Singh, Khanna Publishing, 1st edition 2016
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 18th edition 2014
3. Strength of Materials, R. K. Bansal, Laxmi Publication; 6th edition 2018

Reference Books:
1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials, HigdonStyle, Publisher Wiley, 3rd edition 1978
3. Strength of Materials Vol. I& II, B.C. Punmia, Laxmi Publication, 10th edition 2018
4. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 2016
5. Mechanics of Materials, J. M. Gere & B.J. Goodno, Cengage Publisher, 8th edition 2014

List of Experiments:
1. Impact Test
2. Brinell Hardness Test
3. Behaviour of columns with Different End Conditions
4. Tensile test
5. Compression test
6. Flexure test
7. Shear test
8. Spring test
9. Torsion test
10. Verification of Maxwell's Reciprocal Theorem.
11. Bending of Beam (One Point loading only).
12. Bending of Beam (Two Point loading only).

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

CO1: Evaluate properties of material by impact test.

CO2: Evaluate properties of material by hardness test.

CO3: Evaluate properties of material by tensile test.

CO4: Determine compressive & flexural strength of materials.

Suggestive List of Skill Based Mini Project:
1. Determination of unsymmetrical bending & shear center.
2. Beam Deflection
3. Determination of Stress Strain curve for steel.

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

2023 ADMITTED BATCH

SEMESTER-III

<div align="center">

Course Code: 3110321
Course Name: Fluid Mechanics - I

</div>

L	T	P	Credit
2	1	2	4

Course Objective:
To provide a comprehensive understanding of fluid properties, fluid continuum, kinematics and dynamics of fluid flow, fluid measurement mechanisms, simulation and dimensional analysis methods, and the concepts of laminar flow, enabling students to apply these principles to various fluid flow problems.

Syllabus:
Unit I

Review of Fluid Properties: Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapour pressure.

Fluid Statics: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems – gravity dams and Tainter gates), buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit II

Kinematics of Flow: Types of flow-ideal & real, steady and unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streamlines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational &irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets-their utility & method of drawing flownets.

Unit III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum equation, forces of fixed and moving vanes, velocity triangles.

Fluid Measurements: Velocity measurement, flow measurement (Orifices, nozzles, mouth pieces, orifice meter, Nozzle meter, venturimeter, weirs and notches).

Unit IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pie theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, etc.)

Unit V

Laminar Flow: Introduction to laminar, transition & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.

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

CO 1: Define various fluid properties & states of fluid.

CO 2: Apply principles of fluid flow & dimensional analysis.

CO 3: Solve fluid flow problems.

CO 4: Analyze characteristics of fluid at rest, fluid at motion & dimensionless numbers.

CO 5: Discriminate different types of fluid flow, measurement techniques & principles.

CO 6: Apply the concepts of laminar flow in solving various fluid flow problems.

Text Books:
1. Fluid Mechanics, Modi & Seth, Standard Book House, Delhi, 21st edition, 2018.
2. Fluid mechanics, Girde & Mirazgaonkar, SCI Tech Publishers, 2019
3. Fluid Mechanics, R.K. Bansal, Laxmi Publishers, 2015

Reference Books:
1. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 2014
2. Fluid Mechanics, Streeter, McGraw Hill Publishers, 9th edition, 2017

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					1						1		
CO2	2	1	1	2	1	1	1					2		1
CO3	2	2	1	2	2	2	2					2		2
CO4	2	3	1	2	1	2	2					2		2
CO5	2	2		2	2	2	2					2		
CO6	2	2	1	2	1	1	1					2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

List of Experiments:
1. Determination of viscosity of fluid by redwood viscometer
2. Determination of metacentric height of floating body
3. Calibration of Venturimeter
4. Determination of Cc, Cd, Cv of Circular Orifice
5. Calibration of Mouthpiece
6. Calibration of Orifice Meter
7. Reynolds experiment for demonstration of stream lined & turbulent flow
8. Determination of Friction Factor for a pipe
9. Verification of Stoke's law.

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

CO 1: Differentiate between different flow measurements devices.

CO 2: Notice flow through pipes & fall velocity of particle.

CO 3: Correct the instrumental errors.

CO 4: Apply Stoke's law to calculate terminal velocity.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2		3	2	2		2	2	2		2		1
CO2	2		1	3	2	2			2	2		2		2
CO3	2	2		2	2				2	2		2		
CO4	2	2	1	3	2			2	2	2		2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110322

Course Name: Theory of Structure - I

L	T	P	Credit
2	1	0	3

Course Objective:

To understand the behavior of the structure, different methods for the analysis of indeterminate structure, principle of virtual work and energy methods.

Syllabus:

Unit-I

Deflection of beams: Energy Methods, Castigliano's theorem, method of real work, Principle of virtual work, method of virtual work for beam displacements.

Unit-II

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies. Maxwell's Reciprocal theorems, Energy theorems, Application to pin jointed frames only.

Unit – III

Indeterminate Structures –I: Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by Theorem of three moments, Effect of sinking and rotation of supports**.**

Unit-IV

Indeterminate Structures – II**:** Analysis of beams and analysis of frames (with and without sway) by slope Deflection method.

Unit-V

Moment Distribution Method: Moment distribution method for analysis of beams and analysis of frames (without sway) Three hinged arches of different shapes, Eddy's Theorem. Two Hinged and Fixed Arches.

Course Outcomes:

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

CO 1: Determine the deflection of beam using energy methods and the principle of virtual work.
CO 2: Explain various methods & principles for analysis of structures.
CO 3: Apply various methods & principles for structural analysis.
CO 4: Analyse various structures using various methods, principles & theorems.
CO 5: Evaluate different methods of structural analysis.

Text Books:

1. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
2. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9[th]edition, 2014
3. Theory of Structures, B.C. Punmia, Laxmi Publications, 2017

Reference Books:

1. Structural Analysis – A Unified classical and matrix Approach, Ghali A & NevilleM, Chapman

and Hall, New York, 6thedition, 2009

2. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
3. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
4. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		2		1						2		2
CO2	1			2		1		1				1		1
CO3	2	2		2	2			1				2		2
CO4	2	3	1	3	1	2	1	1				2		2
CO5	2	2	1	3	1	2						2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110323
Course Name: Geotechnical Engineering

L	T	P	Credit
2	1	2	4

Course Objective:

To familiarize students with the significance of geological investigations for civil engineering projects, and fundamental soil properties and classifications. It also aims to develop an understanding of the relationships between physical and mechanical properties of soils, the role of water in soil behavior, shear parameters, stress changes due to foundation loads, and the principles of soil mechanics for stability analysis of slopes and settlement calculations.

Syllabus:

Unit-I Engineering geology & soil properties

Introduction to geology, mineralogy, petrology – Three-fold classification of rocks and their characteristic features. Structural geology - Types and classification of structures (Joints, Unconformities, Folds and faults) and their effect on civil engineering projects.

Introduction – Types of soils, their formation & deposition, basic definitions and relationships - Three phase system. Index properties of soil and their determination. Relationship between volume weight, void ratio-moisture content, moisture content-specific gravity, and unit weight- air voids etc.

Plasticity Characteristics of soil & indices and their determination, use of consistency limits, Classification of soil based on particle size and consistency limits, unified soil classification systems, Indian standard soil classification system, general characteristics of soil in different groups.

Unit-II Soil Water and Consolidation:

Permeability of soil: Darcy law and its validity, Determination of permeability in laboratory and in field using various methods like constant head method, pumping tests etc. factors affecting permeability of soil, Seepage analysis – introduction, stream & potential functions, flow nets, uses of a flow net, Introduction to effective, neutral and total stresses, effect of water table, fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

Consolidation – Introduction, Compressibility and consolidation, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's Theory of consolidation, final settlement of soil deposits, Determination of consolidation settlement and secondary consolidation.

Unit-III Stress Distribution in Soils:

Stresses in soil – Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area, influence factors, isobars, Boussinesq's equation, westergaard's analysis. Newmark's influence chart. Contract pressure under rigid & flexible area, computation of displacements from elastic theory.

Unit – IV Shear Strength of Soils:

Mohr Circle and its characteristics, principal planes, relation between major and minor principal stresses. Mohr–Coulomb's theory, types of shear tests, direct shear test, merits of direct shear test, Triaxial compression test, test behaviour of UU, CU and CD tests, pore-pressure measurements, computation of effective shear strength parameters, unconfined compression test, vane shear test, critical void ratio, Liquefaction.

Unit – V Stability of Slopes:

Introduction, Types of slopes and their failure mechanisms, factor of safety, analysis of Infinite and finite slopes, wedge failure, Swedish circle method, friction circle method, stability numbers and charts. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Stability of Earth dams.

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

CO1: Evaluate different properties of rocks & soil and its classification.

CO2: Examine the flow and shear parameters & their effects on various types of soil.

CO3: Determine the stress distribution & shear failure by various methods.

CO4: Evaluate the shear strength parameter of soil by various methods.

CO5: Analyse the stability of slopes using various methods.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2		2		2	2					2	1	2
CO2	2	2		2	1	2	2					2		2
CO3	2	3	1	2	2	2	2	1				2	1	2
CO4	2	3	1	3	2	2	2	1				2	1	2
CO5	2	2	1	3	2	2	1					2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

Text Books:
1. Soil Mech. & Found. Engg., Dr. K.R. Arora, Std. Publishers Delhi, 7th Edition, 2014
2. Soil Mech. & Foundation, Dr. B.C. Punmia, Laxmi Publications, Delhi, 16th Edition, 2017
3. Basic & Applied Soil Mechanics, Gopal Ranjan, New Age International Publishers, 2016
4. Parbin Singh., "Engineering and General Geology", S. K. Kataria and Sons, 2009

Reference Books:
1. Modern Geotech Engg. Dr. Aram Singh, IBT Publishers, Delhi, 8th Edition, 2016
2. Geotech Engg., C. Venkatramaiah, New Age International Publishers, 16th Edition, 2018
3. Soil Testing for Engg., T.W. Lambe, John Wiley & Sons. Inc. 1969
4. Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, 1995, New Delhi

List of Experiment's:
1. Moisture Content Determination. Oven Drying Method.
2. Grain Size Analysis – Mechanical Method.
3. Grain Size Analysis – Hydrometer Method.
4. Liquid Limit, Plastic Limit, Shrinkage Limit Tests.
5. In-Place Density tests – Core Cutter Method, Sand Replacement Method.
6. Specific Gravity Tests.
7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (UU)
12. Vane Shear Test.
13. Plate Load Test (Demonstration)

14. Consolidation Test.

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

CO 1: Check physical properties of soil.

CO 2: Check strength properties of soil.

CO 3: Differentiate the flow properties and stresses of soil.

CO 4: Check shear strength of soil.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		3	2	2	2	2	2	3		2		1
CO2	2	2		3	2	2	2	2	2	3		2		2
CO3	2	2		3	2	2		2	2	3		2		1
CO4	2	2		3	2	2		2	2	3		2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110324

Course Name: Transportation Engineering

L	T	P	Credit
2	1	2	4

Course Objective:

To provide comprehensive knowledge on the planning and geometric design of roads and highways, pavement materials and design, construction processes and methods, and traffic characteristics and intersection design.

Syllabus:

Unit – I Highway Development and Planning

Highway Development in India — Necessity for Highway Planning – Different Road Development Plans; Classification of Roads. Road Network Patterns — Highway Alignment- Factors affecting Alignment- Engineering Surveys.

Unit – II Highway Geometric Design

Importance of Geometric Design – Design controls and Criteria – Highway Cross Section Elements – Sight Distance Elements – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment - Gradients- Vertical curves.

Unit – III Traffic Studies

Spot Speed Studies and Volume Studies, Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies, Origin and destination Studies (O & D): Various methods, collection and interpretation of data, Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service, Parking Studies: Methods of parking studies, design of intersections at grade & grade separated.

Unit -IV

Highway Construction Materials: Aggregates and their types, physical and engineering properties, Fillers, Bitumen, 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 Evaluation and Maintenance of Pavements

Pavement distress in flexible and rigid pavements, Pavement evaluation, structural evaluation, evaluation by deflection measurements, Strengthening of pavements, Types of maintenance, Importance of highway drainage, Surface and sub-surface drainage arrangements.

Course Outcomes:

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

CO 1: Explain the principles of highway planning & their geometrical design.

CO 2: Evaluate physical properties of suitable highway engineering materials with drainage provisions.

CO 3: Apply the concepts of traffic engineering in transportation planning.

CO 4: Design pavements as per regulations.

CO 5: Formulate the layers of pavement along with provisions of its drainage & maintenance.

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, 2006
3. Principles & Practices of Highway Engineering, L R Kadiyali, N B Lal, Khanna Publishers, 2016

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 of Practice of Highway Engg., Sharma & Sharma, Asia Publishing House, 1965
4. Analysis and Design of Pavements, Haung, Pearson, 2nd edition, 2004

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		1			1	1					1		1
CO2	2			1		1	1					2		1
CO3	2	2	1	2		2	2	2				2	3	2
CO4	2			2	2	2	2					2		2
CO5	2	1		2	2	2	2	2	2	2	2	2		2

1 - Slightly; 2 - Moderately; 3 – Substantially

List of Experiments:

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 Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Course Outcomes:

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

CO 1: Select suitable aggregate material by testing the physical properties.

CO 2: Determine properties of bitumen and its grade.

CO 3: Determine CBR value of material for subgrade and subsequent layers of pavement.

CO 4: Design job mix formula for bituminous surface using Marshal Stability test

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1		3	2	2	2	2	2	3		2		1
CO2	2	2		3	2	2	2	2	2	3		2		2
CO3	2	2		3	2	2		2	2	3		2		1
CO4	2	2		3	2	2		2	2	3		2		2
CO5	2	1		3	2	2	2	2	2	3		2		1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110325
Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objective:
To encourage students to engage with civil engineering literature, enhance their presentation and communication skills, promote lifelong learning, and develop the soft skills necessary for effective topic presentation

Syllabus:
1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL /MOOC.

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

CO1: Analyze contemporary issues in civil engineering & its allied areas through literature survey.

CO2: Distinguish state of art & relevance of the topic in national & international arena.

CO3: Demonstrate good oral & written communication skills.

CO4: Develop poster and power point presentations for effective communication.

CO5: Display lifelong learning.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1		2	1	2	2	1	2	2	1	2	1	2
CO2	1			2	1	2	2	1	2	2	1	2		1
CO3									3	3		2		
CO4									3	3		2		
CO5	2	2	2	2	2	2	2	2	2	2	1	3	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110326
Course Name: Skill Internship Project

L	T	P	Credit
0	0	4	2

Course Objective:

To encourage students to engage with various civil engineering topics, acquire strong oral and written communication skills, and promote the habit of lifelong learning.

Syllabus:

Each candidate shall have to undergo 15 days in-house summer internship at the institute after the completion of their 2nd Semester exams (in summer vacations). Candidate can choose from various modules which are offered by the institute and after successful completion of internship they have to submit detailed report.

Course Outcomes:

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

CO1: Observe various activities in field.

CO2: Examine the utility of general and specific equipments for construction.

CO3: Differentiate the construction projects individually and in team.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Adapt lifelong learning for benefit of society.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1		2	2	2	1	1	2	2	1	2
CO2	1			2	2	2			2	1		2		2
CO3	2	2	1	2	2	2	2	2	2	1	1	2	2	2
CO4									3	3		2		
CO5	2	2	2	2	2	2	2	2	2	2	1	3	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 1000005

Course Name: Project Management and Financing

L	T	P	Credit
2	0	0	GRADE

Course Objective:

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

Upon completion of the course, the students 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 esimation 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

Recommended 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.

Recommended 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	PO12	PSO1	PSO2
CO1	2	2	1	1	2	1						2		1
CO2	3	3	2	2	2	2	1				1	2		1
CO3	3	3		3	3	2					1	2		1
CO4	3	3		2	2	2					1	2		1
CO5	2	1		1	1	1					1	2		1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110421
Course Name: Fluid Mechanics – II

L	T	P	Credit
2	1	0	3

Course Objectives:

To develop a comprehensive understanding of fluid flow patterns, including laminar and turbulent flows, boundary layer theory, drag and lift estimation, open channel flow classification and design, critical and non-uniform flow analysis, hydraulic jump characteristics, and the design principles of pumps and turbines for practical engineering applications.

Syllabus:
Unit-I
Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically rough boundaries, velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes, aging of pipes.
Pipe Flow Problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, Concepts of equivalent length, Hydraulic and energy gradient lines, Siphon, Pipes in series, in parallel, Branching of pipes.(Hardy Cross method)
Pipe Network: Water hammer (only quick closure case) transmission of power.

Unit - II Forces on immersed bodies:
Introduction, Force Exerted by a flowing fluid on a stationary body, Expression for Drag & Lift, Drag on a sphere, Terminal velocity of a Body, Drag on a cylinder. Introduction to Development of Lift on a Circular Cylinder and an Airfoil

Unit – III Uniform Flow in open Channels:
Channel geometry and elements of channel section, Velocity distribution, Energy in open channel flow, Specific energy, Types of flow, Critical flow and its computations, Uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections.

Unit - IV Gradually varied flow
Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, Surges in open channels.

Unit - V Introduction to Fluid Machinery: Turbines & Pumps
Turbines: Classifications, definitions, Similarity laws, Specific speed and unit quantities, Pelton turbine – their construction and settings, Speed regulation, Dimensions of various elements. Action of jet, Torque, Power and efficiency for ideal case, Characteristics curves. Reaction turbines construction & setting, Draft tube theory, Runaway speed, Simple theory of design and characteristic curves, Cavitation.
Pumps: Principle of working & criteria for selection of different types of pump, viz. Centrifugal, Reciprocating.

Course Outcomes:

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

CO 1: Differentiate different types of fluid flow & fluid machinery.

CO 2: Describe principles of analysis of fluid flow problem.

CO 3: Explain basic principles for measurement of different forces acting on fluid body.

  CO 4: Analyze pipe flow, open channel flow problems & various characteristics of hydraulic
machines.

CO 5: Design open & closed conduit systems.

Text Books:
1. Fluid Mechanics, Modi & Seth, Standard Book house, Delhi, 21st edition, 2017
2. Open Chanel Flow, K. Subramanya, Tata McGraw Hill, New Delhi, 5th edition, 2019

Reference Books:
1. Open Channel Flow, Rangaraju, Tata Mc Graw Hill Publishing Comp. Ltd., New Delhi, 1st edition,2001
2. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi,1988
3. Fluid Mechanics, Hydraulics & Hydraulic Mechanics, K.R. Arora, Standard Publishers, 2009
4. Open Channel Hydraulics, Chow V.T., McGraw Hill, New York, 57th edition, 2009

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	2	-	-
CO3	2	2	-	1	-	-	-	1	-	-	-	2	-	-
CO4	3	3	-	2	-	1	1	-	-	-	-	3	-	-
CO5	3	2	3	2	1	1	1	1	-	-	-	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110422

Course Name: Theory of Structure - II

L	T	P	Credit
2	1	0	3

Course Objectives:
To develop an understanding of the analysis of beams and frames using Moment Distribution Method, Kani's method, Approximate method and Matrix Method; influence line diagram for determinate beam, trusses and Three Hinged Arches; Plastic analysis of beams and frames

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
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
Plastic analysis of beams & frames

Course Outcomes:
Upon completion of the course, the students will be able to:
CO 1: Explain various methods for analysis of structures and frames.
CO 2: Analyse various loads on framed structures using codal provisions.
CO 3: Analyse different type of structures for various load conditions by different methods.
CO 4: Draw influence line diagrams for statically determinate & indeterminate structure.
CO 5: Analyse beams & frames using plastic analysis.

Text Books:
1. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
2. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
3. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9th edition, 2014

Reference Books:

1. Elementary Structural Analysis, Norris C.H., Wilbur J.B. McGraw Hill Intenrational
2. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
3. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017
4. Indeterminate Structural Analysis, Kinney Sterling J., Addison Wesley
5. Matrix Methods of Framed Structures, Weaver W & Gere J. M., CBS Publishers, Delhi

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	-	-	1	-	-	-	-	-	2	-	1
CO2	3	3	3	3	-	1	-	-	-	-	-	2	-	1
CO3	3	3	3	3	-	1	-	-	-	-	-	2	-	1
CO4	3	3	3	3	-	1	-	-	-	-	-	2	-	1
CO5	3	3	3	3	-	1	-	-	-	-	-	2	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110423
Course Name: Water Supply Engineering

L	T	P	Credit
2	1	2	4

To develop a comprehensive understanding of drinking water supply systems, water quantity and quality standards, mechanism of water conveyance, concepts and design of water treatment and distribution systems.

Syllabus:

Unit-I

Water demand (types variation, factors affecting it), Design period, population forecasting methods, estimation of water requirement of cities, Sources of Water, Source selection, underground water quality & quantity, characteristics of water (laboratory method & effects), water borne diseases, standards for drinking water.

Unit-II

Water treatment flow diagram, design, construction, working of (Aerators, screens, plain sedimentation tank, tube settlers), coagulants & coagulation, flocculation, feeding and mixing of coagulants, optimum dose of coagulants, design & working of clarrifloculator, filtration (Theory & types), Design, operation & construction of slow sands & Rapid sand gravity filters, pressure filters.

Unit-III

Disinfectants (types) & disinfection method of disinfection, chlorine & chlorine compounds, types of chlorination, Hardness (Causes & types), various methods of softening, Recarbonation, calculation of chemical requirements, Removal of colour, odor, Taste, Iron & manganese, algae removal, fluoridation / defluoridation, desalination, latest treatment techniques.

Unit-IV

Intake structures (location, types & design), conduits for transporting water, forces on conduits, types of pressure pipe, joints, corrosion of pipe (causes & control), pipe appurtenances (design), pumping of water (numerical problems), types of pumps, Economical diameter of rising main (numerical), pumping stations.

Unit-V

Requirement of good distribution system, layout of distribution, methods of distribution, Distribution reservoir and calculation of its capacity, fixing size of pipe, Analysis of pipe networks (Hardy cross method, Equivalent pipe method), appurtenances used in distribution networks, water supply & plumping system in building, Rural water supply.

Courses Outcomes:

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

CO 1: Explain the concepts of water supply engineering.

CO 2: Apply suitable water treatment technique.

CO 3: Analyze a given water supply scheme.

CO 4: Design a water supply and distribution system based upon the needs of society.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	2	-	-	-	-	2	2	-
CO2	2	2	3	-	-	-	3	-	-	-	-	3	3	-
CO3	2	2	2	-	-	-	2	-	-	-	-	2	3	-
CO4	2	2	3	2	2	-	2	-	-	-	-	3	3	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Text Books:
1. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Water Supply Engg., S. K. Garg, Khanna Publishers New Delhi, 2017

Reference Books:
1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition, 2008
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009

List of Experiments:
1. Determination of pH of a given water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water sample.
3. Determination of Chloride concentration in water sample.
4. Determination of turbidity of water sample using turbidity meter.
5. Determination of acidity of the water sample.
6. Determination of alkalinity of the water sample.
7. Determination of Hardness of the water sample.
8. Determination of D.O concentration of a given water sample.
9. Determination of optimum dose of coagulants required for the treatment of a given water sample.
10. Determination of MPN of the given water sample.
11. Determination of Sulphate of a given water sample.
12. Determination of Nitrate of a given water sample.

List of Skill Based Mini Project
1. Estimation of drinking water requirement for various locations including new upcoming localities in and around Gwalior city.
2. Design of water supply & distribution layout system for various new upcoming localities in and around Gwalior city.
3. Study of existing water supply & distribution scheme available for Gwalior city and suggest improvement in it.
4. Study of existing water supply sources and determination of water quality of those sources.
5. Determination of water quality characteristics of various localities in and around Gwalior city.

6. Draw a water quality map for various localities in and around Gwalior city.
7. Comparative analysis of water quality between Municipal Corporation supplied water in city & R.O. treated water.
8. Study of new water treatment plant in the city.
9. Design of water treatment system for new upcoming localities in and around Gwalior city.
10. Performance evaluation of existing water treatment plants in city.

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

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water samples.

CO 2: Check various water quality parameters.

CO 3: Improve the water quality by suggesting suitable corrective measures.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	3	-	2	-	2	2	2	-	2	2	-
CO2	-	2	-	3	-	3	2	2	2	2	-	2	2	-
CO3	-	-	2	-	-	-	2	-	-	2	-	2	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110424
Course Name: Water Resources Engineering

	L	T	P	Credit
	2	1	0	3

Course Objectives:

To develop a comprehensive understanding of water resources management, including crop water requirements, irrigation systems, reservoir planning, and canal design using Khosla's, Bligh's, Lacey's, and Kennedy's theories; to analyze components of the hydrological cycle, such as rainfall, infiltration, and evaporation; to study hydrometry, groundwater hydrology, runoff estimation, rainfall analysis, hydrographs, and flood estimation methods for effective water resource planning and management.

Syllabus:

Unit – I
Hydrology: Definition, Hydrological Cycle, Precipitation, Evaporation, Infiltration, Runoff, Estimation of Runoff, Empirical Formulae, Rainfall-Runoff relationships, Hydrometry, Methods of Stream Gauging, Rating Curves, Ground Water: Elements of Ground water Hydrology, Well Hydraulics, Equations of Ground Water flow, Solutions and applications.

Unit - II
Hydrographs & Hyetographs, Hydrographs analysis, Unit Hydrographs, Methods of constructing, Unit Hydrographs, S-curve Hydrograph, Synthetic unit Hydrograph, Flood and its estimation by different methods.

Unit-III Irrigation Water Requirement and Soil Water Crop Relationship:
Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.
Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.
Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit – IV Reservoir Planning and Canal Irrigation
Types of reservoir, Reservoir planning, Estimation of storage capacity by mass curve analyses, Economical height of dam, Reservoir sedimentation, Canal systems, Planning and layout of canal systems, Regime concept and tractive force method of channel design, Channel losses, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal section, Water-logging: Causes and effects, Remedial measures, Salinity, Land reclamation and Drainage.

Unit – V Diversion works and Canal Regulation Structures
Elements of diversion works, Type of weirs and barrages, Weir design for surface and sub-surface

flow, Bligh's, Lane's and Khosla's theories, Silt excluders and Silt ejectors.

Canal regulation structure like Head & Cross regulations, falls, Escapes, Outlets, Their Need, Functions sketches.

Course Outcomes:

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

CO 1: Apply the concept of hydrology for measurement & forecasting of rainfall & runoff.

CO 2: Analyse runoff hydrograph by various methods.

CO 3: Analyse various requirements for an efficient irrigation project.

CO 4: Design different components of irrigation system using different theories.

CO 5: Plan an efficient, economical & safe irrigation system.

Text Books:

1. Engineering. Hydrology, K. Subramanya, Tata McGraw Hill Publ. Co. 4thedition, 2013
2. Hydrology & Water Resources Engineering, S. K. Garg, Khanna Publishers, 2016
3. Irrigation Engineering & Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, 2017
4. Irrigation, Water Power & Water Resources Engg., K.R. Arora, Standard Publishers Distributors, 2010

Reference Books:

1. Engineering. Hydrology, J. NEMEC, Prentice Hall, 1972
2. Hydrology for Engineers, Linsley, Kohler, Paulnus, Tata Mc Graw Hill, 2014
3. Engineering Hydrology, H. M. Raghunath, New Age International Publishers, 5th edition, 2015.
4. Irrigation, Water Resources & Water Power, Dr. P.N. Modi, Standard Book House, 9th edition, 2014
5. Irrigation Engineering by Varshney & Gupta, Vol I & II, Nemchand Publishers, 2007.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	1	-	-	-	-	2	-	2
CO2	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO3	2	2	1	-	-	1	1	-	-	-	-	2	-	-
CO4	2	2	3	2	-	1	1	1	-	-	-	3	-	2
CO5	2	2	-	-	-	1	1	1	-	-	1	3	-	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110425
Course Name: Civil Drawing Lab

	L	T	P	Credit
	0	0	2	1

Course Objectives:

To develop proficiency in civil engineering drawing by preparing plans, elevations, and sections of building components, creating detailed sketches of elements like doors and windows, and utilizing software tools such as AutoCAD for accurate and efficient drafting.

Syllabus:
List of Experiments:
1. One drawing sheet containing Foundations and Footing using AutoCAD
2. One drawing sheet containing Doors, Windows, Ventilators using AutoCAD
3. One drawing sheet containing Lintels, Trusses and Arches etc. using AutoCAD
4. One drawing sheet containing detailed planning of one room residential building
5. One drawing sheet containing detailed planning of multi rooms residential building
6. Drawing sheets one each of residential building using AutoCAD
7. One Drawing sheet of Institutional building using AutoCAD
8. One Drawing sheet of Commercial building using AutoCAD
9. One Drawing sheet of Hospital building using AutoCAD
10. Sketches of various building components i.e. floors, roof & roof covering
11. Sketches of various building components i.e. staircase

List of Skill Based Mini Project
1. To design an institution building of given area using AutoCAD with all the required components
2. To design an Residential building of given area using AutoCAD with all the required components
3. To design an Multistorey building of given area using AutoCAD with all the required components
4. To design an Hospital building of given area using AutoCAD with all the required components

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

CO1: Attempt to draw different components of a building.

CO2: Produce plan, elevation & section of various components of a residential and institutional building.

CO3: Use AutoCAD software in civil engineering drawing.

CO4: Prepare drawing sheets of various types of buildings like residential, institutional, commercial etc

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	1	2	-	-	-	2	2	-	3	-	-
CO2	2	-	-	1	2	-	-	-	2	2	-	3	-	-
CO3	2	-	-	2	3	-	-	-	2	2	-	3	-	-
CO4	2	-	-	2	3	-	-	-	2	2	-	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 3110426
Course Name: Cyber Security

L	**T**	**P**	**Credit**
2	**0**	**0**	**2**

Course Objectives: To analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

Course Contents:

Unit 1: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Unit 2: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

Unit 3: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

Unit 4: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Unit 5: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Datalinking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

Course Outcomes

At the end of this course, students will be able to:
CO 1: Analyze cyber-attacks, types of cybercrimes and cyber laws
CO2: Interpret and forensically investigate security incidents
CO3: Apply policies and procedures to manage Privacy issues
CO4: Design and develop secure software modules

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.

2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin, CRC Press T&F Group.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1	1	1	1	1		1	1	1	1	1
CO2				1	1		1			1	1	2	2	2
CO3				1		1	1			1	1	2	2	2
CO4				1	1	1			2	2	2	3	3	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 1000001
Course Name: Indian Constitution and Traditional Knowledge

L	T	P	Credit
2	0	0	Grade

Course Objectives:
- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-1
- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-2
- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedanta
- Indian Linguistic Tradition: Panini's Ashtadhyayi
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art
- Case Studies

Unit 3 **Introduction to Political Science**
- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit 4 **Concept of Government and Its Organs**
- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

Unit 5 **Salient features of Indian Constitution**
- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties

- Election Commission and Electoral Reforms

Basic Readings:
1. O.P. Gauba, *Political Theory,* Macmillan, (latest edition).
2. D.D. Basu, *Introduction to the Constitution of India,* (Latest Edition).
3. N.G. Jayal & Pratap Bhanu Mehta, *The Oxford Companion of Politics in India*, 2000.
4. W.H. Morris-Jones, *The Government and Politics of India.*
5. Swami Jitamanand, Holistic Science and Vedam, Bhartiya Vidyabhawan
6. V. Shivramakrishnan (Ed.), Cultural Heritage of India, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
7. Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
8. Panini Shiksha, Motilal Banarsidas
9. VN Jh, Language, Thought and Reality
10. Krishna Chaitanya. Arts of India, Abhinav Publications, 1987.
11. SC Chaterjee and DM Datta, An Introduction to Indian Philosophy, university of Calcutta, 1984
12. A L Basham, The Wonder That was India

Course Outcomes:
1. Gain knowledge about the Indian tradition and Indian constitution.
2. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.
3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.
4. Connect itself with traditional Indian philosophy with their everyday conduct and practices.
5. Appraise the utility and significance of tradition and its working in the light of more radical thought of the modern times.
6. Create a better society and living standards for themselves as well as for the generations for the others to come.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				1	1	1	1	1		1	1	1		
CO2				1	1		1			1	1	2		
CO3				1		1	1			1	1	2		
CO4				1	1	1			2	2	2	3		

1 - Slightly; 2 - Moderately; 3 – Substantially