

R26 Course Structure of
Department of Civil Engineering, JNTU GV

I B.Tech I Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	HSMC		Communicative English	3	0	0	3
2	BSC		Mathematics-1	3	0	0	3
3	BSC		Engineering Chemistry (Branch Specific)	3	0	0	3
4	ESC		Engineering mechanics	3	0	0	3
5	HSMC Lab		Communicative English Lab	0	0	3	1.5
6	BSC Lab		Engineering Chemistry Lab	0	0	3	1.5
7	ESC Lab		Elements of Electrical and Electronics Engineering Lab	0	1	2	1.5
8	**HSMC**		Universal human values and Professional Ethics	2	0	0	2
9	BSC		AI Tools & Applications	1	0	2	2
10	MC		NSS / NCC/Health & Wellness	0	0	2	0
			Total	**15**	**0**	**13**	**20.5**

I B.Tech II Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	BSC		Mathematics-II (Branch Specific)	3	0	0	3
2	BSC		Engineering Physics	3	0	0	3
3	ESC		Computational Thinking & Problem Solving with Python	3	0	0	3
4	ESC		Engineering Drawing and Computer-Aided Design (CAD)	1	0	4	3
5	HSMC		Design Thinking	2	0	0	2
6	BSC Lab		Engineering Physics Lab	0	0	3	1.5
7	ESC Lab		Computational Thinking & Problem Solving with Python Lab	0	0	3	1.5
8	**PCC lab**		Introduction to Civil Engineering Materials and Laboratory	1	0	3	2.5
09	MC		Environmental Science	2	0	0	0
			Total	**14**	**1**	**13**	**19.5**

II B. Tech I-Semester

S.No	Category	Course code	Course Title	L	T	P	C
1	BSC		Mathematics-III (Branch Specific)	3	0	0	3
2	PCC		Strength of Materials-I	3	0	0	3
3	PCC		Fluid Mechanics	3	0	0	3
4	ESC		Engineering Geology	3	0	0	3
5	PCC		Surveying	3	0	0	3
6	PCC		Strength of Materials Lab	0	0	3	1.5
7	PCC		Surveying Field Work	0	0	3	1.5
8	PCC		Engineering Geology Lab	0	0	2	1
9	HSMC		Entrepreneurship Development	2	0	0	2
			Total	**17**	**0**	**8**	**21**

II B. Tech II-Semester

S.No	Category	Course code	Course Title	L	T	P	C
1	PCC		Building Materials Construction	3	0	0	3
2	PCC		Structural Analysis-I	3	0	0	3
3	PCC		Hydraulics & Hydraulic Machinery	3	0	0	3
4	PCC		Strength of Materials-II	3	0	0	3
5	PCC		Concrete Technology	3	0	0	3
6	HSMC		Managerial Economics and Financial Analysis	2	0	0	2
7	PCC		Concrete Technology Lab	0	0	3	1.5
8	PCC		Building Planning & Drawing	0	0	3	1.5
9	PCC		Fluid mechanics lab	0	0	3	1.5
10	MC		Indian Constitution	0	0	2	0
			Total	**17**	**0**	**11**	**21.5**

III B. Tech I-Semester

S.No	Category	Course code	Course Title	L	T	P	C
1	PCC		Water Resource Engineering-I	3	0	0	3
2	PCC		DDRCS	2	1	0	3
3	PCC		Geo Technical Engineering-I	3	0	0	3
4	PEC		Ground Improvement Techniques*	3	0	0	3
5	PEC		Environmental Engineering *	3	0	0	3
6	OEC		Disaster Management*	3	0	0	3
7	PCC		Geo Technical Engineering Lab	0	0	3	1.5
8	PEC		CAD Lab	0	0	2	1
9	PEC		Environmental Engineering Lab	0	0	3	1.5
10	EEC		CSP Internship	0	0	4	2
			Total	**17**	**1**	**12**	**24**

III B. Tech II-Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	OEC		Construction Technology Management*	3	0	0	3
2	PCC		Structural Analysis-II	3	0	0	3
3	PCC		DDSS	3	0	0	3
4	PEC		Earthquake Resistance Design of Structures*	3	0	0	3
5	OEC		Environmental Impact Assessment*	3	0	0	3
6	HSMC		Industrial Management	2	0	0	2
7	PCC		Transportation Engineering	3	0	0	3
8	PCC Lab		BIM & Revit Lab	0	0	2	1
9	PCC Lab		Transportation Engineering Lab	0	0	3	1.5
			Total	**20**	**0**	**5**	**22.5**

IV B. Tech I-Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	PEC		Design & Drawing of Irrigation Structures	3	0	0	3
2	PEC		Repair & Retrofitting of Structures*	3	0	0	3
3	OEC (Interdisciplinary)		IOT for Smart Infrastructure* / Artificial Intelligence & Machine Learning Technologies*	3	0	0	3
4	PEC		Design of Pre stressed Concrete Structures*	3	0	0	3
5	OEC		Building Technology for Engineers*	3	0	0	3
6	OEC		MOOCS - Enabled Course	3	0	0	3
7	PEC		ETABS	0	0	2	1
8	EEC		Seminar	0	0	2	1
9	EEC		Internship/ Mini Project on any design of Civil Engineering Infrastructure	0	0	4	2
			Total	**15**	**0**	**8**	**22**

IV B. Tech II-Semester

S.No	Category	Course Code	Course Title	L	T	P	C
1	EEC		Internship	0	0	4	2
2	EEC		Major Project	0	0	20	10
			Total	**0**	**0**	**24**	**12**

NOTE:

1) Each basket of Professional Elective/ Open Elective courses should contain at least five courses, along with MOOC courses like NPTEL/SWAYAM/WISER/IBM Skill Build/ any other approved by university.

2) For Honors/Minors, there should be subject pools or baskets, with each pool/basket containing a minimum of 4 subjects. A minimum of 5 such pools/baskets should be offered.

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I Year-II Semester

PCC Lab

L	T	P	C
1	0	3	2.5

INTRODUCTION TO CIVIL ENGINEERING MATERIALS AND LABORATORY

Course Objectives

- Introduce first-year students to common materials used in Civil Engineering and their practical applications.
- Develop basic skills in identifying, measuring and handling construction materials.
- Introduce simple laboratory methods for determining basic physical properties of selected materials.
- Develop skills in observation, recording, basic calculation and interpretation of laboratory results.
- Create awareness of modern, sustainable and emerging construction materials.
- Relate basic material properties to material selection and applications in civil engineering works.

PART A – THEORY: INTRODUCTION TO CIVIL ENGINEERING MATERIALS

Unit I – Introduction to Construction Materials

- Importance of materials in Civil Engineering.
- Classification: natural, manufactured, composite, recycled and sustainable materials.
- Basic properties: density, specific gravity, porosity, absorption, strength, durability and workability.
- Material selection based on function, environment, availability, economy and sustainability.

Unit II – Traditional Civil Engineering Materials

- Cement: types, grades, basic properties and applications.
- Fine and coarse aggregates: sources, size, shape, texture and grading.
- Bricks and blocks: clay bricks, fly-ash bricks, concrete blocks and AAC blocks.
- Natural stones: granite, basalt, sandstone, limestone, marble and laterite.
- Timber: hardwood, softwood, grain, defects, seasoning and applications.

Unit III – Manufactured and Building Finishing Materials

- Steel: reinforcement steel, structural steel and basic identification.
- Plywood and engineered wood: plywood, blockboard, MDF, particle board and OSB.
- Tiles: ceramic, vitrified, porcelain and terrazzo tiles.
- Glass: float, toughened, laminated and double-glazed glass.
- Paints, coatings, adhesives and sealants – basic introduction.

Unit IV – Infrastructure Materials

- Bituminous materials and applications.
- PVC, UPVC, CPVC and HDPE products.

- Geosynthetics and applications.
- Precast and prefabricated construction materials.
- Insulation and roofing materials.

Unit V – Modern and Sustainable Materials

- Fly-ash and GGBS-based materials.
- Recycled aggregates and recycled plastic construction products.
- Geopolymer materials – basic concept.
- Fibre-reinforced materials and FRP.
- Pervious and low-carbon materials – introductory concept.
- Green building materials and sustainable material selection.
- Emerging materials: composite panels, 3D-printing materials and bio-based materials.

PART B – LABORATORY: 12 SIMPLE EXPERIMENTS

S.No.	Experiment	Scope / Learning
1	Cement – Identification and Specific Gravity	Identify cement types, appearance and storage requirements; determine specific gravity.
2	Bulk Density of Cement and Aggregates	Determine mass, volume, bulk density and unit weight.
3	Fine Aggregate – Identification and Specific Gravity	Identify fine aggregates and determine specific gravity.
4	Fine Aggregate – Sieve Analysis	Determine particle-size distribution, grading and fineness modulus.
5	Coarse Aggregate – Identification and Specific Gravity	Identify aggregate sizes, shape and basic characteristics; determine specific gravity.
6	Coarse Aggregate – Sieve Analysis	Determine particle-size distribution and grading.
7	Reinforcement Steel – Identification and Measurement	Measure bar diameter; study markings, ribs and determine weight per metre.
8	Bricks/Blocks – Identification and Water Absorption	Study clay bricks, fly-ash bricks and AAC/other blocks; determine water absorption.
9	Natural Stones – Identification and Study	Identify granite, marble, sandstone, limestone, basalt and laterite; study characteristics and applications.
10	Timber, Plywood and Engineered Wood – Identification	Study grain, defects, timber, plywood, MDF, blockboard, particle board, OSB and applications.

11	Tiles and Glass – Identification and Study	Study ceramic/vitrified/porcelain tiles and float/toughened/laminated/double-glazed glass.
12	Modern Construction Materials – Identification and Comparison	Study PVC, HDPE, FRP, recycled materials, insulation and composite panels.
13	Modern Construction Materials – Identification and Comparison	
14	Modern Construction Materials – Identification and Comparison	Fly-ash products and GGBS,

Text Books

P. C. Varghese, Building Materials, 2nd Edition, PHI Learning Pvt. Ltd., New Delhi.
S. S. Bhavikatti, Building Materials, Vikas Publishing House.

Reference Books

S. K. Duggal, Building Materials, New Age International.
Edward Allen and Joseph Iano, Fundamentals of Building Construction: Materials and Methods, Wiley.

Course Outcomes

CO1: Identify common natural, conventional, manufactured and modern construction materials and describe their basic characteristics.

CO2: Determine simple physical properties such as specific gravity, bulk density, water absorption and particle-size distribution.

CO3: Use basic laboratory equipment safely and carry out simple material experiments.

CO4: Record observations, perform basic calculations and interpret experimental results.

CO5: Relate material properties to applications and make basic material-selection decisions considering performance, economy and sustainability.

CO–PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	1	1	2	2
CO2	3	3	2	2	2	1	1
CO3	2	2	3	2	3	2	2
CO4	3	3	2	3	2	1	1
CO5	3	3	3	2	3	3	3

Scale: 1 – Low, 2 – Moderate, 3 – High.

Suggested CO–PSO Mapping

CO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	2	2
CO4	2	3
CO5	3	3

PSO1: Apply civil engineering knowledge to materials and construction practice.

PSO2: Use modern material technologies and sustainable approaches in civil engineering.



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I Year-II Semester

ESC Course

L	T	P	C
1	0	4	3

ENGINEERING DRAWING AND COMPUTER-AIDED DESIGN (CAD)

Course Objectives

CO1. Develop fundamental skills in engineering graphics and graphical communication.

CO2. Develop spatial visualization through orthographic, sectional, isometric and surface-development drawings.

CO3. Develop proficiency in 2D CAD drafting, modification, annotation and documentation.

CO4. Apply CAD techniques to Civil Engineering infrastructure and structural drafting.

CO5. Introduce 3D CAD modelling and fundamental BIM concepts.

CO6. Develop the ability to prepare professional engineering drawings using appropriate standards and modern engineering tools.

Course Outcomes

CO	Course Outcome
CO1	Apply engineering drawing standards, conventions, scales and dimensioning techniques to prepare and interpret engineering drawings.
CO2	Construct and interpret orthographic, sectional, isometric and surface-development drawings using principles of engineering graphics.
CO3	Use CAD software to create, modify, annotate, dimension, layer and document 2D engineering drawings.
CO4	Prepare basic CAD drawings for roads, drainage, water supply, sewerage, site development and structural applications.
CO5	Develop basic 3D CAD models and explain the fundamental concepts and applications of BIM in Civil Engineering.

UNIT I – Fundamentals of Engineering Graphics and Geometrical Construction

Engineering Graphics: importance in Civil Engineering; instruments; drawing sheet sizes and layout; BIS/ISO conventions; types of lines; lettering; dimensioning; plain, diagonal and comparative scales; representative fraction.

Geometrical Construction: division of lines and angles; polygons; tangency; ellipse, parabola, hyperbola; cycloid, epicycloid, hypocycloid and involute.

Introduction to CAD: concept and evolution; CAD versus conventional drawing; engineering applications; hardware/software; CAD interface; coordinate systems; units; limits; templates.

UNIT II – Orthographic Projection and Sections

Orthographic projection: principles; first-angle and third-angle projection; reference planes; projection of points, lines and planes; auxiliary planes and views.

Projection of solids: prism, pyramid, cylinder, cone, simple and composite solids; solids inclined to reference planes.

Sections: section planes; sectional views; sections of prism, pyramid, cylinder and cone; true shape; conventional representation.

CAD applications: absolute, relative and polar coordinates; object snap; grid/snap; Line, Polyline, Circle, Arc, Rectangle, Polygon and Ellipse.

UNIT III – Isometric Projection, Development of Surfaces and Advanced CAD

Isometric projection: principles; isometric axes and scale; views of points, lines, planes, solids and compound objects; conversion between orthographic and isometric views.

Development of surfaces: prism, pyramid, cylinder and cone; applications in Civil/Construction Engineering.

Advanced CAD: Move, Copy, Rotate, Mirror, Scale, Offset, Trim, Extend, Fillet, Chamfer, Array; layers; line types and weights; hatch; text; dimensions; multileaders; blocks; attributes; templates.

UNIT IV – Civil Engineering Drafting and CAD Applications

Civil Engineering drafting conventions; survey/site drawings; contour representation; topographical plans; site development concepts; reference grids and coordinates; engineering symbols.

Infrastructure CAD: road alignment plan; longitudinal profile; typical road cross-section; pavement layer representation; drainage layout; culvert drawing; water-supply pipeline layout; sewerage network layout (simple cases exclusively for understanding the components)

CAD documentation: drawing sheet setup; standard layers; dimensioning; annotation; hatching; title blocks; scales; layouts/viewports; plotting and PDF output.

UNIT V - 3D Modelling and Introduction to BIM

3D CAD: 3D coordinate system; wireframe, surface and solid modelling; primitives; Extrude, Revolve, Union, Subtract, Intersect; visualization.

Introduction to BIM: concept; CAD versus BIM; workflow; 3D modelling; parametric objects; basic 4D and 5D concepts; interdisciplinary coordination; introduction to Revit/Civil 3D or equivalent.

Practical / CAD Laboratory

Expt. No.	Practical Exercise	Major Components
1	Engineering Drawing Standards and Geometrical Constructions	Drawing standards, line types, lettering, dimensioning, geometrical constructions and polygons
2	Scales and Graphical Representation	Plain, diagonal and comparative scales; graphical representation

3	Engineering Curves	Conic sections, cycloid, involute and other standard engineering curves
4	Projection of Points and Lines	Projection of points and straight lines in different positions
5	Projection of Planes	Projection of planes and determination of true shape/inclination
6	Projection of Solids	Prisms, pyramids, cylinders and cones in different positions
7	Sections of Solids	Sectional views and true shape of sections
8	Development of Surfaces	Development of prisms, pyramids, cylinders and cones
9	Isometric Projection	Isometric projection and isometric views of simple engineering objects
10	CAD Fundamentals and Drawing Setup	CAD interface, units, coordinates, drawing limits/setup, object snaps and basic navigation
11	Basic CAD Drawing Commands	Line, polyline, circle, arc, rectangle, polygon, ellipse and related commands
12	CAD Modification and Editing	Move, copy, rotate, mirror, offset, trim, extend, fillet, chamfer, array, scale and stretch
13	CAD Annotation and Drawing Management	Layers, linetypes, hatch, text, dimensions, annotation, blocks, attributes, title blocks and templates
14	Integrated Orthographic and Isometric CAD Drawing	Orthographic views, sectional/isometric representation and preparation of a complete dimensioned CAD drawing
15	Civil Engineering CAD (Demonstration Only)	i) Survey/site plan with survey points, grid, coordinates, contours and existing/proposed features. ii) Road drawing: alignment, plan, longitudinal profile and typical cross-section.
16	Civil Engineering CAD (Demonstration Only)	i) Drainage drawing: stormwater drainage layout, longitudinal profile and cross-section. ii) Water supply/sewerage drawing: pipeline alignment, nodes/manholes, pipe sizes, flow direction and chainages. iii) 3D CAD model of a bridge component, retaining wall, road junction or small civil structure.

Suggested CAD Software

AutoCAD or any equivalent industry-standard CAD software approved by the University. Civil 3D, Revit or equivalent BIM platforms may be used for introductory applications. The syllabus should remain software-neutral where possible.

Textbooks

1. N.D. Bhatt, Engineering Drawing, Charotar Publishing House.
2. K.L. Narayana and P. Kannaiah, Textbook on Engineering Drawing, Scitech Publications.
3. B. Agrawal and C.M. Agrawal, Engineering Drawing, McGraw Hill.
4. Sham Tickoo and D. Swapna, AutoCAD for Engineers and Designers, Pearson Education.
5. Venugopal, Engineering Drawing and Graphics + AutoCAD, New Age International.

Reference Books

6. Ajeet Singh, Working with AutoCAD, Tata McGraw-Hill.
7. George Omura, Mastering AutoCAD, Wiley.
8. Sham Tickoo, AutoCAD: A Problem-Solving Approach, CADCIM Technologies.
9. V.B. Sikka, A Course in Civil Engineering Drawing, S.K. Kataria & Sons.
10. Balagopal and Prabhu, Building Drawing and Detailing, Spades Publishing.
11. Relevant BIS/ISO standards for technical drawing, dimensioning and Civil Engineering drawings.
12. Official manuals/documentation of the adopted CAD/BIM software.

Evaluation Scheme

Continuous Internal Component	Percentage Marks (in %)
Engineering Drawing assignments	20
CAD laboratory exercises	30
Internal practical examinations	20
Major CAD project	20
Attendance / record / regular performance	10
Total	100

End-Semester Examination

Component	Percentage Marks (in %)
Engineering Drawing	50
CAD Practical	50
Total	100

CO–PO Mapping

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

CO4	3	2	3	1	3	1	1	–	2	3	2	3
CO5	3	2	3	1	3	1	1	–	2	3	2	3

Mapping scale: 3 – High; 2 – Moderate; 1 – Low; – – No direct correlation.

PO Definitions

PO	Graduate Attribute
PO1	Engineering knowledge
PO2	Problem analysis
PO3	Design/development of solutions
PO4	Conduct investigations
PO5	Modern tool usage
PO6	Engineer and society
PO7	Environment and sustainability
PO8	Ethics
PO9	Individual/team work
PO10	Communication
PO11	Project management and finance
PO12	Life-long learning

CO–PSO Mapping

Suggested Civil Engineering PSOs:

PSO1: Apply fundamental Civil Engineering principles to analyse, plan, design and construct infrastructure systems.

PSO2: Use modern engineering tools, computational techniques and professional practices for Civil Engineering applications.

CO	PSO1	PSO2
CO1	2	2
CO2	3	2
CO3	2	3
CO4	3	3
CO5	3	3



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