Course Structure
for
Diploma in Civil Engineering
3rd Semester Onwards

III Semester							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DCV 301	PC	Mechanics of Materials	3	0	0	3
2	DCV 303	PC	Hydraulics	3	0	0	3
3	DCV 305	PC	Building Materials	2	0	0	2
4	DCV 307	PC	Basic Surveying	3	0	0	3
5	DHS 301	HS	Universal Human Value II	3	0	0	3
6	DCV 302	PC	Mechanics of Materials Laboratory	0	0	2	1
7	DCV 304	PC	Hydraulics Laboratory	0	0	2	1
8	DCV306	PC	Building Materials Laboratory	0	0	2	1
9	DCV 308	PC	Surveying Laboratory	0	0	3	1.5
10	DSI 361	SI	Summer Internship-I (4 Weeks) after 2nd semester.	0	0	0	0
Periods per week				**14**	**0**	**9**	
Total Credits							**18.5**
Total Periods per week							**23**

IV Semester							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DCV 401	PC	Structural Analysis	3	0	0	3
2	DCV 403	PC	Geotechnical Engineering	3	0	0	3
3	DCV 405	PC	Concrete Technology	3	0	0	3
4	DPE 461, DPE 463	PE	PE-I	3	0	0	3
5	DPE 465, DPE 467	PE	PE-II	3	0	0	3
6	DOE 461, DOE 463	OE	OE-I	3	0	0	3
7	DAU 401	MC	Essence of Indian Knowledge & Tradition	2	0	0	0
8	DCV 402	PC	Geotechnical Engineering Laboratory	0	0	2	1
9	DCV 404	PC	Concrete Technology Laboratory	0	0	2	1
10	DCV 406	PC	Civil Engineering Drawing	0	0	3	1.5
Periods per week				**20**	**0**	**7**	
Total Credits							**21.5**
Total Periods per week							**27**
PE I							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DPE 461	PC	Building Construction	3	0	0	3
2	DPE 463	PC	Advanced Surveying	3	0	0	3
PE II							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DPE 465	PC	Building Services and Maintenance	3	0	0	3
2	DPE 467	PC	Building Bye-laws & Planning	3	0	0	3
OE I							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DOE 461	OE	Renewable Energy and Environment	3	0	0	3
2	DOE 463	OE	Principles of Geospatial Engineering	3	0	0	3

V Semester							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DCV 501	PC	Design of RCC Structures	3	0	0	3
2	DCV 503	PC	Water Resource Engineering	3	0	0	3
3	DCV 505	PC	Environmental & Public Health Engineering	3	0	0	3
4	DPE 561, DPE 563	PE	PE-III	3	0	0	3
5	DOE 561, DOE 563	OE	OE-II	3	0	0	3
6	DCV 502	PC	RCC Design Laboratory	0	0	2	1
7	DCV 504	PC	Water Resource Engineering Laboratory	0	0	2	1
8	DCV 506	PC	Environmental & Public Health Engineering Laboratory	0	0	2	1
9	DSI 561	SI	Summer Internship – II (Four weeks) after 4th semester	0	0	0	4
10	DPR 561	PR	Project-1	0	0	4	2
Periods per week				**15**	**0**	**10**	
Total Credits							**24**
Total Periods per week							**25**

PE III							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DPE 561	PC	Prestressed Concrete	3	0	0	3
2	DPE 563	PC	Repairs and Maintenance of Structures	3	0	0	3

OE II							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DOE 561	OE	Ground Water Engineering	3	0	0	3
2	DOE 563	OE	Solid waste management	3	0	0	3

VI Semester							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DCV 601	PC	Estimation, Costing, & Construction Management	3	0	0	3
2	DCV 603	PC	Transportation Engineering	3	0	0	3
3	DPE 661, DPE 663	PE	PE-IV	3	0	0	3
4	DOE 661, DOE 663	OE	OE-III	3	0	0	3
5	DHS 601	HS	Entrepreneurship and start-ups	3	1	0	4
6	DAU 601	MC	Indian Constitution	2	0	0	0
7	DCV 602	PC	Transportation Engineering Laboratory	0	0	2	1
8	DPR 661	PR	Project II	0	0	6	3
9	DSE 661	SE	Seminar	0	0	2	1
Periods per week				**17**	**1**	**10**	
Total Credits							**21**
Total Periods per week							**28**

PE IV							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DPE 661	PC	Design of Steel Structure	3	0	0	3
2	DPE 663	PC	Pavement Design & Maintenance	3	0	0	3

OEIII							
S. No.	**Subject Code**	**Segment**	**Subject**	**L**	**T**	**P**	**Credit**
1	DOE 661	OE	Disaster Management	3	0	0	3
2	DOE 663	OE	Smart Infrastructure & Sustainability	3	0	0	3

SEMESTER-WISE CREDITS

Semester	Credits
Sem III	18.5
Sem IV	21.5
Sem V	24
Sem VI	21

SEMESTER WISE TEACHING HOURS

Semester	L	T	P	Total Hours
Sem III	14	0	09	23
Sem IV	20	0	07	27
Sem V	15	0	10	25
Sem VI	17	1	10	28

CREDIT DISTRIBUTION

Category	Credits	%
Core	47	**55.30%**
Program Elective	12	**14.11%**
Open Elective	9	**10.59%**
Other	17	**20.00%**

THEORY AND PRACTICAL PERCENTAGE

Theory = L + T = 66 + 1 = 67

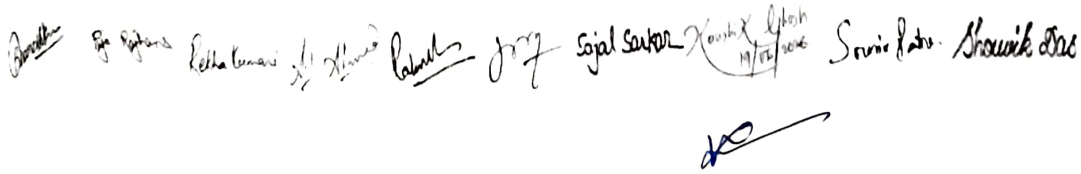
Practical = 36

Percentages:

- Theory % = (67 / 103) × 100 = 65.05 %
- Practical % = (36 / 103) × 100 = 34.95 %

PRACTICAL DISTRIBUTION

Semester	Practical %
Sem III	39.13 %
Sem IV	25.93 %
Sem V	40.00 %
Sem VI	35.71 %



UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

3RD SEMESTER

UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 301 MECHANICS OF MATERIALS

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 301			COURSE TITLE: MECHANICS OF MATERIALS				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This course enables the students:

1.	To explain the fundamental concepts of stress, strain, and the mechanical properties of materials under different loading conditions.
2.	To analyze beam behaviour, including shear force and bending moment under various loading conditions.
3.	To apply bending and shear stress theories to determine stress distribution in structural members.
4.	To evaluate the behaviour and stability of columns under compressive loads using analytical methods.
5.	To analyze torsional behaviour of shafts and stress analysis in thin-walled tubes.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Explain basic concepts of stress, strain, elastic properties, and behaviour of materials under axial and thermal loading.
CO2	Analyze shear force, bending moment, and beam behaviour under different loading conditions using standard analytical methods.
CO3	Apply bending and shear stress theories to determine stress distribution and load-carrying capacity of beams of different cross-sections.
CO4	Evaluate the behaviour and stability of columns and determine critical loads using Euler's theories.
CO5	Analyze torsion in circular shafts and evaluate stresses in thin-walled tubes under internal pressure.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Simple Stresses and Strains** 1.1 Basic Concepts of Materials: Definition of rigid, elastic, and plastic bodies and deformation under applied forces. 1.2 Stress, Strain and Elastic Properties: Concept of stress, strain, Hooke's law, elastic limit, and modulus of elasticity. 1.3 Types of Stresses and Stress-Strain Curve: Normal, shear, tensile, compressive stresses, and stress-strain behaviour.

	1.4 Elastic Constants: Poisson's ratio, modulus of rigidity, bulk modulus, and relationships among elastic constants. 1.5 Axial Loading and Temperature Effects: Deformation under axial loads, composite sections, temperature stresses and strains, and introduction to multi-axial stress conditions. Course Outcome: CO1 Teaching Hours: 8 hrs
2	**Beam Analysis and Behaviour** 2.1 Supports, Beams and Loads: Types of supports, beams, and common loading conditions used in structural members. 2.2 Shear Force and Bending Moment Concepts: Definition, physical significance, and relationship between load, shear force, and bending moment (without derivation). 2.3 Shear Force and Bending Moment Diagrams: SFD and BMD for cantilever, simply supported and overhanging beams under standard and combined loading, including point of contraflexure. Course Outcome: CO1, CO2 Teaching Hours: 8 hrs
3	**Bending and Shear Stresses in Beams** 3.1 Theory of Pure Bending: Assumptions and fundamentals of bending theory. 3.2 Flexural Equation and Bending Stress: Relation between bending moment, stress, and section properties. 3.3 Bending Stress Distribution and Resistance: Stress variation across the section and moment of resistance. 3.4 Shear Stress Theory: Shear stress equation (without derivation), Shear stress distribution diagram and relation between average and maximum shear stress for rectangular, circular, isosceles triangular sections, and square section bending about diagonal. 3.5 Shear Stress Distribution in Built-up Sections: I-section, and T-section. Course Outcome: CO1, CO2, CO3 Teaching Hours: 8 hrs
4	**Columns** 4.1 Compression Members and Classification: Short and long columns and their behaviour. 4.2 Column Geometry and Properties: Radius of gyration, slenderness ratio. 4.3 End Conditions and Buckling Concept: Different end supports, effective length, and stability of columns. 4.4 Euler's Theory of Columns: Assumptions, limitations, and buckling load calculation. Course Outcome: CO4 Teaching Hours: 8 hrs
5	**Torsion, and Thin-walled Tubes** 5.1 Theory of Torsion: Concept of torsion in circular shafts and assumptions. 5.2 Torsion Equation and Shaft Analysis: Torsional equation, solid and hollow shafts, torsional rigidity, and angle of twist. 5.3 Thin-walled tubes: Stress analysis under internal pressure.

	5.4 Stress Components in Pressure Vessels: Circumferential stress, longitudinal stress, and volumetric changes. Course Outcome: CO5 Teaching Hours: 8 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Strength of Materials	R.K.Bansal, S.Chand Publications, New Delhi	978-8131808146
2.	Strength of Materials	R.S. Khurmi, S.Chand of Company Ltd., New Delhi.	978-8121928229
3.	Strength of Materials	Beer and Jonson, Tata McGraw Hill	978-1259097171
4.	Strength of Materials	S.Ramamrutham, Dhanpat Rai & Publications, New Delhi	978-9384378264

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Strength of Materials	S. Timoshenko, Vol. I, CBS, New Delhi.	978-8123910307
2.	Strength of Materials	R. Subramaniam, Oxford University Press.	978-0199464739

E-REFERENCES:

https://nptel.ac.in/courses/105105108
https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_me140

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	0	0	0	2	1	0
CO2	3	3	2	2	0	0	1	3	2	0
CO3	3	3	3	2	0	1	1	3	2	0
CO4	3	3	3	1	1	1	1	3	2	0
CO5	3	3	2	2	2	1	1	3	2	0

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) – 2026

COURSE: DCV 303 HYDRAULICS

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 303			COURSE TITLE: HYDRAULICS				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This course enables the students to

1.	Explain the physical properties of fluids and apply hydrostatic principles to determine pressures, forces, and spatial stability conditions on submerged and floating engineering structures.
2.	Apply the principles of conservation of mass, momentum, and energy to evaluate fluid kinematics and dynamics in closed conduits and open systems.
3.	Analyze pipe networks by quantifying major and minor energy losses, evaluating transient phenomena like water hammer, and interpreting Hydraulic and Total Energy Lines.
4.	Formulate optimal geometric configurations for uniform flow in open channels and interpret non-uniform hydraulic profiles (GVF and hydraulic jumps).
5.	Evaluate the operational mechanics of hydraulic pumps and turbines, while introducing advanced field instrumentation and modern, sustainable water-management concepts.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Analyze fluid properties, hydrostatic pressure profiles, and boundary forces acting on closed pipe boundaries, open channel cross-sections, and submerged or floating structural surfaces.
CO2	Apply the continuity, Euler, and Bernoulli equations to model fluid dynamics, evaluate energy distributions, and analyze discharge profiles across pipe systems and open channel segments.
CO3	Quantify friction losses, minor turbulent variations, specific energy transitions, and transient surge phenomena across complex pipe networks and open water paths.
CO4	Design efficient, economical open channel cross-sections and formulate discharge/velocity relationships utilizing advanced mathematical flow models and uniform/non-uniform profiles.
CO5	Evaluate the working principles and performance criteria of mechanical flow devices (pumps, turbines) alongside digital sensors, notch/weir structures, and modern field flow meters.

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Fluid and Hydrostatics** 1.1 Introduction: Definition of a fluid, Properties of Fluid and their responses with variation in pressure and temperature, Dimensions and Base Units, Classification of Fluids. 1.2 Fluid statics: Pressure and hydrostatic forces in a fluid, Hydrostatic Law and its application, Pressure measurement and simple Numerical Problems. 1.3 Applications: Pressure Force on immersed vertical surface (no derivations required). 1.4 Buoyancy and Floatation: Buoyant force, Principle of floatation, stability of floating and submerged bodies, metacentre and metacentric height. Course Outcome: CO1, CO4 Teaching Hours: 8 hrs
2	**Fluid Kinematics and Dynamics** 2.1 Flow Types: Characteristics of steady/unsteady, laminar/turbulent, and uniform/non-uniform flow. 2.2 Conservation Laws: The Continuity Equation, based on the principle of conservation of mass. 2.3 Bernoulli's Theorem: Derivation (conceptually) from Euler's equation; statement, assumptions, and energy components (potential, kinetic, and pressure energy). 2.4 Flow Measurement: Practical applications in Venturi meters, Orifice meters, and Pitot tubes. Digital sensors for flow measurement. 2.5 Orifice Theory: Hydraulic coefficients of orifices (No derivation required) Course Outcome: CO2, CO5 Teaching Hours: 8 hrs
3	**Pipe Flow and Energy Losses** 3.1 Flow Regimes: Reynolds number and the transition between laminar and turbulent flow, explained through Reynolds' experiment. 3.2 Energy Losses: Major head loss due to friction and minor losses due to sudden expansion, contraction, entrance, and exit. 3.3 Gradient Analysis: Concept of Hydraulic Gradient Line (HGL) and Total Energy Line (TEL). 3.4 Pipe Networks: Analysis of flow through pipes in series and parallel. 3.5 Hydraulic Phenomena: Definition and effects of the water hammer phenomenon. Course Outcome: CO1, CO2, CO3 Teaching Hours: 8 hrs
4	**Flow in Open Channel** 4.1 Channel Fundamentals: Comparison between pipe flow and open channel flow; geometric elements and velocity distribution. 4.2 Uniform Flow: Discharge computation using Chezy's and Manning's formulas for rectangular channels. 4.3 Economic Design: Principles for the most economical rectangular and trapezoidal channel sections. 4.4 Flow Measurement: Use of rectangular and triangular notches and weirs. 4.5 Current Meters: Introduction to current meters for field velocity measurement.

	Course Outcome: CO1, CO2, CO3, CO4, CO5	Teaching Hours: 8 hrs
5	**Advance Hydraulics and Machinery** 5.1 Specific Energy: The specific energy equation, variation with depth, and critical flow concepts. 5.2 Varied Flow: Gradually Varied Flow (GVF) and sketching of water surface profiles in rectangular channels. 5.3 Hydraulic Jump: Concept of rapidly varied flow, energy loss, and practical applications. 5.4 Hydraulic Machinery: Basic working principles (without numerical problem) of reciprocating and centrifugal pumps. 5.5 Turbines: Distinction between impulse (Pelton wheel) and reaction (Francis and Kaplan) turbines, working principles, application and selection. Course Outcome: CO1, CO2, CO3, CO4, CO5	Teaching Hours: 8 hrs

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Bansal; Laxmi Publications; 10th Edition (2018)	978-8131808153
2.	Hydraulics and Fluid Mechanics	Dr. P.N. Modi and Dr. S.M. Seth, Standard Book House, 22nd Edition, 2019	9788189401269
3.	Theory and Applications of Fluid Mechanics	K. Subramanya; Tata McGraw-Hill; 1st Edition (1993)	978-0074603697
4.	Fluid Mechanics and Hydraulics,	Dr. Jagdish Lal, Metropolitan Book Co. Pvt. Ltd., 9th Edition	978-8120004405

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Introduction to Fluid Mechanics and Fluid Machines, Som, Biswas and Chakraborty	S.K. Som, G. Biswas, and S. Chakraborty; McGraw Hill Education; 3rd Edition (2017)	978-0071329194
2.	Fluid Mechanics: Fundamentals and Applications	Yunus A. Çengel and John M. Cimbala; McGraw Hill; 4th Edition (2017)	978-1259696534

E-REFERENCES:

https://nptel.ac.in/courses/105103192
https://www.cambridge.org/core/journals/journal-of-fluid-mechanics
E-book: https://home.czu.cz/storage/575/52485_IIUNT-Fluid-Mechanics.pdf

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DEPARTMENT OF CIVIL ENGINEERING

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	0	0	0	2	1	0
CO2	3	3	1	2	0	0	0	2	1	0
CO3	3	3	2	2	0	1	0	3	2	0
CO4	3	2	3	2	2	1	1	3	1	2
CO5	3	2	2	3	2	0	2	3	2	3

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation - 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 305 BUILDING MATERIALS

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 305			COURSE TITLE: BUILDING MATERIALS				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
2	-	-	2	2	50	50	100

COURSE OBJECTIVES: This paper, Building Materials, enables the students to

1	Explain the classification, properties, manufacturing processes, and testing methods of commonly used building materials.
2	Describe the characteristics and applications of bricks, aggregates, lime, cement, and concrete used in civil engineering construction.
3	Identify different types of mortars, timber, wood products, paints, and finishing materials along with their applications.
4	Analyze the defects, preservation methods, durability, and performance characteristics of construction materials.
5	Select suitable building materials for different construction works based on strength, durability, economy, and functional requirements.

COURSE OUTCOME: After the completion of this course, students will be able to

CO1	Classify and evaluate bricks and aggregates based on their properties, composition, defects, and standard BIS tests.
CO2	Explain the properties, manufacturing processes, testing methods, and applications of lime, cement, and concrete used in construction.
CO3	Identify different types of mortars, their ingredients, properties, and suitability for various building works.
CO4	Describe the characteristics, seasoning, preservation, defects, and applications of timber and engineered wood products used in construction.
CO5	Explain the composition, properties, applications, and methods of use of paints, gypsum products, adhesives, insulating materials, and geosynthetics in civil engineering works.

Sajal Sarkar

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DEPARTMENT OF CIVIL ENGINEERING

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Bricks and Aggregates** 1.1 Bricks: classification and characteristics of good bricks. 1.2 Ingredients of good brick earth and harmful substances. 1.3 Forms of bricks; testing of bricks as per BIS; defects in bricks. 1.4 Aggregates: classification and properties; fine and coarse aggregates. 1.5 Deleterious substances, soundness, alkali-aggregate reaction; testing of aggregates. Course Outcome: CO1, CO2 Teaching hours: 5 hrs
2	**Lime, Cement, and Concrete** 2.1 Lime: impurities in limestone; classification of lime. 2.2 Processes: slaking, hydration, hardening; testing, storage, handling. 2.3 Cement: OPC, PPC, slag cement; composition and hydration. 2.4 Setting time of cement; properties of cement. 2.5 Concrete: types, ingredients, water-cement ratio, workability, grades, tests. Course Outcome: CO1, CO2, CO3 Teaching hours:7 hrs
3	**Mortars** 3.1 Classification and uses of mortars. 3.2 Characteristics of good mortar. 3.3 Ingredients of mortar. 3.4 Types of mortar: cement mortar, lime mortar, lime-cement mortar. 3.5 Special mortars and their applications. Course Outcome: CO2, CO3 Teaching hours: 4 hrs
4	**Wood and Wood Products** 4.1 Timber: classification and structure. 4.2 Characteristics of good timber; seasoning of timber. 4.3 Defects, diseases, decay, preservation, and testing of timber. 4.4 Wood products: veneers, plywood, fibre boards, particle boards. 4.5 Other products: chip boards, block boards, batten boards, laminated boards; applications. Course Outcome: CO4, CO5 Teaching hours: 6 hrs
5	**Paints and Miscellaneous Materials** 5.1 Paints: composition, characteristics, preparation, covering power. 5.2 Painting: methods for plastered, wooden, and metal surfaces; defects and weather effects. 5.3 Enamels, distemper, water wash, colour wash; varnish, French polish, wax polish. 5.4 Gypsum: classification; plaster of Paris; gypsum plasters and boards. 5.5 Miscellaneous materials: adhesives, insulating materials, geosynthetics. Course Outcome: CO3, CO5 Teaching hours: 6 hrs

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition, Year of Publication	ISBN
1	Building Materials	S.K. Duggal, New Age International Publishers, New Delhi	978-8122417940
2	Engineering Materials	Surendra Singh, Vikas Publishing House Pvt. Ltd.	978-8125938251
3	Building Construction	B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications	978-8131804281
4	Construction Materials	S.C. Rangwala, Charotar Publishing House	978-9385039245
5	Building Materials and Construction	S.S. Bhavikatti, I.K. International Publishing House	978-9380026677

E-REFERENCES:

https://onlinecourses.swayam2.ac.in
https://theconstructor.org/building/building-materials/
https://www.engineeringcivil.com/category/construction-materials
https://www.aboutcivil.org/construction-materials.html
https://testbook.com/civil-engineering/building-materials-notes

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	0	0	1	3	1
CO2	3	2	2	2	2	0	1	1	3	2
CO3	2	2	2	1	1	0	0	1	2	1
CO4	2	1	1	1	2	0	1	1	2	2
CO5	2	2	2	1	3	1	1	1	2	3

Grading: No Correlation: 0, Low Correlation: 1, Moderate Correlation: 2, High Correlation: 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026
COURSE: DCV 307 BASIC SURVEYING

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 307			COURSE TITLE: BASIC SURVEYING				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
3	-	-	3	3	50	50	100

COURSE OBJECTIVES: This paper, Basic Surveying, enables the students to

1	Explain the basic principles, classifications, and instruments used in surveying for civil engineering applications.
2	Apply chain and compass surveying techniques for field measurements, plotting, area calculations, and traverse operations.
3	Demonstrate plane table surveying, levelling, and contouring methods for the preparation of maps and topographic details.
4	Analyze the principles and applications of theodolite surveying and tacheometry for accurate measurement of angles, distances, and traverses.
5	Utilize curve setting methods and modern surveying instruments such as Total Station in engineering surveying projects.

COURSE OUTCOME: After the completion of this course, students will be able to

CO1	Apply chain surveying methods for linear measurements, field booking, plotting, area computation, and correction of errors in surveying.
CO2	Perform compass surveying for measurement of bearings, traverse surveying, plotting, and correction of local attraction errors.
CO3	Apply plane table surveying, levelling, and contouring techniques for preparation of maps, profiles, and topographic surveys.
CO4	Use theodolite and tacheometric surveying methods for measurement of horizontal and vertical angles, traversing, and determination of distances and coordinates.
CO5	Set out simple curves and utilize a Total Station for modern surveying applications such as traversing, levelling, and contour mapping.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Introduction to Surveying and Chain Surveying** 1.1 Definition and classification of surveying; objectives and fundamental principles of surveying. 1.2 Types of chains and their uses; instruments such as optical square and cross staff. 1.3 Reconnaissance and site selection. 1.4 Locating ground features using offsets with proper field book recording; chaining for obtaining structural outlines. 1.5 Methods of overcoming obstacles in chaining; use of conventional symbols;

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	plotting of chain survey data; computation of areas; errors in chain surveying. and their correction; related numerical problems. Course Outcome: CO1, CO2 Teaching hours:7 hrs
2	**Compass Surveying** 2.1 Construction and working of prismatic compass; temporary adjustments. 2.2 Types of bearings and their determination. 2.3 Concept of local attraction; detection and correction. 2.4 Chain and compass surveying of an area; field booking and plotting of traverse. 2.5 Adjustment of compass traverse; errors and precautions; related numerical problems. Course Outcome: CO1, CO2, CO4 Teaching hours:6 hrs
3	**Plane Table Surveying, Levelling and Contouring** 3.1 Equipment used in plane table surveying; orientation of the plane table. 3.2 Methods of plane tabling; three-point problem. 3.3 Introduction to levelling; dumpy level components; temporary adjustments; sensitiveness of bubble tube. 3.4 Methods of levelling: differential, profile, fly levelling; curvature and refraction; automatic levels; longitudinal and cross-sections. 3.5 Topographic maps; contours and contour interval; methods of contouring; interpolation; area and volume measurement. Course Outcome: CO3, CO4, CO5 Teaching hours:11hrs
4	**Theodolite Surveying and Tacheometry** 4.1 Components and working of transit theodolite. 4.2 Measurement of horizontal and vertical angles. 4.3 Computation of coordinates; preparation of traverse table. 4.4 Definition and principles of tacheometry; stadia system. 4.5 Determination of horizontal and vertical distances using a tacheometer. Course Outcome: CO2, CO3, CO4, CO5 Teaching hours:8 hrs
5	**Curves and field application of the Total Station** 5.1 Definition and concept of simple and transition curves; degree of curve. 5.2 Elements of a simple curve. 5.3 Setting out simple curves by linear and Rankine's tangential method. 5.4 Introduction to transition curves. 5.5 Total station: components, principles, and field applications. Course Outcome: CO3, CO4, CO5 Teaching hours:8 hrs

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition, and Year of Publication	ISBN
1	Surveying and Levelling	Basak, N. N., McGraw-Hill Education, New Delhi.	978-9332901533
2	Surveying I	Punmia, B.C, Jain, Ashok Kumar; Jain,	978-8131808142

		Arun Kumar, Laxmi Publications, New Delhi.	
3	Surveying and Levelling Volume I	Kanetkar, T. P.; Kulkarni, S. V., Pune Vidyarthi Gruh Prakashan.	978-8185825805
4	Surveying and Levelling	Bansal, R.K., Laxmi Publications, New Delhi	978-8131809354
5	Textbook of Surveying	C. Venkatramaiah, Universities Press	978-8173717406

E-REFERENCES:

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https://www.engineeringcivil.com/category/surveying
https://www.sanfoundry.com/certification/surveying-certification/
https://www.aboutcivil.org/new/surveying-levelling%20II.html

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	0	0	3	1	0
CO2	3	3	1	2	1	0	0	3	1	0
CO3	3	2	2	3	1	0	0	3	1	1
CO4	3	3	2	3	1	0	0	3	2	0
CO5	3	2	3	3	2	1	1	3	2	2

Grading: No Correlation: 0, Low Correlation: 1, Moderate Correlation: 2, High Correlation: 3

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS (CBCS) - 2026

COURSE: DCV 302 MECHANICS OF MATERIALS LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 302			COURSE TITLE: MECHANICS OF MATERIALS LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	2	1	50	50	100

COURSE OBJECTIVES: This course enables the students:

1	To interpret stress, strain, and material properties through laboratory testing.
2	To evaluate mechanical behaviour of structural elements under different loading conditions.
3	To familiarize with material testing equipment and standard IS procedures.
4	To apply theoretical concepts in analyzing experimental results.
5	To develop engineering judgment, reporting skills, and teamwork.

COURSE OUTCOMES: After the completion of this course, students will be able to:

CO1	Assess the mechanical properties of ductile and brittle materials by performing tensile and compression tests.
CO2	Evaluate the impact strength and hardness of engineering materials and interpret their relation to toughness and strength.
CO3	Analyze the flexural behaviour and stiffness of beams through bending and deflection experiments.
CO4	Assess the modulus of rigidity and analyze torsional behaviour of structural elements using torsion tests.
CO5	Assess and compare the buckling behaviour of columns under different end conditions with theoretical predictions.

Sl. No.	EXPERIMENTS
1	Tensile Test on Mild Steel using UTM Course Outcome: CO1
2	Compression Test on Brittle Material Course Outcome: CO1
3	Determination of Impact Strength Using Izod/Charpy Tests Course Outcome: CO1, CO2
4	Determination of Hardness of Materials Using Rockwell/Brinell Hardness Test Course Outcome: CO1, CO2

5	Determination of Young's Modulus from Deflection of a Simply Supported Beam Course Outcome: CO3
6	Determination of Young's Modulus from Deflection of a Cantilever Beam Course Outcome: CO3
7	Determination of Modulus of Rigidity and angle of twist of hollow/solid steel rod by torsion test. Course Outcome: CO4
8	Column Buckling Test (Euler's Theory – Various End Conditions) Course Outcome: CO5

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Strength of Materials	R.K.Bansal, S.Chand Publications, New Delhi	978-8131808146
2.	Strength of Materials	R.S. Khurmi, S.Chand of Company Ltd., New Delhi.	978-8121928229
3.	Strength of Materials	Beer and Jonson, Tata McGraw Hill	978-1259097171
4.	Strength of Material	S.Ramamrutham, Dhanpat Rai & Publications, New Delhi	978-9384378264

E-REFERENCES:

https://nptel.ac.in/courses/105105108
https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_me140

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	3	0	0	1	3	2	0
CO2	2	2	1	3	2	0	1	2	2	1
CO3	3	3	2	3	2	0	1	3	2	1
CO4	3	3	2	3	2	0	1	3	2	1
CO5	2	3	2	3	2	0	2	3	2	1

Grading: No correlation – 0, Low correlation - 1, Moderate correlation – 2, High Correlation - 3

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SYLLABUS (CBCS) - 2026

COURSE: DCV 304 HYDRAULICS LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV304			COURSE TITLE: HYDRAULICS LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	2	1	50	50	100

COURSE OBJECTIVES: This course enables the students to;

1.	Identify and calibrate primary hydraulic instrumentation and fluid measurement devices used in civil engineering networks.
2.	Experimentally evaluate hydrostatic forces, center of pressure, and buoyancy parameters governing the stability of fluid-interaction structures.
3.	Validate fundamental conservation laws of fluid dynamics and investigate laminar and turbulent flow regimes.
4.	Analyze performance characteristics and operational efficiencies of common pumping machinery used in water supply systems.
5.	Investigate energy conversion profiles and efficiency curves of hydraulic impulse and reaction turbines.

COURSE OUTCOMES: After the completion of this course, students will be able to;

CO1	Demonstrate proficiency in manipulating pressure gauges, Pitot tubes, and pipe fittings while accurately calibrating differential and conservation-based flow measurement units (Venturimeters/Orificemeters).
CO2	Quantify hydrostatic forces, locate the experimental center of pressure, and compute the metacentric height to judge the physical stability of floating and submerged engineering elements.
CO3	Verify Bernoulli's energy equation experimentally and evaluate the transitional boundary parameters between laminar and turbulent flow via Reynolds apparatus.
CO4	Conduct performance testing, plot characteristic curves, and deduce the mechanical efficiency of centrifugal and reciprocating pumps under variable heads.
CO5	Evaluate operational parameters and power output characteristics of impact (Pelton) and reaction (Francis) hydraulic turbines.

COURSE CONTENT DETAILS:

Sl. No.	EXPERIMENTS
1	Study of pressure gauges, Pitot tubes, water meters, and pipe fittings. Course Outcome: CO1
2	Experimental determination of hydrostatic force and center of pressure on a vertically submerged plane surface. Course Outcome: CO2, CO1
3	Determination of the metacentric height and evaluation of the stability of a floating vessel.

	Course Outcome: CO2
4	Verification of Bernoulli's energy equation along a closed, variable-cross-section conduit. Course Outcome: CO3, CO1
5	Determination of the coefficient of discharge for a Venturimeter and an Orificemeter. Course Outcome: CO1, CO3
6	Conduct of Reynold's experiment to visualize and classify laminar, transitional, and turbulent flow regimes. Course Outcome: CO3
7	Performance characteristics and efficiency testing of a Reciprocating Pump. Course Outcome: CO4, CO1
8	Performance characteristics, discharge variation, and efficiency mapping of a Centrifugal Pump. Course Outcome: CO4, CO1
9	Determination of operating characteristics and mechanical efficiency of a Pelton Wheel Turbine. Course Outcome: CO5
10	Determination of operating characteristics and efficiency curves of a Francis Turbine. Course Outcome: CO5

TEXT BOOK:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Bansal; Laxmi Publications; 10th Edition (2018)	978-8131808153
2.	Fluid Mechanics with Laboratory Manual	Majumdar, Bireswar Edition : Second Edition, PHI Learning	9788120351806
3.	Hydraulics and Fluid Mechanics	Dr. P.N. Modi and Dr. S.M. Seth, Standard Book House, 22nd Edition, 2019	9788189401269

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Introduction to Fluid Mechanics and Fluid Machines, Som, Biswas and Chakraborty	S.K. Som, G. Biswas, and S. Chakraborty; McGraw Hill Education; 3rd Edition (2017)	978-0071329194
2.	Fluid Mechanics: Fundamentals and Applications	Yunus A. Çengel and John M. Cimbala; McGraw Hill; 4th Edition (2017)	978-1259696534

E-REFERENCES:

https://fm-iitk.vlabs.ac.in/
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https://www.cambridge.org/core/journals/journal-of-fluid-mechanics

Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	3	1	2	2	3	2	1
CO2	3	3	2	3	2	1	2	3	2	1
CO3	3	3	1	3	1	1	2	3	1	1
CO4	3	2	2	3	2	2	2	3	2	2
CO5	3	2	2	3	2	2	2	3	2	2

Grading: No Correlation – 0, Low Correlation – 1, Moderate Correlation- 2, High Correlation - 3

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SYLLABUS (CBCS) - 2026

COURSE: DCV306 BUILDING MATERIALS LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 306			COURSE TITLE: BUILDING MATERIALS LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	2	2	1	50	50	100

COURSE OBJECTIVES: This paper, the Building Materials Laboratory, enables the students to

1	Identify commonly used building materials and their applications in civil engineering construction.
2	Perform standard laboratory tests to determine the engineering properties and quality characteristics of bricks, stones, cement mortar, and other building materials.
3	Analyze the suitability of construction materials through the evaluation of strength, water absorption, hardness, and related performance parameters.
4	Demonstrate the construction and study of common brick masonry bonds and understand their practical applications in building construction.
5	Evaluate the quality and performance of finishing materials such as paints and glass using standard testing procedures and laboratory observations.

COURSE OUTCOME: After the completion of this course, students will be able to

CO1	Identify and classify common construction materials, timber sections, and glass products based on their physical characteristics and engineering applications.
CO2	Perform standard laboratory tests to determine the compressive strength of bricks and cement mortar and interpret the test results with reference to relevant specifications.
CO3	Determine and analyze the water absorption characteristics of bricks and stones to assess their suitability for construction purposes.
CO4	Construct and evaluate common brick masonry bonds and assess their suitability for different construction requirements.
CO5	Evaluate the quality and performance characteristics of construction finishing materials such as paints and glass through standard laboratory tests and observations.

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COURSE CONTENT DETAILS:

SL. NO.	EXPERIMENT
1	Identification and classification of common construction materials. Course Outcome: CO1, CO4, CO5
2	Determination of the compressive strength of bricks. Course Outcome: CO2, CO3
3	Determination of water absorption characteristics of bricks and stones. Course Outcome: CO3, CO1
4	Construction and study of common brick masonry bonds. Course Outcome: CO4, CO1
5	Preparation and determination of compressive strength of cement mortar cubes. Course Outcome: CO2, CO4
6	Study and demonstration of timber cross-sections and their characteristics. Course Outcome: CO1
7	Evaluation of the spreading quality of paints. Course Outcome: CO5
8	Determination of the hardness of glass. Course Outcome: CO1, CO5

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition, and Year of Publication	ISBN
1	Materials of Construction	D.N. Ghosh, Tata McGraw-Hill Education	978-0074631863
2	Textbook of Building Materials	S.C. Rangwala, Charotar Publishing House	978-9385039245
3	Building Materials	S.K. Basu and A.K. Ray, S.K. Lahiri & Co. Pvt. Ltd.	978-8170086796
4	Civil Engineering Materials	TTTI Chandigarh, Tata McGraw-Hill Education	978-0070702925
5	Building Materials	S.K. Duggal, New Age International Publishers	978-8122417940

E-REFERENCES:

https://nptel.ac.in/course.html
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https://www.engineeringcivil.com/category/construction-materials
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Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	1	2	1	0	0	1	3	1
CO2	3	2	1	3	1	0	0	1	3	1
CO3	3	2	2	3	1	0	1	1	3	1
CO4	2	2	1	3	2	0	1	1	2	2
CO5	2	1	1	2	1	1	1	2	2	2

Grading: No Correlation: 0, Low Correlation: 1, Moderate Correlation: 2, High Correlation: 3

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SYLLABUS (CBCS) - 2026

COURSE: DCV 308 SURVEYING LABORATORY

PROGRAMME: DIPLOMA IN CIVIL ENGINEERING							
COURSE CODE: DCV 308			COURSE TITLE: SURVEYING LABORATORY				
COMPULSORY: PROGRAM CORE							
TEACHING SCHEME AND CREDITS					EXAMINATION SCHEME		
L	T	P	HOURS/WEEK	CREDIT	PE	FINAL	TOTAL
-	-	3	3	1.5	50	50	100

COURSE OBJECTIVES: This paper, Surveying Laboratory, enables the students to

1	Perform chain surveying operations for linear measurements, ranging, chaining, plotting, and preparation of survey maps.
2	Apply compass surveying techniques for the measurement of bearings, traversing, and field data collection.
3	Demonstrate plane table surveying, levelling, and contouring methods for topographic mapping and profile preparation.
4	Utilize theodolite instruments for angle measurement, traversing, curve setting, and related field computations.
5	Employ modern surveying instruments such as Total Station for traversing, levelling, contouring, and other advanced surveying applications.

COURSE OUTCOME: After the completion of this course, students will be able to

CO1	Apply chain surveying techniques to perform ranging, chaining, preparation of index plans, and measurement of distances under field conditions.
CO2	Perform compass surveying operations to determine bearings, conduct traverses, and prepare survey plans using field observations.
CO3	Conduct plane table surveying, levelling, profile levelling, and contouring operations for topographic mapping and analysis.
CO4	Analyze and execute theodolite surveying operations including traversing, angle measurement, and horizontal curve setting for engineering applications.
CO5	Evaluate and utilize Total Station data for traversing, levelling, contouring, and modern surveying applications in civil engineering projects.

COURSE CONTENT DETAILS:

SL. NO.	EXPERIMENT
1	Ranging and chaining of a survey line and preparation of the index plan. Course Outcome: CO1, CO2
2	Measurement of bearings using a prismatic compass. Course Outcome: CO2, CO1
3	Chain and compass traverse survey. Course Outcome: CO1, CO2

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4	Radiation, Intersection, and traversing methods of plane table surveying. Course Outcome: CO3, CO2
5	Temporary adjustments of dumpy level and differential levelling. Course Outcome: CO3, CO4
6	Profile levelling and plotting of longitudinal section. Course Outcome: CO3, CO4
7	Traversing using theodolite. Course Outcome: CO4, CO2
8	Setting out of horizontal curves. Course Outcome: CO4, CO5
9	Levelling and contouring using a Total Station. Course Outcome: CO3, CO5
10	Traverse survey using Total Station. Course Outcome: CO4, CO5

REFERENCE BOOKS:

Sl. No.	Title	Author, Publisher, Edition, and Year of Publication	ISBN
1	Surveying and Levelling	Basak, N. N., McGraw-Hill Education, New Delhi	978-9332901533
2	Surveying Vol. I	Punmia, B.C., Jain, Ashok Kumar & Jain, Arun Kumar, Laxmi Publications, New Delhi	978-8131808142
3	Surveying and Levelling Volume I	Kanetkar, T. P. & Kulkarni, S. V., Pune Vidyarthi Gruh Prakashan	978-8185825805
4	Surveying and Levelling	R.K. Bansal, Laxmi Publications, New Delhi	978-8131809354
5	Textbook of Surveying	C. Venkatramaiah, Universities Press	978-8173717406

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Mapping of Course Outcomes onto Program Outcomes & Program Specific Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	0	2	0	0	1	2	1	0
CO2	3	3	0	3	0	0	1	3	2	0
CO3	2	3	1	3	0	0	1	3	2	1
CO4	3	3	2	3	1	1	1	3	2	0
CO5	3	2	2	3	1	1	1	3	3	2

Grading: No Correlation: 0, Low Correlation: 1, Moderate Correlation: 2, High Correlation: 3