

SDM College of Engineering & Technology, Dharwad

Date:18-7-2019

It is certified that the scheme and syllabus for III & IV semester of UG program in CivilEngineering is recommended by Board of Studies of Civil Engineering Department and approved by the Academic Council, SDM College of Engineering & Technology, Dharwad. This scheme and syllabus will be in force from the academic year 2019-20 till further revision.

Principal

Chairman BoS & HoD

Program Educational Objectives (PEOs)

I. Technical adeptness: The Civil Engineering Graduates will be technically adept to specific fields and other disciplines and Management towards Planning, Design, and Costing. Their technical skills and knowledge will enable them to perform their work with a commitment and quality, timeliness with continuous improvement.

II. Interpersonal Skills: Civil Engineering Graduates will exhibit effective interpersonal skills in teams and at work place.

III. Awareness of Social impact: Graduates will be made aware of causes of impacts due to the development and also to identify remedial measures if necessary.

IV. Professionalism: Understanding of professionalism, ethics, quality performance, sustainability and allow them to be professional leaders and contributors to society through their problem solving capabilities and executing the work.

V. Continuous Learning: Civil Engineering Graduates will exhibit interest in lifelong learning including studies leading to professional licensure or higher studies in engineering that provides for continued development of their technical ability and management skills

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

- PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO2.Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO3.Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal, and environmental considerations.
- PO4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- PO5.Modern tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6.The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7.Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8.Ethics:** Apply ethical principle sand commit to professional ethics and responsibilities and norms of the engineering practice.

PO9.Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team to manage projects and in multi-disciplinary environments.

PO12.Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context to technological change.

PROGRAM SPECIFIC OUT COMES (PSOs)

PSO13. Project inception and design: Conceptualize projects related to different fields of Civil Engineering, collect relevant data by direct and indirect methods, analyze the project requirement and design economically viable and sustainable project.

PSO14.Draft specification: Draft specification: Select material, prepare estimates/costing, schedule work plans.

PSO15.Experimentation: Experimentation and Quality Control: Apply knowledge of different fields of Civil Engineering, conduct experiments, analyze, interpret data and design the Civil Engineering systems.

SDMCET: Syllabus

III Semester

Course Code	Course Category	Course Title	Teaching		Examination				
			L-T-P (Hrs/Week)	Credits	CIE	Theory (SEE)		Practical (SEE)	
					Max. Marks	*Max. Marks	Duration in Hrs.	Max. Marks	Duration in Hrs.
18UMAC300	BS	Engg. Mathematics-III	3 - 0 - 0	3	50	100	3	-	-
18UCVC300	PC	Building Construction	4 - 0 - 0	4	50	100	3	-	-
18UCVC301	PC	Mechanics of Materials	4 - 0 - 0	4	50	100	3	-	-
18UCVC302	PC	Fluid Mechanics	3 - 0 - 0	3	50	100	3	-	-
18UCVC303	PC	Surveying	4 - 0 - 0	4	50	100	3	--	--
18UCVC304	PC	Concrete Technology	3 - 0 - 0	3	50	100	3	--	--
18UCVL305	PC	Basic Material Testing Laboratory	0 - 0 - 3	1.5	50	--	--	50	3
18UCVL306	PC	Surveying Practice Laboratory	0-0 - 3	1.5	50	--	--	50	3
Total			21 - 0 - 6	24	400	600		100	

BS- Basic Science, PC- Program Core

SDMCET: Syllabus

IV Semester

Course Code	Course Category	Course Title	Teaching		Examination				
			L-T-P (Hrs/Week)	Credits	CIE	Theory (SEE)		Practical (SEE)	
					Max. Marks	*Max. Marks	Duration in Hrs.	Max. Marks	Duration in Hrs.
18UMAC400	BS	Engg. Mathematics-IV	3 - 0 - 0	3	50	100	3	-	-
18UCVC400	PC	Structural Analysis – I	4 - 0 - 0	4	50	100	3	-	-
18UCVC401	PC	Highway Engineering	4 - 0 - 0	4	50	100	3	-	-
18UCVC402	PC	Water supply Engineering	4 - 0 - 0	4	50	100	3	-	-
18UCVC403	PC	Building Planning & Drawing	2 - 0 - 2	3	50	100	3	--	--
18UCVC404	PC	Hydraulics and Hydraulic Machines	3 - 0 - 0	3	50	100	3	--	--
18UCVL405	PC	Fluid Mechanics Laboratory	0 - 0 - 3	1.5	50	--	--	50	3
18UCVL406	PC	Engineering Geology Laboratory	0 - 1 - 1	1.5	50	--	--	50	3
18UCVL407	PC	Introductory Project	0 - 0 - 2	1	50	--	--	--	--
Total			20 - 1 - 8	25	450	600		100	

BS- Basic Science, PC- Program Core,

Total number of credits offered for the Second year: 49

III Semester

18UMAC300

Engineering Mathematics III

(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs):

To have an insight into Laplace transforms, Fourier series, Fourier transforms, Difference equations and Z-transforms. To develop the proficiency in variational calculus and solving ODE's arising in engineering applications, using numerical methods.

Course Outcomes (COs):

COs	Description of the course outcomes: At the end of course the students will be able to	Mapping to POs (1-12)		
		Mastering 3	Moderate 2	Introductory 1
CO-1	Transform the given function using Laplace /Fourier transforms depending on the nature of engineering applications.			1
CO-2	Express periodic function as a Fourier series and obtain the various harmonics of the Fourier series expansion for the given numerical data.			1,2
CO-3	Solve difference equations using Z-transform.			1
CO-4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.		1,2	
CO-5	Determine the extremals of functional using calculus of variations and solve problems arising in engineering.			1,2

POs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level	1.2	1.3													

Contents:

- 1) **Laplace Transforms:** Definition and Properties. Laplace transform of elementary functions. Laplace transforms of Periodic functions and unit-step function – problems.
Inverse Laplace Transforms: Inverse Laplace transform - problems, Convolution theorem (without proof) to find the inverse Laplace transform and problems, solution of linear differential equations using Laplace transform. **8 Hrs.**
- 2) **Fourier Series:** Periodic functions, Dirichlet's condition. Fourier series of periodic functions of period 2π and arbitrary period. Half-range Fourier series. Practical harmonic analysis, examples from engineering field. **8 Hrs.**
- 3) **Fourier Transforms:** Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Simple problems.
Z-Transforms and Difference Equations : Z-transform- definition, Standard Z-transforms, Damping and shifting rules, Initial value and Final value theorems (without proof) with problems. Inverse Z-transform. Simple problems. Difference equations-basic definition. Application of Z-transform to solve Difference equation. **8 Hrs.**
- 4) **Numerical Solutions of Ordinary Differential Equations (ODE's):** Numerical solution of ODE's of first order and first degree- Taylor's series method, Modified Euler's method. Runge –Kutta method of fourth order, Milne's predictor and corrector method (No derivations of formulae). Problems. **7 Hrs.**
- 5) **Numerical Solution of Second Order ODE's:** Runge-Kutta method and Milne's predictor and Corrector method. (No derivations of formulae).
Calculus of Variations: Variation of function and functional, variational problems, Euler's equation (without proof), Geodesics(plane), hanging chain problems. **8 Hrs.**

Text Books:

- 1) B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
- 2) E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. (Reprint).2016.
- 3) Srimanta Pal et al: Engineering Mathematics, Oxford University Press, 3rd Edition, 2016.

Reference Books:

- 1) C. Ray Wylie, Louis C. Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
- 2) S. S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, 4th Edition 2010.
- 3) B. V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
- 4) N. P. Bali and Manish Goyal : A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2014.
- 5) Veerarajan T., "Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
- 6) Thomas G.B. and Finney R.L."Calculus and Analytical Geometry" 9th Edition, Pearson, 2012.

Web links and Video Lectures:

<http://nptel.ac.in/courses.php?disciplineID=111>.

[http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs)).

<http://academicearth.org/>.

VTU EDUSAT PROGRAMME – 20.

18UCVC300**Building Construction****(4-0-0)4****Contact Hours: 52**

Course Learning Objective (CLOs): In this course, topics on introduction and exposure to traditional and modern building materials, types of soils and foundations, brick/stone masonry, floorings, stairs, roofs, building services and cost effective construction techniques are covered. Two topics viz. plastering & painting and doors & windows are included for the self study by students. The delivery of the topics is achieved through lecture classes and preparation of working drawings for building components and for building services.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)														
		Substantial Level (3)					Moderate Level (2)					Slight Level (1)				
CO-1	Explain the traditional / modern/ cost effective building materials.											1, 7				
CO-2	Identify different types of foundations and their suitability based on soil and other conditions.											1				
CO-3	Define the technical terms related to masonry works and can differentiate between different types of brick and stone walls.											1				
CO-4	Identify different types of flooring/roofing materials and different types of floors/roofs and their suitability											1				
CO-5	Define different components of stairs and do the geometric design of different types of stairs											1				
CO-6	Identify different materials used for Plastering, pointing & painting and methods of carrying out the same											1				
CO-7	Identify different types of Doors and windows and their suitability											1				
POs→		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level		2						2								

Course contents:

- 1) **Building materials:** Bricks, stones, timber and modern building materials. **06Hrs.**
- 2) **Types of foundation:** Masonry footings, isolated footings, Combined and strap RCC footings, Raft footing, Pile foundations. (Friction and Load bearing piles), Foundation in black cotton soils. **07 Hrs.**
- 3) **Brick Masonry:** Definition of terms used in masonry, English and Flemish Bond, Reinforced brickwork, Hollow Block, introduction to Damp Proof construction, Classification and Stability of arches. **07 Hrs.**
- 4) **Stone Masonry:** Types: Rubble Masonry, Coursed Rubble Masonry, Uncoursed rubble masonry, Random rubble masonry, Ashlar Masonry; Comparison of stone & brick masonry. **07 Hrs.**
- 5) **Floorings:** Types of floorings, materials and method of laying of granolithic, mosaic, ceramic, marble, polished granite and industrial flooring. **06 Hrs.**
- 6) **Staircase:** Classification and types, technical terms, requirements of a good stair, geometric design of stairs. **06 Hrs.**
- 7) **Roofs and roofing systems:** RCC and tiled roofing systems, Lean-to-roof, trusses (King post and queen post truss), steel trusses for various spans, roof coverings. **06 Hrs.**
- 8) **Building services:** Water supply & sanitation and electrification **03 Hrs.**
- 9) **Introduction to cost effective construction:** Materials and methods of construction; Green buildings. **04 Hrs.**

Self-study:

- 1) **Plastering, pointing & painting:** Introduction to plastering and pointing, terminologies used, methods of plastering, defects in plasters, characteristics of an ideal paint, constituents, classification and types of paints.
- 2) **Doors and windows:** Introduction, definition of terms, locations, types and sizes, fixtures and fastenings.

Class Teacher Evaluation:

Students shall draw the building components and building services to suitable scale on drawing sheets.

CTE: The above sheets will be evaluated for 10 marks.

Reference books:

- 1) Sushil Kumar, "Building Construction", Standard Publishers, New Delhi.
- 2) Punmia B.C., "Building Construction", Laxmi Publication (P) Ltd., New Delhi.
- 3) Duggal S. K. "Building Materials", New Age Publishers, New Delhi.
- 4) Jha and Sinha, "Building Materials", Khanna Publishers.

18UCVC301

Mechanics of Materials

(4-0-0) 4

Contact Hours: 52

Course Learning Objective (CLOs): In this course, topics on Simple stresses and strains, Compound stresses, BMD and SFD for determinate beams, bending and shear stresses in beams, deflection of beams, Torsion of circular shafts, stability of columns and thin and thick cylinders are dealt.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)														
		Substantial Level (3)					Moderate Level (2)					Slight Level(1)				
CO-1	Analyse and calculate simple stresses and strains, Elastic constants, Thermal stresses and Compound stresses	1,2														
CO-2	Analyse and calculate Bending Moments, Shear Forces, Bending Stresses, Shear Stresses and Deflection of beams	1,2														
CO-3	Analyse and calculate stresses and strains in circular shafts subjected to torsion and thin and thick cylinders subjected to internal pressures.	1,2														
CO-4	Analyse and calculate the elastic stability of long columns by Euler's theory and Rankine's theory.	1,2														
POs→		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level		3	3													

Prerequisites:

Students taking this course shall have the knowledge of following:

- 1) Engineering Mechanics

Course contents:

- 1) Simple Stresses & Strains, Elastic constants, Compound bars, thermal stresses. **10 Hrs.**
- 2) Compound stresses, Mohr's circle of stresses **08 Hrs.**
- 3) BMD & SFD for determinate beams. **05 Hrs.**
- 4) Bending & shear stresses in beams. **08 Hrs.**
- 5) Slopes and deflections of determinate beams by double integration method and Macaulay's method. **06 Hrs.**
- 6) Torsion of circular shafts, power transmitted, and comparison of hollow & solid shafts. **06 Hrs.**
- 7) Elastic stability of Columns, Euler's theory, Rankine's formula. **05 Hrs.**
- 8) Analysis of Thin and Thick Cylinders, **04 Hrs.**

Reference books:

- 1) Punmia B.C., Ashok Jain, Arun Jain, "Strength of Materials", Lakshmi Publications, New Delhi.
- 2) Basavarajaiah and Mahadevappa, "Strength of Materials", Khanna Publishers, New Delhi
- 3) Bhavikatti S.S., "Strength of Materials", Vikas Publishers, New Delhi.
- 4) Ramamrutham, "Strength of Materials", Dhanapath Rai Publishers, New Delhi.

18UCVC302**Fluid Mechanics****(3-0-0)3****Contact Hours: 39**

Course Learning Objective (CLOs): In this course, topics on Fluid Mechanics development, Properties of fluid, Fluid Pressure and its measurement, Hydrostatics, Kinematics of fluids, Dynamics of fluid flow, Flow through open channels and Flow measurement. The delivery of topics will be made through lecture classes, demonstration.

Course Outcomes (COs):

ID	Description of the Course Outcome:															Mapping to POs (1,12)/ PSOs (13,15)		
	At the end of the course the student will be able to:															Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum																1	
CO-2	Measure pressures using different types of pressure measuring devices																1	
CO-3	Compute and solve problems on hydrostatics, including practical applications															2		1
CO-4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications															2		1
CO-5	Compute the discharge through pipes and over notches and weirs															2		1
CO-6	Understand behavior of pipes under different types of flow closure conditions															2		1
POs →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Mapping Level	1.33	3																

Prerequisites:

Students taking this course shall have the knowledge of following:

- 1) Physics,
- 2) Mathematics
- 3) Engineering Mechanics

1. Fluids & Their Properties: Concept of fluid, Systems of units and dimensions. Properties of fluid; Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension & Capillarity. Fluid as a continuum, Newton's law of viscosity (theory & problems). Capillary rise in a vertical tube and between two plane surfaces (theory & problems). Vapor pressure of liquid, saturation vapor pressure,

- compressibility and bulk modulus, pressure inside a water droplet, pressure inside a soap bubble and liquid jet. Numerical problems. **6 Hrs**
- 2. Fluid Pressure and Its Measurements:** Definition of pressure, Pressure at a point, Pascal's law, Hydrostatic law; Variation of pressure with depth. Types of pressure; atmospheric, gauge and vacuum pressure. Measurement of pressure using simple, differential & inclined manometers (theory & problems). Introduction to Mechanical and electronic pressure measuring devices. **6 Hrs**
- 3. Hydrostatics:** Definition, Total pressure, centre of pressure, total pressure on horizontal, vertical and inclined plane surface, total pressure on curved surfaces. **5 Hrs**
- 4. Fluid Dynamics:** Introduction. Forces acting on fluid in motion. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Modified Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses). Vortex motion; forced vortex, free vortex, problems. Momentum equation and problems on pipe bends. Applications: Introduction to Venturimeter, Orificemeter, Pitot tube. Numerical Problems. **7 Hrs**
- 5. Flow measurements:** Orifice and Mouthpiece: Introduction, classification, flow through orifice, hydraulic coefficients and Numerical problems. Mouthpiece, classification, Borda's Mouthpiece (No problems). Notches and Weirs: Introduction. Classification, discharge over rectangular, triangular, trapezoidal notches, Cippoletti notch, broad crested weirs. Numerical problems. **6 Hrs**
- 6. Flow through Pipes:** Introduction. Major and minor losses in pipe flow. DarcyWeisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe-problems. Minor losses in pipe flow, equation for head loss due to sudden expansion. Numerical problems. Hydraulic gradient line, energy gradient line. **7 Hrs**
- 7. Surge Analysis in Pipes:** Water hammer in pipes, equations for pressure rise due to gradual valve closure and sudden closure for rigid and elastic pipes. Problems **2 Hrs**

Reference books:

- 1) Modi P.N and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, Delhi.
- 2) Dr Bansal R.K., "Fluid Mechanics and Hydraulic Machines", Lakshmi publications.
- 3) Dr Jain A.K., "Fluid Mechanics", Khanna Publishers, Delhi
- 4) Subramanya K., 1000 Solved Problems in Fluid Mechanics, Tata McGraw Hill Publishers, New Delhi.

18UCVC303

Surveying

(4-0-0)4

Contact Hours: 52

Course Learning Objective (CLOs):The course deals with topics on measurement of distances, angles and elevations. The usage of instruments like chains, tapes, dumpy level and theodolite are dealt with. The delivery of topics will be made through lecture classes and demonstrations.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
		Substantia l Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Understand principles of surveying, differentiate between map & plans and read toposheets			1
CO-2	Measure distances and angles by direct and indirect methods using chain and theodolite	5, 15	1	
CO-3	Understand and apply techniques of levelling and determine elevations to generate contour maps	5,15	1, 4	
CO-4	Measure areas and volumes of civil engineering works		1	
CO-5	Design different types of curves based on suitability & setout the same on field	5, 15	1	
CO-6	Understand & apply methods of setting out of works for buildings		1, 15	
CO-7	Measure distances, angle and elevations using tangential methods and tacheometry	5, 15	1	
CO-8	Use modern surveying equipments like GPS and TS and to generate contour maps using appropriate software	5	1	

POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level	1.875			2	3										2.8

Prerequisites:

Students taking this course shall have the knowledge of following:

- 1) Trigonometry and geometry

Course contents:

- 1) **Introduction:** Definition of Surveying, Classification of Surveys, Units of Measurements, Maps and plans, Survey of India Topographical Maps and their numbering, Basic principles of surveying. **02 Hrs.**
- 2) **Measurement of horizontal distances:** Chains and Tapes, Ranging of lines -Direct and Indirect. **02 Hrs.**
- 3) **Levelling:** Principles and basic definitions, Fundamental axes and part of a dumpy level, Temporary adjustments of a dumpy level, Types of levelling **08 Hrs.**
- 4) **Contouring:** Contours, characteristics and uses. **02Hrs.**
- 5) **Areas and Volumes:** Computations of areas and volumes by trapezoidal and prismoidal methods. **04 Hrs.**
- 6) **Theodolite Survey:** Types of theodolites, Measurement of horizontal and vertical angles **04 Hrs.**
- 7) **Trigonometric Levelling:** Determination of heights and distances. **06 Hrs.**
- 8) **Tacheometry:** Principles of tacheometry, measurement of heights and distances. **08 Hrs.**
- 9) **Curve Setting:** Setting out of horizontal, vertical and transition curves. **12 Hrs.**
- 10) **Construction Survey:** Setting out of works for buildings **02 Hrs.**
- 11) **Modern surveying instruments:** GPS and Total station **02 Hrs.**

Reference books:

- 1) Punmia B.C., "Surveying Vol- 1& 2", Laxmi Publications.
- 2) Chandra A.M., "Plane Surveying Vol-I", New Age International Ltd.
- 3) Agor R., "Text Book of Advanced Surveying", Khanna Publishers, Delhi.
- 4) Kanetkar T.P., Kulkarni S.V., "Surveying and Levelling Vol. No 1 & 2", PuneVidyarthiGrahaPrakashana.

18UCVC304 Concrete Technology (3-0-0) 3

Contact Hours: 39

Course Learning Objective (CLOs): In this course, topics on ingredients of concrete, manufacture of concrete, properties of fresh and hardened concrete, special concrete, non-destructive testing of concrete and concrete mix design

are dealt. The delivery of topics will be made through lecture classes and demonstration.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)													
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)											
CO-1	Understand the properties of different types of cement and aggregates	3	1	6, 7											
CO-2	Understand the manufacturing of concrete		1	6, 7											
CO-3	Understand the properties of concrete in fresh and hardened state	1	2												
CO-4	Identify special types of concrete for specific purpose of works		7												
CO-5	Design economic mix proportion for different exposure conditions and illustrate nondestructive testing	4													
POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level	2.33	2	3	1		1	1.33								

Prerequisites:

Students taking this course shall have the knowledge of following:

1. Engineering Chemistry

Course contents:

1) Ingredients of concrete:

Cement: Chemical composition, hydration of cement, classification and types of cement, tests on cement.

Aggregate: Classification, mechanical and physical properties, deleterious materials, soundness, alkali-aggregate reaction, grading of aggregate, tests on aggregate, artificial and recycled aggregates.

Water: Quality of Water, mixing water, curing water.

08 Hrs.

2) Manufacture of concrete: Batching, mixing, transporting, placing, compaction, finishing, curing.

04 Hrs.

3) Properties of fresh concrete: Workability, Factors affecting workability, segregation and bleeding, harshness, measurement of workability, admixture, plasticizers, accelerators, retarders and air entraining agents.

06 Hrs.

4) **Properties of hardened concrete:** Unit weight, strength characteristics, impermeability, durability, dimensional changes. **05 Hrs.**

5) **Special concretes:**

Light weight concrete, polymer concrete, ready mix concrete, high strength/performance concrete, pumped concrete, self-compacting concrete. **05 Hrs.**

6) **Non-destructive testing of concrete:** Importance, methods-Rebound hammer test, penetration and pullout test, Ultrasonic pulse velocity test-Principles, applications and limitations. **04Hrs.**

7) **Concrete Mix design:** Concept of Mix design, variables in proportioning, Exposure conditions, Procedure of mix design as per IS 10262-2009, numerical examples of mix design with and without mineral admixtures. **07Hrs.**

Reference books:

1. Shetty M.S., "Concrete Technology" -Theory and Practice, S. Chand and company, New Delhi.
2. Neville A.M. & Brooks J.J., "Concrete Technology", Tans-Atlantic Publications, Philadelphia, USA.
3. Gambhir M.L., "Concrete Technology", Tata McGraw Hill, Education, New Delhi.
4. IS 10262: 2009, "Recommended guidelines for concrete mix design", BIS publication, New Delhi.
5. All relevant IS codes.

18UCVL305 Basic Material Testing Laboratory (0-0-3)1.5

Contact Hours: 36

Course Learning Objective (CLOs):In this course various test on steel, aggregates cement, bricks, concrete blocks, timber, tiles are dealt. The delivery of topics will be made through instruction classes, demonstration and laboratory work.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
		Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Test on metals: Interpretation of results, determination of	15	9	

	hardness based on numbers and classification of steel.														
CO-2	Test on fine aggregate: Suitability of aggregates based on test results.	15	9												
CO-3	Test on Coarse aggregate: Suitability of aggregates based on test results.	15	9												
CO-4	Test on Cement: Interpretation of results and Identification of grade of cement.	15	9												
CO-5	Tests on Bricks: Interpretation of results and classification based on strength.	15	9												
CO-6	Test on concrete blocks: Interpretation of results and classification based on grade of concrete	15	9												
POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level									2						3

Course Contents

- 1) **Tests on steel & metals:** Unit weight, Tension, shear, Hardness and Impact.
- 2) **Tests on fine aggregate:** Specific gravity, Bulk density, Bulking, Silt and deleterious materials.
- 3) **Tests on Coarse aggregate:** Specific gravity, Bulk density, water absorption, Impact and crushing strength.
- 4) **Tests on Cement:** Specific gravity, Fineness, Density, Normal Consistency, Initial and Final setting time, soundness, Compressive strength.
- 5) **Tests on Bricks:** Size, water absorption, Compression strength,
- 6) **Tests on concrete blocks:** solid, hollow block and interlocking pavers- Size, water absorption, Compression strength.

Reference books:

Duggal S.K, “Materials Testing Laboratory Manual”, Tata McGraw Hill Publishers, New Delhi.

18UCVL306 Surveying Practice Laboratory (0-0-3)1.5

Contact Hours: 36

Course Learning Objective (CLOs):In this course Measurement of distances, angles, heights, elevations and contouring are dealt. The delivery of topics will be made through instruction classes, demonstration and Laboratory work.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)														
		Substantial Level (3)			Moderate Level (2)			Slight Level(1)								
CO-1	Measure horizontal distance by direct ranging & setout perpendiculars using various instruments	5, 15														
CO-2	Determine elevations of points	5, 15														
CO-3	Determine horizontal and vertical angles	5, 15														
CO-4	Determine heights and distances of objects by single and double plane methods using theodolite and total station	5, 15														
CO-5	Employ various methods to set out simple curve by different methods	5, 15														
CO-6	Conduct cadastral survey and prepare maps (features and contours).	5, 15														
CO-7	Verify the plumb of tall vertical structures	5, 15														
CO-8	Setout Civil Engineering works on the field.	5, 15														
POs →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Mapping Level					3										3	

Course Contents:

- 1) Chain survey: To measure distance between two points using direct ranging, indirect ranging and to set out perpendiculars.
- 2) Levelling: To determine difference in elevation between two points and to conduct fly back levelling; profile levelling.
- 3) Theodolite surveying: Measurement of horizontal angles by the method of repetition and reiteration using theodolite/total station. Measurement of vertical angles using theodolite/total station.
- 4) Trigonometric levelling: To determine heights and distances by single plane and double plane method
- 5) Curve setting: To set out simple curves using linear methods, - perpendicular offsets from long chord and offsets from chords produced and Rankine's method.
- 6) Total station survey: Open land survey for the determination of areas and plotting the features.
 - a) Cadastral survey and plotting.
 - b) Heights and distances.
 - c) Checking of plumb of towers/chimneys.
 - d) Setting out of civil works.

IV SEMESTER

18UMAC400

Engineering Mathematics-IV

(3-0-0) 3

Contact Hours: 39

Course Learning Objectives (CLOs): To provide an insight into applications of conformal mapping, integration of complex functions and application of probability distributions in Engineering.

Course Outcomes (Cos):

COs	Description of the course outcomes: At the end of course the students will be able to	Mapping to POs (1-12)		
		Mastering 3	Moderate 2	Introductory 1
CO-1	Construct and use the concepts of analytic function to solve the problems arising in Engineering field.			1
CO-2	Utilize conformal transformation and complex integral to transform irregular domain onto a relatively simple domain.		1	
CO-3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.		1	
CO-4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.		1,2	
CO-5	Estimate the correlation, covariance using joint probability distributions. Also use student's t-distribution, Chi-square distribution as a test of goodness of fit.		1,2	

POs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mapping Level	1.8	2														

Contents:

- 1) **Calculus of complex functions:** Review of function of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms. Construction of analytic functions: Milne-Thomson method-Problems. **7 Hrs.**
- 2) **Conformal transformations:** Introduction. Discussion of transformations: $w = e^z$; $w = z^2$, $w = z + \frac{1}{z}$, $z \neq 0$). Bilinear transformations- Problems. Complex integration: Line integral of a complex function, Cauchy's theorem and Cauchy's Integral theorem. **8 Hrs.**
- 3) **Probability Distributions:** Review of basic probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial, Poisson, exponential and normal distributions- problems (No derivation for mean and standard deviation)-Illustrative examples. **8 Hrs.**
- 4) **Statistical Methods:** Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation-problems. Regression analysis- lines of regression-problems.
Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form $y = ax + b$; $y = ax^2 + bx + c$; $y = ax^b$. **8 Hrs.**
- 5) **Joint probability distribution:** Joint Probability distribution for two discrete random variables, expectation and covariance.
Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit. **8 Hrs.**

Text Books:

- 1) E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint) 2016.
- 2) B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
- 3) Srimanta Pal et al: Engineering Mathematics, Oxford University Press, 3rd Edition, 2016.

CO-3	Calculate the internal forces of arches and cables.	1,2		3											
CO-4	Calculate and sketch the bending moment and shear force in the beam under moving load using ILD.	1,2		3											
CO-5	Analyze the indeterminate beams by consistent deformation method and Clapeyron's theorem of three moments.	1,2		3											
POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level	3	3	1												

Prerequisites:

Students taking this course shall have the knowledge of following:

- 1) Engineering Mechanics
- 2) Strength of Materials

Course content:

- 1) **Structural systems:** Forms of structures, conditions of equilibrium, degree of freedom, linear and non-linear structures, one, two and three dimensional structural systems, determinate and indeterminate structures [Static and Kinematics]. **03 Hrs.**
- 2) **Deflection of beams:** Moment area method, conjugate beam method. **09 Hrs.**
- 3) **Strain energy:** Strain energy and complimentary strain energy, strain energy due to axial load, bending and shear, theorem of minimum potential energy, Law of conservation of energy, principle of virtual work, the first theorem of Castigliano, Betti's law, Clarke -Maxwell's theorem of reciprocal deflection, deflection of beams and trusses using strain energy and unit load methods. **10 Hrs.**
- 4) **Arches and cables:** Three hinged circular and parabolic arches with supports at same levels and different levels, determination of thrust, shear

and bending moment, analysis of cables under point loads and UDL, length of cables supports at same level and at different levels. **10 Hrs.**

5) Influence line diagrams for beams and trusses: Influence line for maximum shear force, maximum bending moment for rolling loads. **10 Hrs.**

6) Analysis of beams: Consistent deformation method -propped cantilever and fixed beams, strain energy method -propped cantilever and fixed beams Clapeyron's theorem of three moments -continuous beams. **10 Hrs.**

Reference books:

- 1) Reddy C. S., "Basic Structural Analysis", Tata McGraw Hill.
- 2) Punmia B.C., Jain A.K., "Strength of Materials and Theory of Structures Vol I & II", Laxmi Publication
- 3) Ramamrutham S., "Theory of Structures"; DhanpalRai& Sons, Delhi.
- 4) Bhavikatti S.S., "Structural Analysis Volume-I", Vikas Publications, New Delhi.

18UCVC401 Highway Engineering (4-0-0) 4

Contact Hours: 52

Course Learning Objective (CLOs): In which the basic knowledge of Highway alignment, design of pavement imparted to the students. Topics covered include the Highway Planning and alignment, geometric design, pavement design, highway economics, pavement maintenance and highway drainage along with numerical problems. The delivery of the topics is achieved through lecture classes, problem solving and demonstrations.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1,12)/ PSOs (13,15)		
		Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Prioritize of the road link by a standard method			1
CO-2	Calculate sight distance required for driver for safe movement and overtaking		2	1

3. Traffic Engineering: Introduction, traffic survey **2 Hrs**
4. Design Principles: Highway geometric design: Importance cross sectional elements, width of carriage way, camber, shoulder width, design speed, sight distances, design of horizontal and vertical alignment, problems on above. **10 Hrs**
5. Pavement Design: Types of pavements, design factors, determination of ESWL and EWL factors and problems, IRC method of flexible pavement design based on CSA method, stresses in rigid pavement and design as per IRC (IRC 37: 2001 and IRC 58: 2002) only. Design of joints, Tie bars, dowel bars, Temperature reinforcement. **8 Hrs**
6. Pavement Construction: Construction procedure of WBM, WMM, Bituminous and concrete roads, quality control measures. **7 Hrs.**
7. Highway Economics and Financing: Highway user benefits - VOC using charts only — Highway costs — Economic analysis by annual cost method and benefit cost ratio method. Highway financing -BOT and BOOT concepts **08 hrs.**
8. Pavement Maintenance: Functional & Structural deterioration of pavements, principles of pavement evaluation, types pavement failures, cases, maintenance measures for road drainage & system & pavements. **06 hrs.**
9. Highway Drainage: Subsurface drainage system for road pavements, types, functions and basic design principles. **04 hrs.**

Reference Books:

- 1) Khanna S.K. and Justo C E G., "Highway Engineering", Nemchand and Bros, Roorkee.
- 2) Kadiyali L.R., "Traffic Engineering And Transport Planning", Khanna Publishers, New Delhi.
- 3) Subramanyam K.P., "Transportation Engineering-I", Scitech Publications, Chennai.

18UCVC402**Water Supply Engineering****(4-0-0) 4****Contact Hours: 52**

Course Learning Objective (CLOs): In this program, basic knowledge of drinking water, its requirement, effects on health & utility, source finding, its quality and quantity, transportation of raw water to the treatment plant, water treatment as per IS codes & design of distribution system are dealt. The delivery of topics will be made through lecture classes, demonstrations and field visits. The delivery of topics will be made through lecture classes.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1,12)/ PSOs (13,15)		
		Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Characterize the sources of drinking water with respect to quantity and quality.		3,12	
CO-2	Estimate the quantity of water required by computing water demand and population forecast for a given city.	3	4,12	
CO-3	Design a system for transporting water from the source to the treatment plant and then to the consumers.		3,4	
CO-4	List and describe the quality parameters of water and their effects on health and other materials.		3,4	
CO-5	Design a system to produce potable water through conventional and special treatment processes.	11		
CO-6	Explain the function of various pipe appurtenances, pipe layouts and analyze flow through pipe mains.		5	

Pos→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mapping Level			2.25	2	2						3	2			

Prerequisites:

Students taking this course shall have the knowledge of following:

- 1) Engineering Chemistry

Course content:

1) Introduction: Human activities and environmental pollution, requirement of water for various beneficial uses, need for protected water supply. **02 Hrs.**

2) Demand of Water: Types of water demands, domestic demand in detail, institutional and commercial, public uses, fire demand, per capita consumption, factors affecting Per capita demand, population forecasting, different methods with merits and demerits, variations in demand of water, Fire demand, Estimation by Kuichling's formula, Freeman formula and National Board of Fire under Writer's formula. Peak factor, design periods and factors governing the design period. **08 Hrs.**

3) Quality of water, (IS: 3025 and IS: 1622)by analytical & Instrumental techniques of Water: Objectives of water quality management, concept of safe water, wholesomeness, palatability and potability, water born diseases, sampling of water for examination, physical, chemical and microbiological examination. Drinking water standards - BIS & WHO. Significance of fluorides, nitrates and heavy metals like mercury and cadmium on human health. **06 Hrs.**

4) Sources: Surface and subsurface sources, suitability with regard to quality and quantity. **03 Hrs.**

5) Collection and Conveyance of Water: Intake structures, different types of intakes; factor of selection and location of intakes, pumps, necessity, types, power of pumps; factors for the selection of a pump, pipes, design of the economical diameter for the rising main; Nomograms, use, pipe appurtenances. **04 Hrs.**

6) Water Treatment: Objectives of treatment, aeration, principles, types of aerators, sedimentation-theory, settling tanks, types, design, sedimentation with coagulants, dosages, chemical feeding, flash mixing, flocculators, filtration, mechanism, theory of filtration, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design, back washing, disinfection, methods of disinfection, chlorination, chlorine demand, residual chlorine, use of bleaching powder, minor methods of treatment. **12 Hrs.**

7) Miscellaneous treatment: Removal of color, odor, taste with methods like aeration, use of copper sulfate, activated carbon treatment, removal of iron and manganese, fluoridation and de-fluoridation. Treatment of swimming pool water, softening process. **08 Hrs.**

8) Methods of Distribution Systems: System of supply, service reservoirs and their capacity determination, methods of layout distribution, Hardy cross method. **06 Hrs.**

9) Miscellaneous: Pipe appurtenances, valves, fire hydrants, pipe fittings, layout of water supply pipes in buildings. **03 Hrs.**

Reference books:

- 1) Garg S.K., "Water supply Engineering", Khanna Publishers.
- 2) Punmia B.C. and Ashok Jain, "Environmental Engineering", standard book house.
- 3) Hammer and Hammer, "Water and Waste Water Technology", PHI, New Delhi.
- 4) Howard S. Peavy, Donald R. Rowe, George Techno BanoGlous, "Environmental Engineering", McGraw Hill.

18UCVC403 Building Planning & Drawing (2-0-2)3

Contact Hours: 39

Course Learning Objective (CLOs): In this course, topics on architectural planning and design of residential and public buildings following the principles of planning and regular rules of setback are dealt. The delivering of topics will be made through lecture classes and drawing sessions.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
		Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Architecturally plan and design small independent / row houses following principles of planning.	3	2	1

CO-2	Understand planning and architectural design of public buildings.						3	2					1				
	POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Mapping Level	1	2	3														

Prerequisite:

1) Building Construction

Course content:

- 1) **Introduction to planning and architectural design:** Principles of planning, zoning regulations, building bye laws. **04 Hrs.**
- 2) **Planning and designing:** Planning and architectural design of residential buildings following principles of planning for load bearing and framed structure for ground floor and ground plus one floor only. **25 Hrs.**
- 3) **Planning and designing of public buildings**
 - i) Primary health centre, ii) Primary school building, iii) College Canteen
 - iv) Office building (Plan and elevation only). **10 Hrs.**

Note: Scheme of evaluation: 3 IAs of 1 ½ hour duration each (best of two) 40 marks. The drawing sheets prepared during the drawing sessions will be evaluated for 10 marks. The semester end examination is of 3hour duration.

Drawings to be prepared: Residential buildings - Three sheets, public buildings - four sheets.

Reference books :

Tata McGraw Hill Publishing Co. Ltd. Sushil Kumar “Building Construction”, National Building Code, BIS. Lakshmi Publications, New Delhi.

18UCVC404 Hydraulic and Hydraulic Machines (3-0-0)3

ContactHours: 39

Course learning objectives (CLOs):In this course, topics on dimensional analysis & model testing, open channel flow design of economical sections, energy concepts of fluid in open channel, the working principles of the hydraulic machines like turbines and pumps are dealt with. The delivering of topics will be made through lecture classes.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1,12)/ PSOs (13,15)		
		Substantial Level (3)	Moderate Level (2)	Slight Level(1)
CO-1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters.	1,2		
CO-2	Design the open channels of various cross sections including economical channel sections, Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation and Compute water surface profiles at different conditions.	1,2		
CO-3	Calculate forces acting on different type of plates for different conditions	1,2		
CO-4	Draw velocity triangles and understand working principles of different types turbines and to know their operation	1,2		

	characteristics under different operating conditions.															
CO-5	Understand working principles of reaction and reciprocating pumps and calculate different types of efficiencies.						1,2									
POs→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Mapping Level	3	3														

Contents:

- 1. Dimensional analysis and similitude:** Dimensional homogeneity, Non Dimensional parameter, Rayleigh methods and Buckingham Pi theorem, dimensional analysis, choice of variables, examples on various applications. Model analysis: Model analysis, similitude, types of similarities, force ratios, similarity laws, model classification, Reynold’s model, Froude’s model, Euler’s Model, Webber’s model, Mach’s model, scale effects, Distorted models. Numerical problems on Reynold’s, and Froude’s Model. **10 Hrs**
- 2. Open Channel Flow:** Uniform Flow; Introduction, Classification of flow through channels, Chezy’s and Manning’s equation for flow through open channel, most economical channel sections and Uniform flow through Open channels. Specific Energy and Specific energy curve, Critical flow and corresponding critical parameters, Metering flumes. Non-Uniform Flow: Suddenly varied flow; Hydraulic Jump, Expressions for conjugate depths and Energy loss. Gradually varied flow equation, Back water curve and afflux, Description of water curves or profiles, mild, steep, critical, horizontal and adverse slope profiles, Control sections. **14 Hrs**

Impact of jet on vanes: Introduction, Impulse-Momentum equation. Direct impact of a jet on a stationary and moving curved vanes, Introduction to concept of velocity triangles, impact of jet on a series of curved vanes-Problems. **6 Hrs**
- 3. Turbines – Impulse Turbines:** Introduction to turbines, General lay out of a hydroelectric plant, Heads and Efficiencies, classification of turbines. Pelton

wheel components, working principle and velocity triangles. Maximum power, efficiency, working proportions. Reaction Turbines: Radial flow reaction turbines: (i) Francis turbine Descriptions, working proportions and design. (ii) Kaplan turbine- Descriptions, working proportions and design. Draft tube theory and unit quantities. **6 Hrs**

4. **Pumps:** Components and Working of centrifugal pumps, Types of centrifugal pumps, Work done by the impeller, Heads and Efficiencies, Minimum starting speed of centrifugal pump, Numerical problems, Multi-stage pumps. Working of different types of reciprocating pumps. **3 Hrs**

Reference books

1. P N Modi and S M Seth, "Hydraulics and Fluid Mechanics, including Hydraulic Machines", 20th edition, 2015, Standard Book House, New Delhi
2. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi
3. S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, New Delhi
4. K Subramanya "Open Channel Hydraulics", Tata McGraw Hill Publishing Co. Ltd.
5. K Subramanya, "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Publishing Co. Ltd.

18UCVL405**Fluid Mechanics Laboratory****(0-0-3)1.5****Contact Hours: 36**

Course learning objectives (CLOs):In this course, use flow measuring devices as per the requirements, Estimate major and minor losses in pipe and pipe fittings, calibration of triangular and trapezoidal notches. Calibration of venturimeter, determination of friction losses in pipe, determination of minor losses, determination of hydraulic coefficients for orifices and mouthpieces, calibration of broad crested weir and ogee weir, calibration of venturiflume, hydraulic jump experiments. The delivery of topics will be made through demonstration and Laboratory work.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs(1,12)/ PSOs (13,15)														
		Substantial Level (3)					Moderate Level (2)					Slight Level(1)				
CO-1	Estimate major and minor losses in pipe.						15					9				
CO-2	Perform analysis on triangular, rectangular and trapezoidal notches.						15					9				
CO-3	Examine Bernoulli's theorem						15					9				
CO-4	Analysis of broad crested weir and ogee weir						15					9				
CO-5	Perform analysis on venturimeter and venturiflume.						15					9				
CO-6	To find hydraulic jump						15					9				
Pos→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Mapping Level									1						2	

Course Content:

- 1) Use of flow measuring devices.
- 2) Estimate major and minor losses in pipe and pipe fittings.
- 3) Calibration of triangular, rectangular and trapezoidal notches.
- 4) Calibration of Venturimeter.
- 5) Determination of friction losses in pipe.
- 6) Determination of hydraulic coefficients for orifices and mouthpieces (external cylindrical only).
- 7) Calibration of broad crested weir and ogee weir.
- 8) Calibration of Venturiflume.
- 9) Study of Hydraulic jump.

18UCVL406

Engineering Geology Laboratory

(0-1-1)1.5

Contact Hours: 36

Course Learning Objective (CLOs): In this course, topics like finding width and thickness of the rock beds using their geometry and attitude for quarry, and estimation of quantity (volume) of the rocks, their quality including mineral composition for various construction activities, understand the subsurface geological conditions from bore hole data, preparation of geological maps, evaluation of the site for various projects like dam, tunnel, water harvesting, road projects etc by studying geological cross section.

The delivery of topics will be made through instruction classes, demonstration and Laboratory work.

Course Outcomes (COs):

ID	Description of the Course Outcome: At the end of the course the student will be able to:							Mapping to POs (1,12)/ PSOs (13,15)							
								Substantial Level (3)		Moderate Level (2)		Slight Level(1)			
CO-1	Evaluate the engineering properties of rocks based on their mineral composition, structure and texture									1					
CO-2	Understand the structural aspects of rocks and their influence on engineering projects including geological investigations.									1					
CO-3	Identify the rocks, estimate the thickness of the strata; and study the geological maps with respect to civil engineering structures.									1,15					
POs→	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-13	PSO-14	PSO-15
Mapping Level	2														2

Part A (Tutorial)

10 Hours

1. Rock as construction material: Qualitative evaluation of engineering properties of rocks for facing, decorative works, foundation, architectural works; ballast, road aggregates - based on mineral composition, structure, and texture; evaluation of sedimentary, igneous, metamorphic rocks, their availability based on mode of occurrence. **4 hours**
2. Structural aspects of rocks like Dip and strike, Folds, Faults, Joints, Unconformities and their influence on Engineering Projects/structures like dams and tunnels. Slope treatment; ground improvement. **4 hours**
3. Geological investigations of sites for dams, reservoirs and tunnels. **2 hours**

Part B (Laboratory)

10 Hours

1. Identification of rocks based on their geological properties. Igneous, Sedimentary, Metamorphic.
2. Thickness of strata, and areal exposure for artificial recharge structure.
3. Dip and strike problems for minimum depth of cutting.
4. Study and interpretation of standard structural geological maps with respect to Civil Engineering structures like road, dam, tunnel and rain water harvesting and artificial recharge.
5. Thickness of strata and depth of soil cover by electricity resistivity method.

18UCVL407

Introductory Project

(0-0-2)1

Contact Hours: 24

Course Learning Objectives (CLOs): Introductory Project is introduced as a course to provide exposure to students to identify simple societal problems, conduct relevant literature review, identify the required data and formulate the methodology. It also helps them to find and use appropriate tool to obtain the solution and prepare a report based on the work carried out.

Course Outcomes (COs):

Description of the Outcome: Upon completion of the course, the student will be able to:		Mapping to POs (1-12) / PSOs (13,14)		
		Level 3 Substantial	Level 2 Moderate	Level 1 Slight
CO-1	Identify a socially/ technically relevant problem and formulate a problem statement.		2	6, 7

CO-2	Carry out literature review in the relevant field.	2	6, 7	11
CO-3	Identify the suitable data required to carry out the project.	1, 3, 12	9, 10, 13	
CO-4	Formulate the methodology.	9	12	
CO-5	Prepare a report based on the work carried out.	5, 9	12, 13	

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mapping levels	3	2.5	3	-	3	1.5	1.5	-	2.67	2	1	2.3	2	-

SDM College of Engineering & Technology, Dharwad**Odd Semester 2019-20****Academic Calendar for UG Programmes**

Sl. No.	Particulars	Date
1	Registration	27-07-2019 to 31-07-2019
2	Induction program for First Semester (Tentative)	01-08-2019 to 14-08-2019
3	Teaching Commences for odd semester except I Sem	01-08-2019
4	Last date for registration with late fee	06-08-2019
5	Teaching Commences for I semester	16-08-2019
6	Display of attendance	16-09-2019
7	Internal Assessment – IA- I	18-09-2019 to 20-09-2019
8	Communication of performance to the parents	26-09-2019
9	Last date to drop the course	27-09-2019
10	Display of attendance	02-11-2019
11	Internal Assessment –IA- II	04-11-2019 to 06-11-2019
12	Students Feedback	11-11-2019 to 15-11-2019
13	Communication of performance to the parents	13-11-2019
14	Last date to withdraw the course	13-11-2019
15	Teacher – Parents Meet	16-11-2019
16	Internal Assessment –IA- III	27-11-2019 to 29-11-2019
17	Last day of teaching for Odd Semester	30-11-2019
18	Final Lab Assessments	03-12-2019 to 10-12-2019
19	Display of consolidated Continuous Internal Evaluation (CIE) & Attendance	05-12-2019
20	Communication of performance to the parents	05-12-2019
21	Semester End Examination	13-12-2019 to 27-12-2019
22	Inter Semester Recess	28-12-2019 to 12-01-2020
23	Declaration of Results	09-01-2020
24	Communication of performance to the parents by putting on website	10-01-2020
25	Makeup SEE for odd semesters	11-01-2020 to 18-01-2020
Commencement of Even Semester :		13-01-2020

Dean (Academic Program)**PRINCIPAL**

**Academic Calendar (Tentative) for Even Semester 2019-20
B.E. & M.Tech**

Sl. No.	Particulars	Date
1	Registration	09-01-2020 to 11-01-2020
2	Commencement of Teaching	13-01-2020
3	Last date for registration with late fee	18-01-2020
4	Display of attendance	18-02-2020
5	Internal Assessment – IA- I	24-02-2020 to 26-02-2020
6	Communication of performance to the parents	03-03-2020
7	Last date to drop the course	04-03-2020
8	Parents Meet	14-03-2020
9	Insignia – 2020	20-03-2020 & 21-03-2020
10	Display of attendance	30-03-2020
11	Internal Assessment – IA- II	01-04-2020 to 03-04-2020
12	Last date to withdraw the course	08-04-2020
13	Communication of performance to the parents	11-04-2020
14	Feedback by Students	20-04-2020 to 25-04-2020
15	Internal Assessment –IA- III	04-05-2020 to 06-05-2020
16	Last day of teaching for Even Semester	06-05-2020
17	Final Lab Assessments	09-05-2020 to 20-05-2020
18	Display of consolidated Continuous Internal Evaluation (CIE) marks & Attendance for 8 th semester	09-05-2020
19	Semester End Examination for 8 th semester	11-05-2020 to 19-05-2020
20	Display of consolidated CIE marks & Attendance for 2 nd , 4 th & 6 th semesters (Both for UG & PG)	13-05-2020
21	Communication of performance to the parents	14-05-2020
22	Project exam for 8 th semester	21-05-2020 to 26-05-2020
23	Semester End Examination for 2 nd , 4 th & 6 th semesters (Both for UG & PG)	22-05-2020 to 05-06-2020
24	Results for 8 th semester	30-05-2020
25	Summer vacation	06-06-2020 to 31-07-2020
26	Announcement of Results for 2 nd , 4 th & 6 th semester (Both for UG & PG)	12-06-2020

Supplementary Semester: 12-06-2020 to 27-07-2020

Commencement of next Academic Year 2020 - 21: 01-08-2020

Dean (Academic Program)

PRINCIPAL

Supplementary Semester Calendar for B.E./M.Tech/MBA – 2020

Sl. No.	Particulars	VII & VIII Sem (B.E.)	I to VI Sem (B.E.), M.Tech & MBA
1	Registration	01-06-2020 to 03-06-2020	06-06-2020 to 08-06-2020
2	Teaching Commences	01-06-2020	12-06-2020
3	Registration with special permission by Principal	04-06-2020	12-06-2020
4	Internal Assessment (IA) – I	13-06-2020 & 15-06-2020	24-06-2020 & 25-06-2020
5	Internal Assessment (IA) – II	25-06-2020 & 26-06-2020	03-07-2020 & 04-07-2020
6	Internal Assessment (IA) – III	10-07-2020 & 11-07-2020	13-07-2020 & 14-07-2020
7	Display of consolidated Continuous Internal Evaluation (CIE) marks & Attendance	13-07-2020	16-07-2020
8	Supplementary SEE	14-07-2020 to 17-07-2020	18-07-2020 to 23-07-2020
9	Declaration of results	22-07-2020	27-07-2020

Dean (Academic Program)**PRINCIPAL**

Notes: