ESTD. 1939

KARNATAK LAW SOCIETY'S
GOGTE INSTITUTE OF TECHNOLOGY
"JNANA GANGA" UDYAMBAG, BELAGAVI-590008,
KARNATAKA, INDIA.
Approved by AICTE & UGC
Permanently Affiliated and Autonomous Institution Under
Visvesvaraya Technological University, Belagavi
www.git.edu

ESTD. 1979

2018-19 Scheme

Department: CIVIL ENGINEERING

Programme: B.E. (CIVIL ENGINEERING)

3rd to 8th Semester Scheme of Teaching and Examination

3rd and 4th Semester Syllabus

INSTITUTION VISION

Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity

and entrepreneurial skills.

MISSION

To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

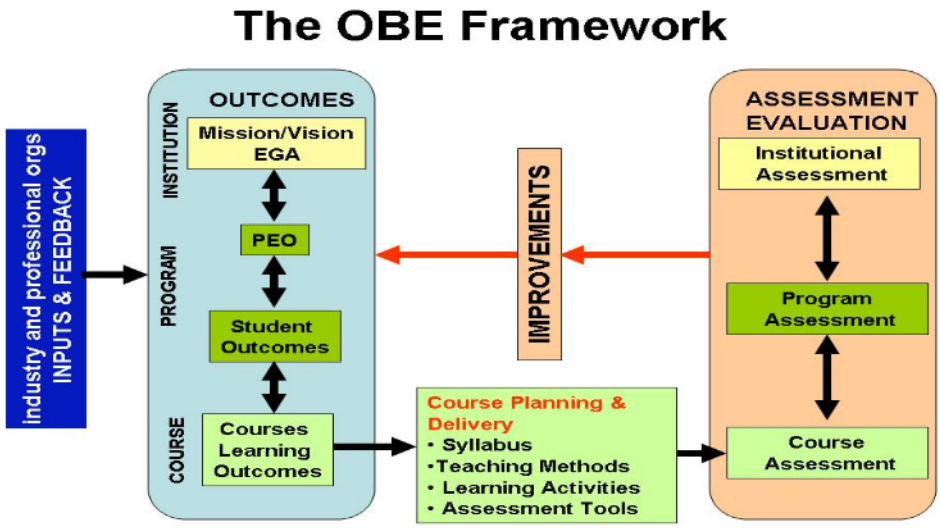
QUALITY POLICY

- Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment.
- Fostering cultural, ethical, moral and social values in the human resources of the institution.
- Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

DEPARTMENT VISION
Imparting futuristic technical education with high degree professionalism in endeavour to attain global standards to make students technologically competent and ethically strong to ensure better quality of life

MISSION
Contributing to the country's infrastructure endeavour by encouraging creativity in civil engineering aspirants and educating them with up to date knowledge, strong leadership skills and commitment to the society.

OUTCOME BASED EDUCATION (OBE)



PROGRAM OUTCOMES (POs):

National Board of Accreditation (NBA) has framed the Program Outcomes (PO) based on twelve Graduate Attributes (GA). These POs are generic to engineering education and applies to all branches of Engineering.

1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

1. The graduates shall acquire core competence in basic science and civil engineering.

2. The graduates shall constantly pursue the professional growth with multidisciplinary outlook.

3. The graduates shall work with high professionalism and ethical standards.

4. Graduates shall be responsive to societal needs for sustainable development.

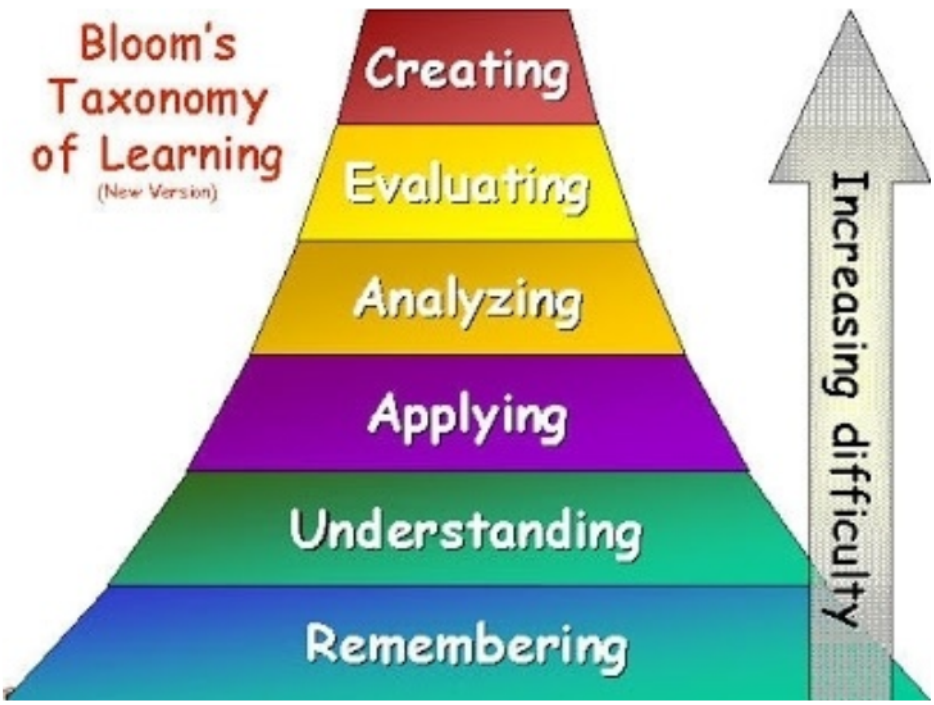
PROGRAM SPECIFIC OUTCOMES (PSOs):

1. Understanding and applying the mathematical and scientific concepts for analytical and design skills concerned with civil engineering practice.
2. Inculcating communicational skills, and leadership attributes towards the team work. Developing critical thinking abilities with competence in use of computational tools for current research.
3. Sensitizing towards contemporary issues, societal needs with professionalism and ethics for sustainable development.

BLOOM'S TAXONOMY OF LEARNING OBJECTIVES

Bloom's Taxonomy in its various forms represents the process of learning. It was developed in 1956 by Benjamin Bloom and modified during the 1990's by a new group of cognitive psychologists, led by Lorin Anderson (a former student of Bloom's) to make it relevant to the 21st century. The **revised taxonomy** given below emphasizes what a learner "Can Do".

Lower Order Thinking Skills (LOTS)		
L1	Remembering	Retrieve relevant knowledge from memory.
L2	Understanding	Construct meaning from instructional material, including oral, written, and graphic communication.
L3	Applying	Carry out or use a procedure in a given situation – using learned knowledge.
Higher Order Thinking Skills (HOTS)		
L4	Analyzing	Break down knowledge into its components and determine the relationships of the components to one another and then how they relate to an overall structure or task.
L5	Evaluating	Make judgments based on criteria and standards, using previously learned knowledge.
L6	Creating	Combining or reorganizing elements to form a coherent or functional whole or into a new pattern, structure or idea.



Scheme of Teaching and Examination- 3rd to 8th Semester B.E.

As per the guidelines of UGC CBCS the courses can be classified into:

(i) Core Courses (PC): This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study. These courses will have 4 credits per course.

(ii) Foundation Courses: The Foundation Courses are of two kinds:

Compulsory Foundation: These courses are the courses based upon the content that leads to Knowledge enhancement. These courses provide opportunities to improve technological knowledge before entering industry as well as preparing students for higher degrees in technological subjects. They are mandatory for all disciplines. These courses will have 4 credits per course.

The courses are: **Basic Science Courses (BS), Engineering Science Courses (ES)**.

Foundation Electives: These are value-based courses aimed at man making education. The course is related to **Humanities and Social Science Courses (HS).**

(iii) Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills.

An elective may be **Discipline Centric (PE)** or **Open Elective (OE).**

(iv) Mandatory Non-Credit Courses (MNC): These courses are mandatory for students joining B.E Program and students have to successfully complete these courses before the completion of degree.

Semester wise distribution of credits for B.E program

Total credits for B.E Program: 175 credits

		Regular batch		Dip. Lateral entry	
	Semester	**Credits per Sem**	**Total credits**	**Credits per Sem**	**Total credits**
1st year	1	20	40	----	----
	2	20		----	
2nd year	3	24	48	24	48
	4	24		24	
3rd year	5	24	48	24	48
	6	24		24	
4th year	7	23	39	23	39
	8	16		16	
	Total	**175**	**175**	**135**	**135**

Credit definition:

Lecture (L): One Hour /week – 1 credit
Tutorial (T): Two hour /week – 1 credit
Practicals (P): Two hours /week – 1 credit;

Scheme of Teaching and Examination

3rd to 8th Semester B.E.

Third Semester (Regular)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/ week**	**Total credits**	**Marks**		
				L – T -P			**CIE**	**SEE**	**Total**
1.	18MATCV31	Statistical-Numerical – Fourier Techniques	BS	3 –2 – 0	4	4	50	50	100
2.	18CV32	Fluid Mechanics	PC	3 –2 – 0	5	4	50	50	100
3.	18CV33	Strength of Materials	PC	3 –2 – 0	5	4	50	50	100
4.	18CV34	Building Materials and Concrete Technology	PC	3 – 0 – 0	3	3	50	50	100
5.	18CV35	Surveying and Geomatics	PC	2– 2 – 0	4	3	50	50	100
6.	18CVL36	Building Planning and Drawing	PC	2– 0 – 2	4	3	50	50	100
7.	18CVL37	Strength of Materials Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
8.	18CVL38	Surveying Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
9.	18CV39	Kannada	HS	1- 0 - 0	1	MNC	25	-	25
		Total				**24**	**375**	**350**	**725**

Fourth Semester (Regular)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18MATCV41	Engineering Mathematics - IV	BS	4 – 0 – 0	4	4	50	50	100
2.	18CV42	Water Supply Engineering	PC	4 – 0 – 0	4	4	50	50	100
3.	18CV43	Highway Engineering	PC	3– 0 – 0	3	3	50	50	100
4.	18CV44	Analysis of Determinate Structures	PC	3 –2 – 0	5	4	50	50	100
5.	18CV45	Hydraulics and Hydraulic Machines	PC	3 –2 – 0	5	4	50	50	100
6.	18CVL46	Surveying and Geomatics Laboratory	PC	1 – 0 – 2	3	2.0	25	25	50
7.	18CVL47	Hydraulics and Hydraulic Machines Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
8.	18CVL48	Concrete & Highway Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
9.	18CV49	Environmental Studies	HS	2-0-0	2	MNC	25	-	25
		Total				**24**	**350**	**325**	**675**

 # MNC: Mandatory Non-credit course. Pass in this course is mandatory for the award of degree.

Third Semester (Diploma)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18DMATCV31	Engineering Mathematics -I	BS	4 – 0 – 0	4	4	50	50	100
2.	18CV32	Fluid Mechanics	PC	3 –2 – 0	5	4	50	50	100
3.	18CV33	Strength of Materials	PC	3 –2 – 0	5	4	50	50	100
4.	18CV34	Building Materials and Concrete Technology	PC	3 – 0 – 0	3	3	50	50	100
5.	18CV35	Surveying and Geomatics	PC	2– 2 – 0	4	3	50	50	100
6.	18CVL36	Building Planning and Drawing	PC	2– 0 – 2	4	3	50	50	100
7.	18CVL37	Strength of Materials Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
8.	18CVL38	Surveying Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
9.	18CV39	Kannada	HS	1 – 0 – 0	1	MNC	25	-	25
		Total				**24**	**375**	**350**	**725**

Fourth Semester (Diploma)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/ week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18DMATCV41	Engineering Mathematics -II	BS	4 – 0 – 0	4	4	50	50	100
2.	18CV42	Water Supply Engineering	PC	4 – 0 – 0	4	4	50	50	100
3.	18CV43	Highway Engg.	PC	3– 0 – 0	3	3	50	50	100
4.	18CV44	Analysis of Determinate Structures	PC	3 –2 – 0	5	4	50	50	100
5.	18CV45	Hydraulics and Hydraulic Machines	PC	3 –2 – 0	5	4	50	50	100
6.	18CVL46	Surveying and Geomatics Laboratory	PC	1 – 0 – 2	3	2.0	25	25	50
7.	18CVL47	Hydraulics and Hydraulic Machines Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
8.	18CVL48	Concrete & Highway Laboratory	PC	0 – 0 – 3	3	1.5	25	25	50
9.	18CV49	Environmental Studies	HS	2-0-0	2	MNC	25	-	25
		Total				**24**	**350**	**325**	**675**

Fifth Semester (Regular)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18CV51	Hydrology and Irrigation Engineering	PC	4-0-0	4	4	50	50	100
2..	18CV52	Soil Mechanics	PC	2-2-0	4	3	50	50	100
3..	18CV53	Analysis of Indeterminate Structures	PC	2-2-0	4	3	50	50	100
4.	18CV54	Design of RCC Structural Elements	PC	2-2-0	4	3	50	50	100
5.	18CV55X	Professional Elective-I	PE	3-0-0	3	3	50	50	100
6.	18CV56X	Open Elective - I	OE	3-0-0	3	3	50	50	100
7.	18CVL57	Environmental Engineering Laboratory	PC	1-0-2	3	2.0	25	25	50
8.	18CVL58	Design & Drawing of Hydraulic Structures	PC	2-0-2	4	3.0	50	50	100
		Total				**24**	**375**	**375**	**750**

Fifth Semester (Diploma)									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18DMATCV51	Mathematics –III**	BS	4-0-0	4	4	50	50	100
2.	18CV52	Soil Mechanics	PC	2-2-0	4	3	50	50	100
3.	18CV53	Analysis of Indeterminate Structures	PC	2-2-0	4	3	50	50	100
4.	18CV54	Design of RCC Structural Elements	PC	2-2-0	4	3	50	50	100
5.	18CV55X	Professional Elective-I	PE	3-0-0	3	3	50	50	100
6.	18CV56X	Open Elective - I	OE	3-0-0	3	3	50	50	100
7.	18CVL57	Environmental Engineering Laboratory	PC	1-0-2	3	2.0	25	25	50
8.	18CVL58	Design & Drawing of Hydraulic Structures	PC	2-0-2	4	3.0	50	50	100
9.	18CV59	Communicative English		HS	MNC	--	MNC	--	---
10.	18CV51A	Hydrology and Irrigation Engineering		4-0-0	4	MNC	50	--	50
		Total				**24**	**425**	**375**	**800**

**** One Course of 4 credits exempted in 5th sem for Diploma lateral entry students to maintain the same credits as regular.**

Sixth Semester									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T -P			**CIE**	**SEE**	**Total**
1.	18CV61	Geotechnical Engineering	PC	3-2-0	5	4	50	50	100
2.	18CV62	Design of Steel Structures	PC	3-2-0	5	4	50	50	100
3.	18CV63	RCC Design and Drawing	PC	2-0-2	4	3	50	50	100
4.	18CV64X	Professional Elective-II	PE	3-0-0	3	3	50	50	100
5.	18CV65X	Professional Elective-III	PE	3-0-0	3	3	50	50	100
6.	18CV66X	**Open Elective – II (Other branch only)**	OE	3-0-0	3	3	50	50	100
7.	18CVL67	Extensive Survey Project	PC	0-0-3	3	1.5	25	25	50
8.	18CVL68	Geotechnical Laboratory	PC	0-0-3	3	1.5	25	25	50
9.	18CV69	Constitution of India, PE and HV	HS	1-0-0	1	1	25	25	50
		Total				**24**	**375**	**375**	**750**

Seventh Semester									
Sl. No.	**Course Code**	**Course**		**Contact Hours**	**Total Contact Hours/week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18CV71	Construction Management	HS	2-2-0	4	3	50	50	100
2.	18CV72	Quantity Surveying and Valuation	PC	2-2-0	4	3	50	50	100
3.	18CV73	Design of Pre-stressed Concrete Structures	PC	2-2-0	4	3	50	50	100
4.	18CV74X	Professional Elective-IV	PE	3-0-0	3	3	50	50	100
5.	18CV75X	Professional Elective-V	PE	3-0-0	3	3	50	50	100
6.	18CV76X	**Open Elective – III (Other Branch only)**	OE	3-0-0	3	3	50	50	100
7.	18CVL77	Structural Steel Design and Drawing	PC	2-0-2	4	3	50	50	100
8.	18CVL78	Software Application Laboratory	PC	0-0-1	2	1	25	25	50
9.	18CV79	**Seminar on Project synopsis (Design Thinking Approach) Project Phase -1**	**PC**	0-0-2	2	1	25	--	25
		Total				**23**	**400**	**375**	**775**

Project Phase -1: CIE- 25 marks (Average of 25 marks –Internal guide and 25 marks-presentation)

Eight Semester									
Sl. No.	**Code**	**Course Title**		**Contact Hours**	**Total Contact Hours/ week**	**Total credits**	**Marks**		
				L – T - P			**CIE**	**SEE**	**Total**
1.	18CV81	Internship	PC			2	50	--	50
2.	18CV82	Intellectual Property Rights	HS	Self Study		1	50	50	100
3.	18CV83	Professional Certification – 1 (English / any other foreign language)	HS			1	25	--	25
4.	18CV84	Professional Certification - 2	PC			1	25	--	25
5.	18CV85	Project Phase -2	PC			2	50(25+25)	--	50
6.	18CV86	Project Phase -3	PC			4	50(25+25)	--	50
7.	18CV87	Project Phase-4 (Final Viva Voce)	PC	Final		5	--	100	100
						16	**250**	**150**	**400**

Internship: 6 to 8 weeks duration

Project Phase -2 and 3: CIE- 50 marks (25 marks –Internal guide + 25 marks- presentation)

LIST OF ELECTIVES

Professional Elective –I (V Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Theory of Elasticity	18CV551
2	Open Channel Hydraulics	18CV552
3	Railways, Airports and Harbours	18CV553
4	Wastewater Engineering	18CV554
5	Alternative Building Materials	18CV555

(Open) Elective-I (V Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Remote Sensing & GIS	18CV561
2	Environmental Impact Assessment	18CV562
3	Road Safety	18CV563

Professional Elective –II (VI Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Matrix Method of Structural Analysis	18CV641
2	Ground Water Hydrology	18CV642
3	Highway Geometric Design	18CV643
4	Solid Waste Management	18CV644
5	Ground Improvement Techniques	18CV645
6	Advanced Concrete Technology	18CV646

Professional Elective –III (VI Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Design of RCC Bridges	18CV651
2	Hydraulic Analysis and Design of Water Distribution Networks	18CV652
3	Traffic Engineering	18CV654
4	Air Pollution & Control	18CV655
5	Advanced RCC Design	18CV656

LIST OF ELECTIVES

Open Elective –II (VI Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Optimization Techniques	18CV661
2	Occupational Health & Safety	18CV662
3	Numerical Methods	18CV663

Professional Elective –IV (VII Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Structural Dynamics	18CV741
2	Water Resources Engineering & Management	18CV742
3	Pavement Materials and Construction	18CV743
4	Industrial Wastewater Treatment	18CV744
5	Reinforced Earth Structures	18CV745

Professional Elective –V (VII Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Earthquake Resistant Structures	18CV751
2	Principles of River Hydraulics	18CV752
3	Pavement Design	18CV753
4	Disaster Management	18CV754
5	Advanced Foundation Design	18CV755

Open Elective –III (VII Semester)		
Sl. No.	**Subject**	**Subject Code**
1	Energy & Environment	18CV761
2	Finite Element Analysis	18CV762
3	Research Methodology	18CV763

SEMESTER III

STATISTICAL – NUMERICAL – FOURIER TECHNIQUES
(COMMON TO ALL BRANCHES)

Course Code	18MATCV31	Credits	04
Course type	BS	CIE Marks	50 marks
Hours/week: L-T-P	4-0-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLO's)

1. Learn Numerical methods to solve Algebraic, Transcendental and Ordinary Differential Equations.
2. Understand the concept of Fourier series and apply when needed.
3. Get acquainted with Fourier Transforms and its properties.
4. Study the concept of Random variables and its applications.
5. Get acquainted with Joint Probability Distribution and Stochastic processes.

Pre-requisites:

1.Basic Differentiation and Integration
2. Basic Probability
3. Basic Statistics

UNIT I — 10 Hours

Numerical solution of Algebraic and Transcendental equations:
Method of False position, Newton- Raphson method (with derivation), Fixed point iteration method (without derivation).
Numerical solution of Ordinary differential equations: Taylor's Series method, Euler and Modified Euler method, Fourth order Runge–Kutta method

UNIT II — 10 Hours

Fourier Series: Periodic functions. Dirichlet's conditions, Fourier series, Half range Fourier sine and cosine series. Practical examples, Harmonic analysis.

UNIT III — 10 Hours

Fourier Transforms: Infinite Fourier Transform and Properties. Fourier Sine and Cosine Transforms Properties and Problems.

UNIT IV — 10 Hours

Probability: Random Variables (RV), Discrete and Continuous Random variables, (DRV, CRV) Probability Distribution Functions (PDF) and Cumulative Distribution Functions (CDF), Expectations (Mean, Variance). Binomial, Poisson, Exponential and Normal Distributions. Practical examples.

UNIT V — 10 Hours

Joint PDF and Stochastic Processes: Discrete Joint PDF, Conditional Joint PDF, Expectations (Mean, Variance and Covariance). Definition and classification of stochastic processes. Discrete state and discrete parameter stochastic process, Unique fixed probability vector, Regular Stochastic Matrix, Transition probability, Markov chain.

Text Books

1 B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
2. Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th Edition, 2006.
3. B. V. Ramana- Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.

Reference Books:

1. P.N. Wartikar & J. N. Wartikar– Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994.
2 Peter V. O' Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
3 Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.

Course Outcome (COs)

	At the end of the course, the student will be able to	**Bloom's Level**
1.	**Use** Numerical methods and **Solve** Algebraic, Transcendental and Ordinary differential equations.	**L2**
2.	**Develop** frequency bond series from time bond functions using Fourier series.	**L2**
3.	**Understand** Fourier Transforms and its properties.	**L2**
4.	**Understand** the concept of Random variables, PDF, CDF and its applications	**L2**
5.	**Extend** the basic probability concept to Joint Probability Distribution, Stochastic processes.	**L3**
6.	**Apply** Joint Probability Distribution, Stochastic processes to solve relevant problems.	**L3**

	Program Outcome of this course (POs)	**PO No.**
1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO1**
2.	Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural Sciences and Engineering sciences	**PO 2**
3.	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.	**PO 5**

Course delivery methods	**Assessment methods**
1. Black Board Teaching	1. Internal Assessment
2. Power Point Presentation	2. Assignment
3. **Scilab/Matlab/ R-Software/Geogebra**	3. Quiz

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments /MATLAB/SCILAB activity	Quiz/Seminar /Course project	Total Marks

Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

CALCULUS, FOURIER ANALYSIS AND LINEAR ALGEBRA

(ALL BRANCHES)

(DIPLOMA ONLY)

Course Code	**18DMATCV31**	**Credits**	**04**
Course type	**BS**	**CIE Marks**	**50 marks**
Hours/week: L-T-P	**4–0– 0**	**SEE Marks**	**50 marks**
Total Hours:	**50**	**SEE Duration**	**3 Hours for 100 marks**

Course Learning Objectives (CLO's)

1. Learn the concept of series expansion using Taylor's and Maclaurin's series and get acquainted with the polar curves and partial differentiation.
2. Learn Differential Equations of first order and higher order and apply them.
3. Get acquainted with Fourier transforms and its properties.
4. Learn numerical methods to solve algebraic, transcendental and ordinary differential equations.
5. Understand and interpret the system of equations and various solutions.

Pre-requisites:

1. Basic differentiation and integration
2. Trigonometry
3. Matrix and determinant operations
4. Vector algebra

UNIT I **10 Hours**

Differential Calculus: Taylor's and Maclaurin's theorems for function of one variable (statement only)-problems. Angle between polar curves.

Partial Differentiation: Definition and problems. Total differentiation- problems. Partial differentiation of composite functions- problems.

UNIT II **10 Hours**

Laplace Transforms: Definition, Laplace transforms of elementary functions. Laplace transforms of $e^{at}f(t)$, $t^n f(t)$, $\int_0^t f(t)\,dt$, $\frac{f(t)}{t}$ (without proof), Inverse Laplace transforms: Inverse Laplace transforms -problems, applications to solve linear differential equation.

UNIT III **10 Hours**

Fourier Analysis: Fourier Series: Fourier series, half range Fourier sine and cosine series. Practical examples. Harmonic analysis.

Fourier Transforms: Infinite Fourier transform and properties. Fourier sine and cosine transforms. Properties and problems.

UNIT IV **10 Hours**

Numerical Techniques: Numerical solution of algebraic and transcendental equations: Method of false position, Newton- Raphson method, fixed point iteration method (without derivation).

Numerical solution of ordinary differential equations: Taylor's series method, Euler and

modified Euler method, fourth order Runge-Kutta method (without derivation).

UNIT V **10 Hours**

Linear Algebra: Rank of a matrix by elementary transformation, solution of system of linear equations-Gauss elimination method and Gauss-Seidal method. Eigen value and eigen vectors – Rayleigh's Power method.

Text Books:

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012 and onwards.
2. Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th Edition, 2006 and onwards.
3. B. V. Ramana - Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.

Reference Books:

1. P. N. Wartikar & J. N. Wartikar – Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994 and onwards.
2. Peter V. O' Neil –Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011 and onwards.
3. Glyn James –Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010 and onwards.

Course Outcome (COs)

	At the end of the course, the student will be able to	Bloom's Level
1.	**Develop** the Taylors and Maclaurins series using derivative concept.	**L1, L2**
2.	**Demonstrate** the concept and use of Partial Differentiation in various problems.	**L1, L2**
3.	**Classify** Laplace transforms of various categories and **apply** them to solve relevant problems**.**	**L1, L3**
4.	**Develop** frequency bond series from time bond functions using Fourier series.	**L3**
5.	**Use** numerical methods and **Solve** algebraic, transcendental and ordinary differential equations	**L1, L2**
6.	**Interpret** the various solutions of system of equations and **Solve them.**	**L2**

	Program Outcome (POs)	PO No.
1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2.	Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural Sciences and Engineering. Sciences	**PO 2**
3.	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.	**PO 5**

Course delivery methods	Assessment methods
1. Black board teaching	1. Internal Assessment Tests
2. Power point presentation	2. Assignments
3. Scilab/ Matlab/ R-Software	3. Quizzes

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments /MATLAB/SCILAB activity	Quiz/Seminar /Course project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks.
3. Question paper will have 10 questions carrying 20 marks each. Student

FLUID MECHANICS

Course Code	18CV32	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-2-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLO's)

1.	Describe the properties of fluids, apply the concepts to solve related problems on Newtonian fluids and analyse problems related to fluid at rest including practical applications.
21.	Illustrate the basic concepts of pressure and its measurements and demonstrate the principles of mathematics to represent kinematic concepts related to fluid flow.
31.	Apply the concept of conservation of mass, conservation of linear momentum, Bernoulli's principle for practical application and outline the various methods of flow measurements
41.	Outline the concepts of dynamics of fluid flow in pipes and evaluate the effects of water hammer.
5	Describe the concept of Dimensional analysis and model studies and apply to practical problems.

Pre-requisites:

1. Engineering Mechanics

UNIT I — **10 Hours**

Basic properties of fluids

Introduction, Definition of fluid, Systems of units, properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Vapour pressure, Bulk modulus of Elasticity and Compressibility, Surface tension and Capillarity.

Case Study: Problems on practical applications of Viscosity, Surface tension and Capillarity.

Pressure and its measurement

Definition of pressure, Variation of pressure in a fluid, Pressure at a point, Pascal's law, Types of pressure – Atmospheric pressure, Absolute pressure, Gauge and Vacuum pressure.

Measurement of pressure using simple, differential and inclined manometers (theory and problems).

Case Study: Problems on practical applications of Simple manometers.

Self-learning topics: NIL

UNIT II — **10 Hours**

Hydrostatic pressure on surfaces

Total pressure and centre of pressure, total pressure on plane surfaces- horizontal, vertical and inclined surfaces, Pressure diagram, Total pressure on curved surfaces and problems

Kinematics of flow

Introduction, methods of describing fluid motion, types of fluid flow, streamline, path line, stream tube. Three dimensional, two dimensional and one-dimensional continuity equations in Cartesian Coordinates (derivation and problems). Velocity and acceleration of fluid particles, Velocity potential and Stream function- problems.

Case Study: Discussion of flownet in earthen dams.

Self-learning topics: NIL

UNIT III — **10 Hours**

Dynamics of fluid flow

Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline,

Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Field applications of Bernoulli's equation (with and without losses). Introduction to Kinetic energy correction factor. Concept of momentum equation for pipe bends.

Discharge measurements

Introduction, Venturimeter, Orificemeter, Pitot tube, Venturiflume, Triangular notch, Rectangular notch, Cipolletti notch, Ogee weir, Broad crested weir, Small orifices- Problems, Mouthpiece

Self-learning topics: NIL

UNIT IV	**10 Hours**

Pipe flow

Introduction, losses in pipe flow, Darcy-Weisbach equation for head loss due to friction in a pipe. Minor losses in pipe flow, equation for head loss due to sudden expansion and sudden contraction- problems. Hydraulic gradient and Energy gradient.

Case Study: Problems on pipes in series and pipes in parallel, equivalent pipe.

Water hammer

Water hammer in pipes, equation for pressure rises due to gradual valve closure and sudden closure for rigid and elastic pipes and field problems.

Self-Learning topics: Hydraulic gradient and Energy gradient

UNIT V	**10 Hours**

Dimensional analysis

Introduction, Dimensions, Dimensional Homogeneity of an equation. Analysis- Rayleigh's method,

Buckingham's Π theorem- problems

Model studies

Model Studies, Similitude – Types of similarity, Non-dimensional numbers: Problems on Froude model law and Reynolds model law. Types of models: Undistorted and Distorted models, Problems. Scale effect.

Case Study: Applications of Model studies to Irrigation structures.

Self-Learning topics: NIL

Text Books:

1.	Modi P.N and Seth S. M., **"Hydraulics and Fluid Mechanics"**, Standard Book House-New Delhi. 2009 Edition.
2.	Rajput R, K., **"A Text Book of Fluid Mechanics & Hydraulic Machines"**-, S. Chand and Co, New Delhi, 2006 Edition.
3.	Bansal R. K., **"Text Book of Fluid Mechanics & Hydraulic Machines",** Laxmi Publications, New Delhi, 2008 Edition.
4.	Narayana Pillai N., "**Principles of Fluid Mechanics and Fluid Machines"**, Universities Press (India), Hyderabad, 2009 Edition.

References:

1.	Bruce R. Munson, Donald F. Young, Theodore H. Okiishi**, "Fundamentals of Fluid Mechanics"**, Wiley India, New Delhi, 2009 Edition.
2.	Edward J. Shaughnessy, Jr. Iram. Katz; James P. Schaffer**, "Introduction To Fluid Mechanics",** Oxford University Press, New Delhi, 2005 Edition.
3	Streeter Wylie, **"Fluid Mechanics"**, Bedford New Delhi, 2008 Edition.
4	Madan Mohan Das, **"Fluid Mechanics and Turbomachines",** PHI Learning Pvt. Limited, New Delhi. 2009 Edition
	E-resourses (https://nptel.ac.in/courses/105101082/#**)**

Course Outcome (COs)

	At the end of the course, students will be able to:	Bloom's Level
1	**Identify** the properties of fluid as a continuum	**L3**
2	**Solve** problems on hydrostatics, including practical applications	**L3, L5**
3	**Demonstrate** the principles of mathematics to represent kinematic concepts related to fluid flow	**L2**
4	**Apply** the fundamental laws of fluid mechanics - conservation of mass, conservation of linear momentum, & the Bernoulli's principle for practical application	**L3**
5	**Outline** and **Propose** the methods of flow measurements	**L2, L6**
6	**Apply** the concept of Dimensional analysis and model studies and **Solve** practical problems	**L3, L6**

	Program Outcome (POs)	PO No.
1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences	**PO 2**
3	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.	**PO 10**

	Course delivery methods		Assessment methods
1.	Lecture and Board	1.	Assignments and Open Book Assignments
2.	NPTEL/ Edusat	2.	Quizzes
3.	Power Point Presentation	3.	Internal Assessment Tests
4.	Videos	4.	Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

STRENGTH OF MATERIALS

Course Code	18CV33	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-2-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLO's)

1. Define stresses, strains and elastic constants and relationship between them.
2. Determine the shear force and bending moment in statically determinate beams.
3. Evaluate the bending stresses and shear stresses and plot the stress distribution diagrams.
4. Determine the slope and deflection for beams subjected to various loads.
5 Evaluate the buckling strength of columns and explain the concept of torsion.

Pre-requisites:

1. Engineering Mechanics

UNIT I — 10 Hours

Simple Stresses and Strains

Introduction to stresses and strains, Hooke's law, Elastic constants, Relationship among Elastic constants, Stress – Strain relationship for structural steel, volumetric strain, composite sections, thermal stresses, Compound stresses- general two-dimensional stress system, principal planes and stresses, Mohr's circle

Case Study- Study on stress—strain behavior of various ductile and brittle materials. Different grades of steel available in market.

Self-Learning topics: NIL

UNIT II — 10 Hours

Shear Force and Bending Moment in Beams

Shear Force and Bending Moment, Relationship between loading, shear force and bending moment, Plotting the SFD and BMD for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and applications to RC canopy and structures

Self-Learning topics: NIL

UNIT III — 10 Hours

Stresses in Beams

Theory of bending, Derivation of equation for bending, Bending stresses in beams, Modulus of Rupture, Section Modulus, Flexural Rigidity, bending stress distribution across the depth of beam in RC and steel structural elements.

Shear stresses in beams, Shear Stress distribution diagrams for rectangular, 'I' and 'T' sections in RC and Steel structural elements

Case study- Demonstration of RC beam under flexure.

UNIT IV **10 Hours**

Deflection of Beams

Equation for elastic curve, Slope and Deflection for prismatic beams (Simply supported, Overhanging and Cantilever beams) subjected to point loads, UDL and external moment in RC and Steel structural elements including canopy, IS code requirements for structures- using Double Integration method and Macaulay's method

Self-Learning topics: NIL

UNIT V **10 Hours**

Elastic Stability of Columns

Euler's theory for columns in RCC structures, Euler's buckling load for different end conditions, Effective length, Slenderness ratio, Rankine's formula.

Torsion of Circular Shafts

Assumptions, Derivation of torsion equation for circular shafts, Torsional Rigidity

Self-Learning topics: NIL

Text Books:

1. Timoshenko and Young, **"Elements of Strength of Materials",** Affiliated East-West Press
2. Beer and Johnston, **"Mechanics of Materials",** Tata McGraw Hill
3. Popov E. P., **"Mechanics of Solids",** Prentice Hall of India

References:

1. Basavarajaiah B. S., Mahadevappa P. **"Strength of Materials in SI Units**", University Press (India) Pvt. Ltd., 3rd Edition, 2010
2. James M. Gere, **"Mechanics of Materials",** Thomson Learning

E-resourses (https://nptel.ac.in/courses/105105108/
https://www.youtube.com/watch?v=IpMZNpWjsk4
https://www.youtube.com/watch?v=GkFgysZC4Vc&list=PL27C4A6AEA552F9E6 **)**

Course Outcomes (COs):

	At the end of the course, students will be able to:	**Bloom's Level**
1.	**Explain** the types of stresses, strains and elastic constants and relation among them	**L2**
2.	**Analyse** shear force, axial force and bending moment and draw SFD, AFD and BMD	**L3 L4**
3.	**Evaluate** the bending and shear stresses and plot the stress distribution Diagrams	**L3 L4**
4.	**Analyse** the beams subjected to various loads for Slope and Deflection	**L4**
5.	**Evaluate** the buckling strength of columns and explain the concept of torsion	**L3 L4**

Program Outcomes (POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 01**
2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	**PO 05**
3	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.	**PO 10**

Content Delivery/Assessments methods and Scheme of Evaluation

Course delivery methods	Assessment methods
1. Lecture and Board	1. Assignments and Open Book Assignment
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests
4. Videos	4. Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Course Code	18CV34	Credits	03
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-0-0	SEE Marks	50 marks
Total Hours:	40	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLO's)

1.	**To study** various properties of building materials.
2.	**To study** the properties of different types of cements, aggregates and chemical admixtures used for construction.
3.	**To examine** the properties of fresh and hardened concrete and illustrate non-destructive testing.
4.	**To illustrate** process of concreting, form work for concrete, Grunting, Shotcreting
5	**To illustrate** different types of advanced building materials and their uses in construction.

Pre-requisites: NIL

UNIT I — **08 Hours**

INTRODUCTION

Physical, chemical and engineering properties of building materials. Application of building materials.

Bricks: Types of bricks, manufacturing process of bricks, properties of bricks, Standard requirements and grades of bricks as per BIS.

Rocks and Stones: Classification of rocks, Rock products, Characteristics of stones – Structure, texture, strength, gravity, porosity, absorption, hardness, durability, weight. Standard requirement of building stone.

Timber: Types of timber, Uses and application of timber, Defects in timber and wood, Seasoning, Wood products with specific uses.

Self-Learning topics: Important stones used in construction with its suitability.

UNIT II — **08 Hours**

Cement: Manufacture of Portland cement, types of cement and its chemical composition, hydration of cement.

Aggregates: Classification of aggregates according to the source, aggregate size and shape, properties of aggregate.

Introduction to Chemical and Mineral admixtures: Super-plasticizers, Retarders, accelerators, air entraining admixtures, GGBFS, Fly ash, silica fume, metakaolin.

Case Study: 1) Field Tests on cement to determine the quality
2) Case studies on the production of mineral admixtures
3) Case study on the operation of quarry

Self-Learning topics: Methods of storing the cement

UNIT III **08 Hours**

Fresh concrete: Factors affecting fresh concrete properties.
Mix Design- Principles of mix design, grades of concrete, methods of proportioning, trial mixes, Design of concrete mixes using IS: 10262-2019, quality control. Mix Design of concrete with admixtures.

Self-Learning topics: Quality control

UNIT IV **08Hours**

Concreting operations
Process and manufacturing of concrete, Mixing, transporting, placing, compacting and finishing; Curing- methods of curing, cold-weather concreting, hot-weather concreting, pre-packed concrete, form work for concrete, Form work for concrete, Guniting, Shotcreting. Hardened concrete; Factors affecting the strength of hardened concrete

Case study: Visit to Ready Mix Concrete Plant**.**

Self-Learning topics: Non-destructive testing.

UNIT V **08 Hours**

Miscellaneous Construction Materials: Plastics and PVC, Ceramic products, Paints and Varnish, Materials for damp proofing, water proofing, Glass and fiber, Steel and iron materials, Materials used for false ceiling, Asbestos.

Self-Learning topics: Prepare a list of construction materials adopted in your residence.

Text Books:

1 Shetty M. S., **"Concrete Technology",** S. Chand and Company Ltd., Delhi, 1988
2 Neville A. M., **"Properties of Concrete",** Longman Scientific & Technical, England, 2000.
3 SanthaKumar A. R., **"Concrete Technology"**, Oxford University Press, New Delhi, 2007
4 D.N. Ghose, "Construction Materials ", TATA Mc Graw Hill Publications
5 S. K. Duggal.," Building materials", New Age International Publications

Reference Books:

1 Dr. Janardan Jha.," Engineering Materials", Khanna Publications
2 IS: 10262-2009, **"Recommended Guidelines for Concrete Mix Design"**, 2009
3 IS: 10262-2019, **"Recommended Guidelines for Concrete Mix Design"**, 2019

E-resourses
(https://www.youtube.com/watch?v=6ju8mig4VoU&list=PLbMVogVj5nJT6RXK4VKPGOfWHp2ZH8xin
https://www.youtube.com/watch?v=EIDXE28_8eQ&list=PL3xq-dxeLe6nspoZOPXrsZyrgm9axOxgX**)**

Course Outcome (COs)

	At the end of the course, the student will be able to	**Bloom's Level**
1.	**Describe** important properties of building materials used in civil engineering construction	**L2**
2.	**Select** appropriate rock /stone products for different uses in building construction	**L1**
3.	**Describe** timber and wood products and its uses in building construction	**L2**
4.	**Select** appropriate ingredients of proper quality for cement concrete as per required BIS codes	**L1**
5.	**Explain** different types of advanced building materials and their uses in construction.	**L2**

	Program Outcome (POs)	**PO No.**
1.		**PO1**

	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	
2.	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.	**PO3**
3	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations	**PO5**
4	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**PO8**
5	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.	**PO 10**

Course delivery methods	**Assessment methods**
1. Lecture and Board	1. Assignments and Open Book Assignments
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests
4. Videos	4. Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

SURVEYING AND GEOMATICS

Course Code	**18CV35**	**Credits**	**03**
Course type	**PC**	**CIE Marks**	**50 marks**
Hours/week: L-T-P	**2-2-0**	**SEE Marks**	**50 marks**
Total Hours:	**40**	**SEE Duration**	**3 Hours for 100 marks**
Course learning objectives			

1.	Explain the principles of surveying with linear and angular measurements and its applications.
2.	Illustrate the objective and working of modern surveying instruments and Compute the areas and volumes for civil engineering works.
3.	Explain the fundamentals of Trigonometric surveying and topographical map
4.	Design of simple curves and discuss the use of compound, reverse, vertical and transition curves.
5	Understand the applications of GIS and remote sensing in the civil engineering works.

Pre-requisites: NIL

UNIT I **08 Hours**

Introduction: Definition of surveying, Primary divisions of surveying, Basic principles of Surveying, Classification of surveying, Units of measurements, Precision and accuracy, Chain surveying, Ranging, Compass surveying, traversing.

Case Study: Identification of errors acquires in distance and direction measurements and its correction.

Fundamentals of Topographic Map: Types of Scale used, Latitude and Longitude, Map projection, Components of topographic map, Study of map numbering system by survey of India,

Case Study: Interpretation of Topographic maps and its uses in civil engineering works.

Self-Learning topics: Local attraction and elimination of errors

UNIT II **08 Hours**

Leveling: Definition, Objective, Temporary adjustment of dumpy level, Curvature and Refraction, Type of leveling- Differential leveling, Profile leveling, Cross sectioning, Fly leveling and Fly back leveling, Booking of levels - Rise and Fall method and Height of Instrument method-Numerical problems.

Case Study: Application of levelling in highway and water supply projects.

Contours: Contours and their characteristics, Direct and Indirect methods, Interpolation techniques, Uses of contours

Case Study: Proposal of economic alignment and plotting profile using contours

Self-Learning topics: NIL

UNIT III **08 Hours**

Theodolite: Parts of a theodolite, Fundamental lines and their desired relations, Temporary adjustments, Measurement of horizontal and vertical angles.

Trigonometric Surveying: Heights And Distances: Determination of height of (i) An accessible object and (ii) Inaccessible object- single plane and double plane methods

Case Study: Use of trigonometric surveying in modern instruments.

Total Station: Electronic Distance Measurement, Components of Total station, Temporary adjustments. File Manager, Measurement functions- Missing Line Measurement (MLM), Remote Distance Measurement (RDM), Area measurement and volume measurement, Remote elevation Measurement (REM), Setting out (Staking out) & Special functions. Uses of Total Station. A**dvantages of using total station over the conventional surveying instruments.**

Self-Learning topics: NIL

UNIT IV **08 Hours**

Curves: Simple Curves-Definition, Designation-Elements of curves, Setting out of simple curves -Linear methods-perpendicular offsets from long chord, chords produced method, Rankine's Method and Numerical problems, Compound Curves, Reverse Curve, Transition Curve and Vertical curve. **Design of Horizontal Curve for Highway and Railway Project.**

Areas and Volumes: Methods of determining area by Cross staff surveying, trapezoidal and Simpson rules, Determination of volume by prismoidal and trapezoidal formulae.
Case Study: Earth work calculation for highway and water supply project and preparation of worksheet on calculation of area and volume.

Self-Learning topics: Design of compound curves

UNIT V **08 Hours**

Geoinformatics: Introduction to Remote Sensing- Definition, working process and components. Introduction to GIS- Definition, Key Components, Functions, Data types, layer concepts, Introduction to aerial photogrammetry, Triangulation survey.
Case Study: Applications of GIS and Remote Sensing in Civil Engineering.
GPS and DGPS: Global Positioning system-GPS satellite systems, components of GPS, positioning and relative positioning with GPS. DGPS and its working principle. Applications of GPS and DGPS in civil engineering
Case study on various GPS satellite systems and its applications

Self-Learning topics: NIL

Text Books:

1. Punmia B. C., **"Surveying Vol–1"**, Laxmi Publications, New Delhi
2. B. C. Punmia, **"Surveying Vol 2 and Vol 3"-**, Laxmi Publications, Twelfth edition reprint, 2005
3. Subramanian R., **"Surveying and Leveling"**, Oxford University Press (2007)
4. Venkataramiah C., **"Text Book of Surveying"**, Universities Press.(2009 Reprint)
5 Rethaliya R. P, **"Surveying"**, Atul Prakashan, Gandhi road, Ahmadabad
6 Kanetkar T. P and Kulkarni S.V, **"Surveying and Levelling Part- I"**, Pune Vidyarthi Ghrih Prakasha
7 A.M. Chandra, **"Higher Surveying"**, New age international(P) Ltd., Revised second edition,2007
8 Satheesh Gopi, R. Sathikumar and N. Madhu- **"Advance Surveying"**- Pearson Education, India., Second edition, 2008.

References:

1. Milton O. Schimidt, **"Fundamentals of Surveying"**, Wong, Thomson Learning
2. Roy S. K., **"Fundamentals of Surveying"**, Prentice Hall of India
3 Duggal S. K., **"Surveying Vol. I"**, Tata McGraw Hill – Publishing Co. Ltd., New Delhi.
4 Milton O. Schimidt and Wong, **"Fundamentals of Surveying"**, CL-Engineering, ISBN 13: 9780534041618, 1985.
5 S.K. Roy, **"Fundamentals of Surveying"**, PHI Learning Pvt. Ltd., ISBN 8120341988, 9788120341982, 11-Oct-2010.
6 Arther Bannister et al., **"Surveying"**, Pearson Education, India., Seventh edition, 1998
7 Maps, Survey of India Publication
E-resourses
(https://www.youtube.com/watch?v=1JfPeQzA62g&list=PL20A0651466E8A776&index=4**)**

Course Outcome (COs)

	At the end of the course, students will be able to:	**Bloom's Level**
1.	**Apply** Basic principles of surveying and **Make use of** linear and angular instrument	**L1**
2.	**Distinguish** between source and types of errors present in surveying measurement and their significance.	**L3**
3.	**Make use of** leveling, trigonometric leveling, Curves in civil engineering	**L3**

work and **Estimate** quantity required.

4.	**Create** and **Interpret** Contours and topographic Map	**L2**
5.	**Demonstrate** applications of modern surveying instruments and geoinformatics in civil engineering works	**L2**

Program Outcomes (POs)

1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems	**PO 1**
2	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.	**PO 5**
3	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.	**PO 10**

	Course delivery methods		**Assessment methods**
1.	Lecture and Board	1.	Assignments and Open Book Assignments
2.	NPTEL/ Edusat	2.	Quizzes
3.	Power Point Presentation	3.	Internal Assessment Tests
4.	Videos	4.	Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

BUILDING PLANNING AND DRAWING

Course Code	18CVL36	Credits	03
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	2-0-2	SEE Marks	50 marks
Total Hours:	40	SEE Duration	4 Hours for 100 marks

Course Learning Objectives (CLO's)

1. To understand and plan the geometry of building components like footings, stairs, doors and windows.
2. To understand principles of planning and building bye-laws.
3. To plan residential & public buildings according to bye-laws.
4. To understand the planning and design of water supply, sanitation and electrification.
5. To understand the commands used in AutoCAD to draw the above drawings.

Pre-requisites: NIL

PART A

08 Hours

Foundation: Introduction, Functions and requirements of a good foundation, Types of foundations, Preliminary investigation of soil, Safe Bearing Capacity of Soil, Introduction to spread, combined, strap, mat and pile foundations.

Masonry: Introduction, Classification of Masonry, Definition of terms used in Masonry, Introduction to classification and qualities of bricks, Bonds in Brick work - English Bond, Flemish Bond. Common building stones, their properties and uses, Classification of stone masonry

Roofs and Floors

Types of Roofs & Roofing materials, Flat roof (RCC), Types of pitched roofs, Wooden Truss, Steel trusses, Types of flooring, Factors affecting selection of flooring materials.

Case study:

1) Case study on foundation of existing prominent structures
2) Open end problems on the selection of foundation based on soil conditions
3) Open end problems on the types of tests to be adopted to identify the types of soils.

08 Hours

Doors, windows and ventilation

Location of doors and windows, Definition of technical terms, Types of Doors, Types of windows, Definition and classification of Lintels. Definition and Purposes of Ventilation.

Stairs, Lifts and Escalators

Definition of technical terms in stairs, Requirements of stair, Types of Stairs, Geometrical design of RCC Dog legged and open well stairs. Definition and essential requirements of Lifts and Escalators. **Study of different types of stairs**.

Case Studies:

1) Case studies on the most widely used type of doors, windows.
2) Introduction to new materials and its availability.

PART B

08 Hours

Preparation of drawings

To prepare drawings of Building components consisting of R.C.C column footing, wall footing and stairs (Dog legged and open well) – Plan and cross section. Doors and windows (Elevation

and cross section).

Introduction to planning

Principles of planning, building byelaws, notations and symbols used in drawings, Types of buildings- Residential (load bearing and framed), public buildings.

Case Study: To measure and draw the existing staircase

08 Hours

Residential Buildings:

Preparation of Plan, elevation, cross section and schedule of openings for load bearing and framed structures - ground floor, first floor and two storey buildings Framed only using AUTO-CAD

Case Study: To measure and draw the plan elevation and section of given structure

08 Hours

Public Buildings:

Preparation of Plan, elevation, cross section and schedule of openings for public buildings like primary schools, offices, primary health centre using AUTOCAD

Building services:

Preparing a line diagram showing building services like water supply, sanitation and electrification for prepared plans of residences and public buildings using AUTOCAD

Case Study: To visit an existing public building and suggest modification as per present requirements.

Text Books:

1. Shah M.H and Kale C.M., "Building Drawing", Tata McGraw Hill Publishing Co. Ltd.
2. Sushil Kumar "Building Construction", Lakshmi Publications, New Delhi.

Reference Books:

1. National Building Code, BIS
2. Building byelaws from local Authority.

E-resourses (https://www.youtube.com/watch?v=1yrOsuXJ1zw&list=PLg_vTQj-xmoWKJqRRi81PKX6YVNE3KlwB&index=6**)**

Course Outcome (COs)

	At the end of the course, the student will be able to	**Bloom's Level**
1.	**Understand** the concepts of foundation, masonry, floors and roofs	**L2**
2.	**Plan** residential buildings following principles of planning.	**L3**
3.	**Plan** building components like footings, stairs, doors and windows.	**L3**
4.	**Understand** planning of public buildings.	**L2**
5.	**Understand** the planning and **design** of Water supply, sanitation and electrification.	**L2, L5**

	Program Outcome (POs)	**PO No.**
1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**

2.	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	**PO 5**
3.	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.	**PO 10**

	Course delivery methods		**Assessment methods**
1.	Lecture and Board	1.	Assignments and Open Book Assignments
2.	NPTEL/ Edusat	2.	Quizzes
3.	Power Point Presentation	3.	Internal Assessment Tests
4.	Videos	4.	Semester End Examination

Scheme of Continuous Internal Evaluation (CIE):

Components	IA test*	Sheet Submission	Total Marks
Maximum marks: 50	30	20	50
*IA test is conducted at the end of semester for 4-hour duration for 100 marks and scaled down to 30 marks. Drawing sheets has to be submitted for UNIT II. Minimum marks required to qualify for SEE: 20 out of 50 marks			

Semester End Examination (SEE):

1.	It will be conducted for 100 marks for 4-hour duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.		
2.	Three questions to be set from Part A. Students have to answer two questions of 20 marks each in answer booklet.	40 marks	100 Marks
	Two questions to be set from Part B. The students have to answer any one question of 60 marks (Drawings to be done in AUTO CAD).	60 marks	
3.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

STRENGTH OF MATERIALS LAB

Course Code	18CVL37	Credits	1.5
Course type	PC	CIE Marks	25 marks
Hours/week: L-T-P	0-0-3	SEE Marks	25 marks
Total Hours:	26	SEE Duration	3 Hours for 50 marks

Course Learning Objectives (CLO's)	
1	To illustrate the behavior of the structural steel under the applied loads and study stress-strain behavior and highlight practical applications.
2	To equip the students to analyze and interpret the results, draw suitable inferences in conformity with specifications, acceptability and utility of the results.
3	To enable students to have hands-on experience on testing and characterize the important building materials by conducting appropriate tests in conformity with the specified IS code procedures.
4	Function as a team member to conduct experiments in groups.

Pre-requisites:

1. Engineering Mechanics
2. Strength of Materials

Exp. No.	Experiments
1	Tension test on Mild steel/ HYSD bar
2	Bend-Rebend test on Mild steel
3	Torsion test on Mild steel
4	Shear test on Mild steel/ Aluminium
5	Impact Test on Mild steel
6	Hardness test on Mild steel/ Aluminium
7	Bending test on Timber under two-point loading
8	Test on Flooring/ Roof Tiles
Test on Bricks/Blocks	
09	Dimensionality Test
10	Compression Test
11	Water Absorption / Initial rate of absorption
	Test on Pavers
12	Compression Test
Tests on Coarse Aggregates	
13	Specific gravity, water absorption and bulk density
Tests on Fine Aggregates	
14	Specific gravity, water absorption and bulk density

References

1. Davis, Troxell and Hawk, **"Testing of Engineering Materials"**, International Student Edition - McGraw Hill Book Co. New Delhi
2. Fenner, **"Mechanical Testing of Materials"**, George Newnes Ltd, London
3. Kukreja C. B., Kishore K., **"Material Testing Laboratory Manual"**, Ravi Chawla Standard Publishers and Distributors 1996

4. Holes K. A., **"Experimental Strength of Materials"**, English Universities Press Ltd. London
5. Suryanarayana A. K., **"Testing of Metallic Materials"**, Prentice Hall of India Pvt. Ltd. New Delhi
6. Relevant IS Codes (as applicable for each test).

Course Outcomes (COs)

	At the end of the course, students will be able to:	**Bloom's Level**
1.	**Get acquainted with** the behaviour of the structural steel.	**L4**
2.	**Get acquainted with** the behaviour of the wooden member subjected to bending and compression.	**L3 L5**
3	**Characterize** the important building materials by conducting appropriate tests in conformity with the specified IS code procedures	**L2**
4	**Ascertain** the suitability and applicability of construction materials.	**L3 L5**

Program Outcomes (POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	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.	**PO 4**
3	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO 9**

Assessment methods

1. Continuous evaluation of conduct of Practical
2. Journals

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	05	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE: 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

SURVEYING LABORATORY

Course Code:	18CVL38	Credits:	1.5
Course Type:	PC	CIE Marks:	25 marks
Hours/week: L – T – P	0 – 0 – 3	SEE Marks:	25 marks
Total Hours:	36	SEE Duration:	3 Hours for 50 marks

Course Learning Objectives (CLO's)

1. Demonstrate the Linear and Angular surveying instruments used in field work.
2. To measure the Reduce level by rise and fall method and Height of instrument.
3. Demonstrate the Theodolite and Total station used in field work.
4. Demonstrate the advance instrument used in surveying.

Lists of Experiments

1. **Linear Measurements:**

a) To measure distance between two points using direct ranging.
b) To set out perpendiculars at various points on given line using cross staff, optical square, Chain and tape

2. Compass surveying:

a) To determine the distance between two inaccessible points using chain/tape & compass

3. Levelling:

a) To determine difference in elevation between two points using Fly leveling, conduct fly back leveling and Booking of levels using HI and Rise and Fall method.
b) To conduct profile leveling for water supply /sewage line and to draw the longitudinal section and to determine the depth of cut and depth of filling for a given formation level

4. Theodolite survey:

a) Measurement of horizontal and vertical angles
b) To determine the elevation of an object using single plane method (Base is accessible)

5. Setting out of curve

a) To set out Compound curve using Rankine's deflection angles method

6. Setting out:

To set out the center line of a simple rectangular rooms (Framed Structure) using double baseline method.

Reference Books

1. Punmia B.C., **"Surveying Vol–1",** Laxmi Publications, New Delhi, Sixteenth edition, 2005 and above.
2. Subramanian R., **"Surveying and Levelling",** Oxford University Press, Third edition 2007 and above.
3. Venkataramiah C- "**Text Book of Surveying",** Universities Press, Second edition 2011 and above.
4. Dr. R. P. Rethaliya**, "Surveying",** Atul Prakashan, Gandhi road, Ahmadabad, ISBN No : 978-93-81-518-35-9
5. Kanetkar T. P. and Kulkarni S.V., **"Surveying and Levelling Part- I",** Vidyarthi Ghrih Prakashan Pune, Twenty fourth edition 2010 and above.

Course Outcomes (COs)

	At the end of the course, students will be able to:	Bloom's Level
1.	**Understand** the applications of surveying instruments in civil engineering projects	**L2**
2.	**Identify** the various instruments used for field work	**L3**
3	**Understand** the function of Compass, Auto level, Theodolite and Total station in surveying projects	**L2**
4	Prepare **plans** or maps to represent the area on a horizontal plane	**L3**
5	**Identify** and **understand** the use of advance surveying instruments used for surveying works	**L3, L2**

Program Outcomes (POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO 9**
3	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.	**PO 10**

Assessment methods

1. Continuous evaluation of conduct of Practical
2. Journals

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE: 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

COMMUNICATIVE KANNADA/ KANNADA FOR COMMUNICATION

(FOR NON – KANNADIGAS, COMMON TO ALL BRANCHES)

Course Code	18CV39	Credits	MNC
Course type	HS	CIE Marks	25 marks
Hours/week: L-T-P	2-0-0	SEE Marks	---
Total Hours:	28	SEE Duration	---

Course Learning Objectives (CLO's)

1. Learners are Non – Kannadigas, so that course will make them to understand the kannada words and to communicate in kannada language.

UNIT I — 1 Hours

About Kannada Language and Karnataka State
Vyavaharika Kannada – Parichaya (Introduction to Vyavaharika Kannada)

UNIT II — 8 Hours

Kannada Aksharamale haagu Uchcharane (Kannada Alphabets and Pronunciation):
Kannada Aksharamale
Kannada stress letters - vattakshara (Ottakashara)
Kannada letters Pronunciation – Uchcharane

UNIT III — 8 Hours

Sambhashanegaagi Kannada Padagalu (**Kannada Vocabulary for Communication**):
Kannada Vocabulary for Communication

UNIT IV — 8 Hours

Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana)

UNIT V — 3 Hours

Activities in Kannada: General Conversations in Kannada with Activities

Books

Text Books:

1 Vyavaharika Kannada Text Book, Published by Prasaranga,Visvesvaraya Technological University, Belagavi.

E-resourses :

1 https://play.google.com/store/apps/details?id=com.englearner.kannadatohindispeaking&hl=en_US
2 http://www.kannada-praadhikaara.gov.in/docs/KANNADA_ABHIVRUDDHI_PRADHIKARA.pdf

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. Spell and Translate in Kannada language	L1, L2

Program Outcome (POs)	PO No.
1. Communicate effectively with society at large	PO 10

Course delivery methods

1. Lectures
2. Presentation
3. Videos

Assessment methods

1. IA tests
2. Presentation
3.

Scheme of Continuous Internal Evaluation (CIE):

Components	Two IA Tests	Assignment/Quiz/Presentation/activity	Total marks
Maximum Marks: 25	10 + 10	05	25
•Writing two IA tests is compulsory. •Minimum marks required: 10 out of 25 marks			

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಕ್ರಮ

KANNADA FOR ADMINISTRATION (FOR KANNADIGAS, COMMON TO ALL BRANCHES)

Course Code	18CV39	Credits	MNC
Course type	HS	CIE Marks	25 marks
Hours/week: L-T-P	2-0-0	SEE Marks	---
Total Hours:	28	SEE Duration	---

Course Learning Objectives (CLO's)

ಆಡಳಿತ ಕನ್ನಡ ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿ ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

UNIT I — 1 Hours

ಅಧ್ಯಾಯ – 1, ಆಡಳಿತ ಕನ್ನಡ – ಒಂದು ಪಕ್ಷಿನೋಟ

UNIT II — 6 Hours

ಅಧ್ಯಾಯ – 2, ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ನಿವಾರಣೆಗಳು

ಅಧ್ಯಾಯ – 3, ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ ಹಾಗೂ ಬಳಕೆಯ ರೀತಿ

UNIT III — 8 Hours

ಅಧ್ಯಾಯ – 4, ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು ಮತ್ತು ವಿವಿಧ ರೀತಿಯ ಅರ್ಜಿಗಳ ನಮೂನೆಗಳು

ಅಧ್ಯಾಯ – 5, ಆಡಳಿತ ಪತ್ರವ್ಯವಹಾರ – ವಿವಿಧ ರೀತಿಯ ಅರ್ಜಿಗಳ ನಮೂನೆಗಳು, ಸರ್ಕಾರಿ ಪತ್ರಗಳು ಮತ್ತು ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು, ವೈಯಕ್ತಿಕ ಪತ್ರಗಳು ಮತ್ತು ಮನವಿ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ – 6, ಸರ್ಕಾರದ ಆದೇಶ. ನಡೆವಳಿ. ಅದಿಸೂಚನೆ. ಸುತ್ತೋಲೆಗಳು ಮತ್ತು ಜಾಹೀರಾತು, ಪತ್ರಿಕಾ ಪ್ರಕಟಣೆ ಹಾಗೂ ಟೆಂಡರ್ ಪತ್ರಗಳು

UNIT IV — 8 Hours

ಅಧ್ಯಾಯ – 7, ಭಾಷಾಂತರ ಮಾಡುವುದು, ಸಂಕ್ಷೀಪ್ತ ಪ್ರಬಂಧ ಹಾಗೂ ಪ್ರಬಂಧ ರಚನೆ. ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧದ ಮಾದರಿಗಳು.

ಅಧ್ಯಾಯ – 8, ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಕನ್ನಡದ ದೇಶ್ಯ ಪದಗಳು ಮತ್ತು ಕನ್ನಡಿಕರಣಗೊಂಡಿರುವ ಅನ್ಯದೇಶ್ಯ ಪದಗಳು.

UNIT V **5 Hours**

ಅಧ್ಯಾಯ – 9, ಕನ್ನಡ ಮತ್ತು ಕಂಪ್ಯೂಟರ್/ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

ಅಧ್ಯಾಯ – 10, ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ / ಕಂಪ್ಯೂಟರ್ ಕನ್ನಡ ಪಾರಿಭಾಷಿಕ ಪದಗಳು

Books

Text Books:

1. ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ
   ಪ್ರಕಾಶಕರು : ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

Course Outcome (COs)

	At the end of the course, the student will be able to	**Bloom's Level**
1.	Explain, interpret, summarize and Translate in Kannada language for administrative purposes	**L1, L2**

	Program Outcome (POs)	**PO No.**
1.	Communicate effectively with society at large	**PO 10**

Course delivery methods

1. Lectures
2. Presentation
3. Videos

Assessment methods

1. IA tests
2. Presentation
3.

Scheme of Continuous Internal Evaluation (CIE):

Components	**Two IA Tests**	**Assignment/Quiz/Presentation/activity**	**Total marks**
Maximum Marks: 25	10 + 10	05	25
•Writing two IA tests is compulsory. •Minimum marks required: 10 out of 25 marks			

SEMESTER IV

PARTIAL DIFFERENTIAL EQUATIONS SAMPLING TECHNIQUES Z TRANSFORM

(ALL BRANCHES EXCEPT CS/IS)

Course Code	18MATCV41	Credits	04
Course type	BS	CIE Marks	50
Hours/week: L-T-P	4-0-0	SEE Marks	50
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLO's)

1. Learn the concept of Interpolation and use appropriately.
2. Understand the concept of Partial Differential Equations.
3. Apply Partial Differential Equations to solve practical problems.
4. Get acquainted with Sampling Distribution and Testing of Hypothesis.
5. Study the concept of Calculus of Variations, Z-Transforms and its applications.

Pre-requisites:

1. Partial Differentiation
2. Basic Probability, Probability Distribution
3. Basic Integration
4. Basic Statistics

UNIT I **10 Hours**

Finite Differences and Interpolation: Forward and Backward differences, Newton's Forward and Backward Interpolation Formulae, Divided Differences, Newton's Divided Difference Formula (without proof). Lagrange's Interpolation Formula. Illustrative examples. Numerical Integration: Newton- Cotes Quadrature formula, Trapezoidal rule, Simpsons $1/3^{rd}$ rule, Simpsons $3/8^{th}$ rule, Weddle's rule. Practical Examples

UNIT II **10 Hours**

Partial Differential Equations: Formation of PDE by elimination of arbitrary Constants and Functions, Solution of non homogeneous PDE by direct integration, Solution of homogeneous PDE involving derivative with respect to one independent variable only.

UNIT III **10 Hours**

Applications of Partial Differential Equations: Derivation of One-dimensional Heat and Wave equations. Solutions of one-dimensional Heat and Wave equations, Two-dimensional Laplace equation by the method of separation of variables. Numerical solution of one-dimensional Heat and Wave equations, Two-dimensional Laplace equation by finite differences.

UNIT IV **10 Hours**

Sampling distribution and Testing of Hypothesis: Sampling, Sampling distribution, Sampling distribution of means, Level of significance and confidence limits, Tests of significance for small and large samples. 't' and 'chi square' distributions. Practical examples.

UNIT V **10 Hours**

Calculus of Variations: Concept of a Functional, Extremal of a Functional, Euler's equation and equivalents. Standard problems. **Applications**: Geodesics, Hanging chain, Minimal surface of revolution and Brachiostochrone problem.

Z -Transform: Definition, Standard Z transforms, Linearity, Damping rule, Shifting properties, Initial and Final value Theorems-Examples. Inverse Z transforms and Solution of Difference Equations by Z transforms.

Text Books:

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
2. Erwin Kreyszig –Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th Edition,
3. B. V. Ramana- Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd.

Reference Books:

1. P. N. Wartikar & J. N. Wartikar– Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994.
2. Peter V. O' Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011.
3. Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Use** Finite differences in Interpolation	**L1**
2. **Form** and **Solve** Partial Differential Equations.	**L1, L2**
3. **Develop** Heat, Wave equations	**L3**
4. **Apply** Partial Differential Equations to solve practical problems	**L3**
5. **Test** the Hypothesis and **Solve** problems related to them.	**L1, L2**
6. Understand the concept of Functional and **Identify** the extremal of a Functional. Understand the concept of Z transforms and solve the problems related to them.	**L2**

Program Outcome (POs)	PO No.
1. Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO1**
2. Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural Sciences and Engineering sciences	**PO 2**
3. 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.	**PO 5**

Course delivery methods	Assessment methods
1. Black Board Teaching	1. Internal Assessment
2. Scilab	2. Assignment
	3. Quiz

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments /MATLAB/SCILAB activity	Quiz/Seminar /Course project	Total Marks

Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

VECTOR CALCULUS, LAPLACE TRANSFORMS AND PROBABILITY
(MECH, CIVIL, E&C, E&E, AERO)
(DIPLOMA ONLY)

Course Code	**18DMATCV41**	**Credits**	**04**
Course type	**BS**	**CIE Marks**	**50 marks**
Hours/week: L-T-P	**4–0– 0**	**SEE Marks**	**50 marks**
Total Hours:	**50**	**SEE Duration**	**3 Hours for 100 marks**

Course Learning Objectives (CLOs)

1. Study the concept of double and triple integrals, vector differentiation.
2. Get acquainted with vector integration and its applications.
3. Be proficient in Laplace transforms and inverse Laplace transforms and solve problems related to them.
4. Learn the concept of interpolation and use appropriately.
5. Study the concept of random variables and its applications.

Pre-requisites:

1. Basic probability, probability distributions
2. Basic statistics
3. Basic differentiation and integration

UNIT I — 10 Hours

Vector and Integral Calculus: Double and triple integrals. Scalar and vector point function, gradient, divergence, curl, solenoidal and irrotational vector fields.

UNIT II — 10 Hours

Vector Integration: Line integral, surface integral, volume integral, Green's theorem, Stoke's theorem, Guass Divergence theorem (statement only) and problems.

UNIT III — 10 Hours

Differential Equations: Linear differential equation, Bernoulli's equation, exact differential equation (without reducible forms)-problems and applications (orthogonal trajectories). Linear differential equation with constant coefficients-solution of second and higher order differential equations, inverse differential operator method and problems.

UNIT IV — 10 Hours

Finite Differences and Interpolation: Forward and backward differences, Newton's forward and backward interpolation formulae. Divided difference, Newton's divided difference formula (without proof). Lagrange's interpolation formula. Illustrative examples.

Numerical Integration: Trapezoidal rule, Simpsons 1/3rd rule, Simpsons 3/8th rule, Weddle's rule. Practical examples.

UNIT V — 10 Hours

Probability: Random variables (RV), discrete and continuous random variables (DRV, CRV). Probability distribution function (PDF) and cumulative distribution function (CDF), expectations (mean), variance. Binomial, Poisson, Exponential and Normal distributions and examples.

Text Books:

1. B.S. Grewal – Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012 and onwards.
2. Erwin Kreyszig – Advanced Engineering Mathematics, John Wiley & Sons Inc., 9th

Edition, 2006 and onwards.

3. B. V. Ramana – Higher Engineering Mathematics, Tata McGraw-Hill Education Private Limited, Tenth reprint 2010 and onwards.

Reference Books:

1. P. N. Wartikar & J. N. Wartikar – Applied Mathematics (Volume I and II) Pune Vidyarthi Griha Prakashan, 7th Edition 1994 and onwards.
2. Peter V. O' Neil – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th Edition, 2011 and onwards.
3. Glyn James – Advanced Modern Engineering Mathematics, Pearson Education, 4th Edition, 2010 and onwards.

Course Outcome (COs)

	At the end of the course, the student will be able to	**Bloom's Level**
1.	**Evaluate** double and triple integration.	**L1, L2**
2.	**Explain** the concept of vector differentiation and integration.	**L3**
3.	**Classify** differential equations of first and higher order and **apply** them to solve relevant problems**.**	**L1, L2**
4.	**Use** finite differences in interpolation**.**	**L1, L2**
5.	**Understand** the concept of random variables, PDF, CDF and its applications	**L2**
6.	**Use** of probability distribution for practical problems	**L2, L3**

	Program Outcome (POs)	**PO No.**
1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO1**
2.	Identify, formulate, research literature and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural Sciences and Engineering sciences	**PO 2**
3.	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.	**PO 5**

Course delivery methods	**Assessment methods**
1. Black Board Teaching	1. Internal Assessment
2. Scilab	2. Assignment
	3. Quiz

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments /MATLAB/SCILAB activity	Quiz/Seminar /Course project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks

3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

WATER SUPPLY ENGINEERING

Course Code	18CV42	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	4-0-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLOs)

1. **Estimate** the water demand for a community.
2. **Evaluate** the sources and conveyance systems for raw and treated water.
3. **Understand** drinking water quality standards.
4. **Estimate** the population of the future by using present statistics.
5 **Design** the water treatment units.

Pre-requisites: Environmental Studies

UNIT I — 10 Hours

Introduction to sources: List of Surface and subsurface sources – suitability with regard to quality and quantity. Water for various beneficial uses and quality requirement. Need for protected water supply.

Quality of Water:

Objectives of water quality management; wholesomeness& palatability; water borne diseases; water quality parameters – physical, chemical and microbiological; sampling of water from various sources- A case study, BIS drinking water standards; health significance of fluoride, nitrates and heavy metals like mercury, cadmium, arsenic.

Self-Learning topics: Surface and subsurface sources of water.

UNIT II — 10 Hours

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 of population forecasting with merits & demerits; variations in demand of water, peak factors, design periods & factors governing the design periods; types of fire hydrants.

Collection and Conveyance of Water

Intake structures – different types of intakes, factor affecting the selection and location of intakes; design of the economical diameter for the rising main. Intake structures- A case study

Self-Learning topics: Fire demand – estimation by Kuching's formula, Freeman formula & National Board of Fire Underwriters formula

UNIT III — 10 Hours

Water Treatment:

Objectives – Treatment flow-chart; aeration- principle, types of aerators.

Sedimentation

Theory, settling tanks, types, design, Coagulant aided sedimentation, jar test.

Filtration

Mechanism – Theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, design, operation and maintanence – excluding under drainage system – back washing of filters; operational problems in filters.

Self-Learning topics: NIL

UNIT IV — 10 Hours

Softening

Definition; methods of removal of hardness by lime soda, zeolite process; RO, ultra-filtration and nano filtration: principles, overview of RO and nano filtration membranes and elements;

conventional pretreatment techniques for RO and nano filtration. A case study of portable water purifiers.

Self-Learning topics: NIL

UNIT V **10 Hours**

Disinfection

Theory of disinfection, types of disinfection; chlorination, chlorine demand, residual chlorine; use of bleaching powder.

Distribution systems

System of supply, service reservoirs and their ***capacity determination***, methods of layout of distribution systems. Pipe appurtenances

Case Study: Water treatment plants

Self-Learning topics: Pipe appurtenances and pipe materials

Text Books:

1 S. K. Garg, "**Water Supply Engineering**", Khanna Publishers, First Edition- publication year 2010.

2 B. C. Punmia and Ashok Jain, "**Environmental Engineering- I**", Laxmi Publications Ltd, New Delhi, reprint Edition August 2007.

3 G. M. Fair, J. C. Geyer and D.A Okun, "**Water and Wastewater Engineering Vol-II**", : John Willey Publishers, New York

4 Sincero A.P., and Sincero, G.A., "**Environmental Engineering – A Design Approach**"–Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

5 Sawyer and Mc Carthy "**Chemistry for Environment Engineering**" Publisher: McGraw-Hill Education (ISE Editions); International 2 Revised edition (1 July 1994).

References:

1 **Manual on Water supply and treatment** –CPHEEO, Ministry of Urban Development, New Delhi, May 1999.

2 Hammer, M.J, "**Water and Wastewater Technology**"–SI Version, 2nd Edition, John Wiley and Sons, 1986.

3 Metcalf and Eddy, "**Wastewater Engineering, Treatment and Reuse**", 4th Edition, Tata McGraw Hill Edition, Tata McGraw Hill Publishing Co. Ltd, 2003.

4 Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., "**Environmental Engineering**"–Mc Graw Hill Book Co, 1986.

5 Peavy, H.S., Rowe, D.R., and Tchobanoglous, G., "**Environmental Engineering**"–Mc Graw Hill Book Co, 1986.

6 Raju, B.S.N., "**Water Supply and Wastewater Engineering**", Tata McGraw Hill Pvt. Ltd., New Delhi, 1995.

7 **IS Standards**: 2490-1974, 3360-1974, 3307-1974.

8 **Standard Methods for Examination of Water and Wastewater**, American Publication – Association, Water Pollution Control Federation, American Water Works Association, Washington DC, 1995

E-resourses

(https://mdws.gov.in/sites/default/files/Manual_on_Water_Supply_and_Treatment_CPHEEO_MoUD_1999.pdf
http://cgwb.gov.in/Documents/WQ-standards.pdf https://nptel.ac.in/courses/116104045/lecture17.pdf
https://nptel.ac.in/courses/116104045/lecture6.pdf)

Course Outcome (COs)

At the end of the course, students will be able to: **Bloom's**

		Level
1.	**Understand** the need for protected water supply and estimation of water demand.	**L1**
2.	**Understand** the selection of Intake structures for surface and subsurface sources.	**L3**
3.	**Illustrate** BIS 10500: 2012	**L3**
4.	**Estimate** the future population by various methods.	**L2**
5.	**Design** various water treatment units	**L2**

Program Outcomes (POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	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.	**PO 3**
3	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.	**PO 5**
4	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.	**PO 6**
5	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	**PO 7**
6	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.	**PO 10**

	Course delivery methods		**Assessment methods**
1.	Lecture and Board	1.	Assignments and Open Book Assignments
2.	NPTEL/ Edusat	2.	Quizzes
3.	Power Point Presentation	3.	Internal Assessment Tests
4.	Videos	4.	Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

HIGHWAY ENGINEERING

Course Code	18CV43	Credits	03
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-0-0	SEE Marks	50 marks
Total Hours:	40	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLOs)

1.	To highlight the fundamentals of transportation engineering.
2.	To learn the design of various parameters relating to geometrics of highways.
3.2.	To learn the design of flexible and rigid pavements and to gain the knowledge of different pavement materials with their specifications.
4.	To study the construction practices of various pavement layers and to learn fundamentals of Highway Drainage.
5	To understand the procedures of highway maintenance and concept of highway economics.

Pre-requisites:
1. Elements of Civil Engineering
2. Building Materials and Construction
3. Surveying

UNIT I — 08 Hours

Principles of Highway Engineering and Geometric Design Aspects:

Importance of Transportation Engineering- Jayakar Committee Recommendations & Implementations- Road Alignment & factors Affecting the Road Alignment-Alternative Proposals- Master Plan, Saturation System & Problems on above, Road classification.

Importance, Factors Controlling The Design of Geometric Elements- Highway Cross Sectional Elements-Camber, Width of Carriage Way, Shoulder Width, Formation Width, Right of Way, Typical Cross Sections of the Roads -Pavement Surface Characteristics

Case study:
1. Identification of types of roads using Master plan
2. Priority of proposed roads
3. Highway Cross Sectional Measurements

Self-Learning topics: PMGSY for Rural Connectivity-Golden Quadrilateral & NSEW Corridor, Road Development Plan Vision 2021- Concept of Express Ways.

UNIT II — 08 Hours

Highway Geometric Design

Sight Distance- SSD and OSD, Types & Importance- Design of Horizontal Alignment-Super elevation, Extra Widening and Transition Curves- Vertical Alignment-SSD and OSD-Numerical Problems on above with Derivation.

Case Study:
1. Design of SSD and OSD for arterial roads.
2. Check for Super-elevation and camber

Self-Learning topics: Typical Cross Sections of the Roads

UNIT III — 08 Hours

Pavement Materials and Design

Properties and Requirements of Sub grade Soil, Classification (HRB)-California Bearing Ratio Test (IRC & AASTHO Methods) and Problems-Aggregates-Basic Properties-Bituminous Materials-Requirements of Bitumen-Tests on Bituminous Materials. Types of Pavements-Introduction to Flexible Pavements and Rigid Pavements, considerations for

flexible and rigid pavement design, Stresses in flexible and rigid pavement.

Case Study:

1. Determination of strength of existing pavement

Basic tests for Engineering properties for road aggregates

Self-Learning topics: Aggregates-Basic Properties, Emulsion, Cutback Bitumen

UNIT IV **08 Hours**

Highway Maintenance

Introduction, Defects in Flexible Pavements and Rigid Pavements, Pavement Evaluation, Maintenance of Highway pavements and strengthening of Highway Pavements. Failures-Flexible and Rigid Pavements-Causes and Types of Failures-Maintenance of Highways by Strengthening of Existing Pavements by Overlay.

Case Study:

1. Pavement Evaluation on Existing pavements.
2. Case studies on failures of important roads.

Self-Learning topics: Hydraulic gradient and Energy gradient

08 Hours

UNIT - V

Highway Drainage

Pavement Surface and Sub-Surface Drainage System-Methods, Requirements of Drainage for Pavements- Basic Design Principles and Problems on Hydrologic and hydraulic Analysis-Design of Filter Media – Drainage in Hill Roads.

Highway Economics: Highway user benefits, VOC using charts only- Examples, Economic analysis-annual cost method-Benefit Cost Ratio method, Examples, Highway financing-BOT-BOOT concepts, PPP model, Toll roads.

Case Study:

1. Study on current scenario of operation of drainage system using modern techniques
2. Study on toll operation

Self-Learning topics: NIL

Text Books:

1 Dr. S. K. Khanna, Dr. C.E.G. Justo and Dr. Veeraragavan, Highway Engineering, NemiChand Brothers, Roorkee. Revised 10th Edition 2015.

2 Dr. L. R. Kadiyali and Dr. N. B. Lal, Principles and Practice of Highway Engineering (Including Expressways and Airport Engineering), Khanna Publishers, New Delhi, Fifth Edition 2012.

3 James H. Banks, Transportation Engineering, Mc. Graw Hill Pub. New Delhi

References:

1 Specifications for roads and Bridges- MoRT&H (Fourth and Fifth Revision July 2010)

2 R. Sreenivaskumar, Highway Engineering, University Press Pvt. Ltd. Hyderabad

3 IRC -37-2012 Guidelines for the Design of Flexible Pavement

4 IRC- 58-2001 Guidelines for the Design of Rigid Pavement

5 IRC:2386 Part I, II, III & IV- Tests on Coarse & Fine Aggregates

6 AASHTO- t193-99 (2003) California Bearing Ratio Test

E-resourses (https://www.youtube.com/watch?v=5zKC_aq4ypM&list=PLE88643285BC70E0F https://www.youtube.com/watch?v=tIkBEky7WsY&list=PLZmv_MNQCMBjOX9qChv1LCNfqHyFP_4fU **)**

Course Outcome (COs)

	At the end of the course, students will be able to:	Bloom's Level
1	To **explain** the importance of transportation and traffic engineering in development of the country	L2
2	To **explain** the various engineering surveys required for master planning and phasing road development plan	L2
3	To **design** the geometric design elements such as cross-section, sight distance, horizontal and vertical alignment required based on site conditions and various categories of roads	L6
4	To **explain** the various properties of sub-grade soil, aggregates, Bitumen and **list** the standard values of materials from relevant codes.	L5 L1
5	To **design** and **illustrate** the construction steps for the flexible pavement and rigid pavement	L6 L2
6	To **demonstrate** the various failures and remedies to be identify for maintaining the road during the design period and to **design** the Highway Drainage System	L2 L6
	To **understand** the highway economic models.	L2

	Program Outcome (POs)	PO No.
1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	PO 1
2	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.	PO 3
3	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.	PO 5
4	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.	PO 6
5	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.	PO 10

Course delivery methods	Assessment methods
1. Lecture and Board	1. Assignments and Open Book Assignments
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests
4. Videos	4. Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

ANALYSIS OF DETERMINATE STRUCTURES

Course Code	18CV44	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-2-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLOs)

1. To differentiate between determinate and indeterminate structure. Learn to determine static and kinematic indeterminacy of trusses, beams and frames and to analyze determinate trusses by i) method of joints, and ii) method of sections.
2. Learn to determine the rotations and deflections of determinate beams by i) Moment-Area method, and ii) Conjugate-beam method.
3. Understand what strain energy is and derive expressions for strain energy in members due axial load, bending and shear. Understand the principle of virtual work, Castigliano's first theorem and apply it to beams and frames to determine the deflections in them. Also understand Clarke-Maxwell's theorem of reciprocal deflection.
4. Learn to analyze three hinged parabolic arches with supports at same and different levels and determine the thrust, bending moment and shear in the arches and also to analyze cables under point load and UDL and to determine the length of the cable for supports at same levels.
5 Develop influence line diagram for reaction, shear force and bending moment for simply supported beam subjected to single point load and UDL.

Pre-requisites:

1. Elements of Civil Engineering,
2. Strength of Materials.

UNIT I — 10 Hours

Structural systems and analysis of trusses

Determinate and indeterminate structures (static and kinematic (degrees of freedom)), conditions of equilibrium, introduction to truss, assumptions in analysis of perfect truss, analysis of perfect truss by method of joints

Case study: Visit to industrial site. Analysing the different types of truss in the industrial shed

Self-Learning topics: NIL

UNIT II — 10 Hours

Deflection of Beams

Deflection and slope of beams by i) Moment-Area method; ii) Conjugate beam method

Case study: Visit to industrial site. Analysing the beams of different flexural rigidity

Self-Learning topics: NIL

UNIT III — 10 Hours

Deflection of Beams by Strain Energy

Strain energy, Strain energy due to axial load, bending and shear, principle of virtual work, first theorem of Castigliano, problems on beam and frames, Clarke-Maxwell's theorem of reciprocal deflection.

Case study: Visit to industrial site. Analysing the beams and frames

Self-Learning topics: NIL

UNIT IV — 10 Hours

Three hinged parabolic arches with supports at same and different levels, determination of thrust, shear and bending moment, analysis of cables under point loads and UDL, length of cables (supports at same levels).

Case study: Visit to site of suspension Cable bridge and analysis of the bridge

Self-Learning topics:

UNIT V **10 Hours**

Rolling Loads and Influence Lines

Introduction to rolling loads on simply supported beams. Influence line diagram for reaction, shear force and bending moment of simply supported beam subjected to a single point load, rolling loads and UDL longer than span.

Applications to Bridges

Self-Learning topics: NIL

Text Books:

1 Hibbeler R. C, **"Structural Analysis"**, Pearson, Sixth Edition, 2007.
2 Reddy C S**, "Basic Structural Analysis",** Tata McGraw Hill, New Delhi, 2007.
3 C. K. Wang, "Intermediate Structure Analysis",

References:

1 Norris and Wilbur, **"Elementary Structural Analysis",** McGraw Hill Book Co: New York, 2003.

E-resourses
(https://www.youtube.com/watch?v=HLMQbX_EjwQ&list=PLhSp9OSVmeyJ_ZMEAsKMexQPQU2lG6ZkR
https://www.youtube.com/watch?v=qhEton-EEOw&list=PL83821B43A558F579**)**

Course Outcome (COs)

	At the end of the course, students will be able to:	**Bloom's Level**
1	**Identify** the static and kinematic indeterminacy of the structures and analyze the determinate trusses	**L1**
2	**Evaluate** deflections and rotations of determinate beams, Moment area method, conjugate beam method and Castigliano theorem	**L5**
3	**Apply** Castigliano's first theorem to beams and frames to determine the deflections in them.	**L5**
4	**Analyze** three hinged parabolic arches and cables for different loading conditions.	**L3**
5	**Analyze** the simply supported beam for rolling loads**.**	**L4**

	Program Outcome of this course (POs)	**PO No.**
1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	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.	**PO 10**

Content Delivery/Assessments methods and Scheme of Evaluation

Course delivery methods	**Assessment methods**
1. Lecture and Board	1. Assignments and Open Book Assignments
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests

4. Videos	4. Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
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Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

HYDRAULICS AND HYDRAULIC MACHINES

Course Code	18CV45	Credits	04
Course type	PC	CIE Marks	50 marks
Hours/week: L-T-P	3-2-0	SEE Marks	50 marks
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives (CLOs)

1. Describe the geometric elements of open channel flow and apply the concepts to solve related problems for uniform flow
2. Analyse problems related to most economical channel section including practical applications.
3. Illustrate the basic concepts of specific energy and critical flow.
4. Demonstrate the principles of specific force in hydraulic jump problems and its applications for practical problems.
5. Apply the concept of impulse momentum principle in case of impact of jets on plates and vanes.
6. Outline the concept of velocity triangles in case of impact of jet on curved vanes striking tangentially.
7. Outline the component parts of Pelton Wheel and Kaplan turbine and evaluate the efficiency.
8. Describe the working principle of centrifugal pumps and evaluate the performance.

Pre-requisites:

1. Engineering Mechanics
2. Fluid Mechanics

UNIT I — 10 Hours

Uniform flow in open channels

Introduction, Types of flow in channels, Geometric properties of Rectangular, Triangular, Trapezoidal and Circular channels. Chezy's equation, Manning's equation-problems

Most economical channel sections

Most economical open channels-Rectangular, Triangular, Trapezoidal and Circular channels-problems

Case Study

- Analysis of partly filled circular storm sewers
- Hydraulic design of channels with different roughness on walls.

Self-Learning topics: NIL

UNIT II — 10 Hours

Specific energy and Critical flow

Introduction, Specific energy, Specific energy diagram, Critical depth, Conditions for Critical flow in rectangular, trapezoidal and triangular channels- Theory & problems.

Hydraulic jump

Hydraulic jump in a Rectangular, trapezoidal and triangular channel- Theory and problems. Practical applications of hydraulic jump. Types of hydraulic jump

Self-Learning topics: Critical flow in trapezoidal channel

UNIT III — 10 Hours

Impact of jet on flat vanes

Introduction, Impulse - Momentum equation. Force exerted by fluid jet on stationary flat plate and moving flat plate. Force exerted by jet on series of moving flat plates mounted on a wheel. Impact of a jet on a hinged flat plate – problems

Impact of jet on curved vanes

Introduction, Force exerted by a jet on a fixed curved vane and moving curved vane. Introduction to concept of velocity triangles, Impact of jet on a series of curved vanes- problems.

Self-Learning topics: NIL

UNIT IV **10 Hours**

Pelton wheel

Introduction to Turbines, Classification of Turbines. Head and efficiencies of hydraulic turbines, Peltonwheel- components, working and velocity triangles. Maximum power, efficiency, working proportions- problems.

Kaplan Turbine

Introduction, Components, Working proportions and Velocity triangles, Problems on Kaplan turbine. Draft Tube: Types, efficiency of a Draft tube. Introduction to Cavitation in Turbines. Specific speed.

Self-Learning topics:

UNIT V **10 Hours**

Centrifugal pumps

Introduction, Component parts, working of a centrifugal pump, Work done by impeller, Head and Efficiencies. Minimum starting speed, velocity triangles and related problems. Multistage Centrifugal Pumps (Pumps in Series and Pumps in parallel). Specific speed - problems.

Case Study

- Pump flow rate calculation
- Design of hydraulic machines

Self-Learning topics: NIL

Text Books:

1. Dr. P. N. Modi & Dr S.M. Seth, "**Hydraulics and Fluid Mechanics**", Standard Book House- New Delhi.2009 Edition.
2. R. K. Rajput ,"**A Text Book of Fluid Mechanics & Hydraulic Machines**"-,S. Chand & Co, New Delhi, 2006 Edition.
3. R. K. Bansal. "**Text Book of Fluid Mechanics & Hydraulic Machines**", Laxmi Publications, New Delhi, 2008 Edition
4. N. Narayana Pillai, "**Principles of Fluid Mechanics and Fluid Machines**", Universities Press (India), Hyderabad,2009 Edition.

References:

1. Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, "**Fundamentals of Fluid Mechanics**", Wiley India, New Delhi, 2009 Edition.
2. Edward J. Shaughnessy. Jr; Ira M. Katz; James P Schaffer, "**Introduction to Fluid Mechanics**", Oxford University Press, New Delhi, 2005 Edition.
3. Madan Mohan Das, "**Fluid Mechanics and Turbomachines**"-, PHI Learning Pvt. Limited, New Delhi.2009 Edition.

E-resourses (https://www.youtube.com/watch?v=9jAZ2eWy-Q4 https://www.youtube.com/watch?v=ImXwx1XdNJE&list=PLVslMh83Rk6Z_Laac833PBN9f6pcF-vZe**)- mention links**

Course Outcome (COs)

	At the end of the course, students will be able to:	**Bloom's Level**
1	**Apply** basic principles to analyze and Solve open channel flow problems	**L3**
2	**Apply** principles of energy concepts to practical applications of free surface flow	**L3**
3	**Explain** the concept of Impact of jet on vanes	**L2**
	Identify the type of turbine based on head, quantity of flow and speed	**L3**
4	**Apply** the principles of hydraulics and **Evaluate** the efficiencies of turbines and centrifugal pump	**L5**

	Program Outcome (POs)	PO No.
1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	PO 1
2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences	PO 2
3	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.	PO 3
4	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	PO 10

Content Delivery/Assessments methods and Scheme of Evaluation

Course delivery methods	Assessment methods
1. Lecture and Board	1.Assignments and Open Book Assignments
2. NPTEL/ Edusat	2.Quizzes
3. Power Point Presentation	3.Internal Assessment Tests
4. Videos	4.Semester End Examination

CIE and SEE Pattern:

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks: 50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE: 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

SURVEYING AND GEOMATICS LABORATORY

Course Code:	18CVL46	Credits:	02
Course Type:	PC	CIE Marks:	25 marks
Hours/week: L – T – P	1– 0 – 2	SEE Marks:	25 marks
Total Hours:	36	SEE Duration:	3 Hours for 50 marks

Course Learning Objectives (CLOs)	
1.	Demonstrate the Linear and Angular surveying instruments used in field work.
2.	To measure the Reduce level by rise and fall method and Height of instrument.
3.	Demonstrate the Theodolite and Total station used in field work.
4.	Demonstrate the advance instrument used in surveying.

Lists of Experiments

1. Introduction to Total Station: Components, Temporary adjustments, Basic functions, working principle, Coordinate system, measurement of distance, direction and elevation, File manager.
2. Total station Data processing and plotting
3. To plot the boundary of given field and determine area using total station survey
4. To carryout Contour Survey using total station, plot contours and determine area and volume of contours
5. Setting out of building using total station
6. To determine the global coordinates and elevation of a given point using DGPS
7. Delineation of catchment on given topo sheet and measurement of area using digital planimeter
8. Introduction to Bhuvan, Google earth and QGIS
9. To create map with information system using QGIS
10. Demonstration of Esurveying

Reference Books

1. Punmia B.C., **"Surveying Vol–1",** Laxmi Publications, New Delhi, Sixteenth edition, 2005 and above.
2. Subramanian R., **"Surveying and Levelling",** Oxford University Press, Third edition 2007 and above.
3. Venkataramiah C., "**Text Book of Surveying",** Universities Press, Second edition 2011 and above.
4. Dr. R. P. Rethaliya, **"Surveying",** Atul Prakashan, Gandhi road, Ahmadabad, ISBN No : 978-93-81-518-35-9
6. Kanetkar T.P and Kulkarni S.V - **"Surveying and Levelling Part- I",** Vidyarthi Ghrih Prakashan Pune, Twenty fourth edition 2010 and above.

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Understand** the applications of surveying instruments in civil engineering projects	**L2**
2. **Identify** the various instruments used for field work	**L3**
3. **Understand** the function of Compass, Auto level, Theodolite and Total station in surveying projects	**L2**
4. Prepare **plans** or maps to represent the area on a horizontal plane	**L3**
5. **Identify** and **understand** the use of advance surveying instruments used for surveying works	**L3, L2**

Program Outcome (POs) — **PO No.**

1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2.	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.	**PO 5**
3.	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO 9**
4	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.	**PO 10**

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE: 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

HYDRAULICS AND HYDRAULIC MACHINERY LABORATORY

Course Code:	18CVL47	Credits:	1.5
Course Type:	PC	CIE Marks:	25 marks
Hours/week: L – T – P	0– 0 –3	SEE Marks:	25 marks
Total Hours:	36	SEE Duration	3 Hours for 50 marks

Course learning objectives

1. Identify and calculate the various discharge coefficients for measurement of discharge and types of head losses in open channel flow.
2. Identify and calculate the various discharge coefficients for measurement of discharge and types of head losses in pipes by applying the concepts of mass and energy.
3. Apply the concept of impulse momentum principle and evaluate the impact coefficient for various types of vanes.
4. Demonstrate the applications of Bernoulli's equation
5. Identify and conduct experiments on pumps and turbines and evaluate its performance characteristics.

Pre-requisites: Fluid Mechanics and Hydraulics and Hydraulic machines

List of Experiments:

1. Calibration of Notches and weirs
2. Calibration of collecting tank (gravimetric method)
3. Calibration of pressure gauge (dead weight method)
4. Verification of Bernoulli's equation
5. Calibration of Venturiflume
6. Calibration of Venturimeter and Orificemeter
7. Determination of Darcy's friction factor for a straight pipe
8. Minor loses
9. Determination of Hydraulic coefficients of a vertical orifice and mouth piece
10. Determination of vane coefficients for vanes
11. Performance characteristics of a single stage centrifugal pump
12. Performance characteristics of a Pelton wheel
13. Performance characteristics of a Kaplan turbine
14. Performance characteristics of a Francis turbine
15. Demonstration of hydraulic jump

Reference Books:

1. P. N. Modi and S. M. Shet "Hydraulics and Fluid Mechanics "Standard Book house, New Delhi
2. Bansal R K., "Fluid Mechanics and Hydraulics Machines", Lakshmi Publication, New Delhi.
3. Sarbjit Singh "Experiments in Fluid Mechanics "PHI Pvt. Ltd.- New Delhi-
4. Dr. N. Balasubramanya "Hydraulics and Hydraulic Machines Laboratory Manual"

Course Outcomes (COs)

At the end of the course, students will be able to:	Bloom's Level

1	**Determine** various hydraulic coefficients and compare the results by graphs	**L5 L4**
2	**Make use of** Bernoulli's equation	**L3**
3	**Explain and evaluate** characteristics and performance of pumps and	**L5**

Program Outcomes (POs)

1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	**PO 1**
2	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO 9**
3	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.	**PO 10**

Assessment methods

1. Viva voce
2. Internal assessment
3. Weekly journal correction

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE: 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

CONCRETE AND HIGHWAY LABORATORY

Course Code	18CVL48	Credits	1.5
Course type	PC	CIE Marks	25 marks
Hours/week: L-T-P	0-0-3	SEE Marks	25 marks
Total Hours:	36	SEE Duration	3 Hours/2 Hours for 50 marks

Course Learning Objectives (CLOs)

1. To prepare the students effectively link laboratory tests with construction practices and comprehend the underlying theoretical principles.
2. To understand the characteristics and the various tests of pavement materials including: aggregate and bitumen
3. To conduct tests on hardened concrete.
4. To design and test concrete mix for the given workability and strength.
5. To equip the students with capability to conduct of experiments, analyze and interpret the results, draw suitable inferences in conformity with IS specifications.

Pre-requisites:

1. Building Materials and Concrete Technology
2. Highway Engineering

List of experiments

Tests on Cement

1 Normal Consistency and setting times (Initial and Final)
2 Specific Gravity of Cement
3 Fineness of cement by Blaine's air permeability test and sieve test
4 Compressive strength of Cement

Tests on Aggregates

5 Aggregate Impact Test
6 Los Angeles Abrasion Test
7 Aggregate Crushing Value Test
8 Specific Gravity and Water Absorption Test
9 Shape Tests

Tests on Fresh concrete

10 Workability tests: Slump cone, Compaction factor, Vee–Bee, Consistometer and Flow table tests.

Tests on Hardened concrete

11 Concrete mix design using IS Code (10262-2019)
12 Compression test on Concrete Cube
13 Split tensile strength test on Concrete Cylinder
14 Flexural Strength test on Concrete Beam

Tests on Bituminous Materials

15 Penetration Test
16 Ductility Test
17 Softening Point Test
18 Specific Gravity of Bitumen
19 Viscosity Tests
20 Flash and Fire Point Test

Books

1. S. K. Khanna, C. E. G. Justo and A. Veeraragavan, Highway and Pavement Testing, Nem Chand & Bros., Roorkee, India

2. L.R. Kadiyali, Traffic Engineering and Transportation Planning, Khanna Publishers.
3. IRC and ASTM Codes
4. Gambhir M. L., **"Concrete manual"**, Dhanpat Rai and Co.
5. Shetty M. S., **"Concrete Technology"**, S. Chand and Co. Ltd., 2009.
6. IS 383:1970, **"Specification for coarse aggregates and fine aggregates from natural sources for concrete".**
7. IS 650: 1991, **"Specification for standard sand for testing of cement".**
8. IS 2386 (Part 3) 1963, **"Methods of test for aggregates for concrete- specific gravity, density, voids, absorption and bulking"**
9. IS 10262: 2019, **"Concrete Mix design procedure"**

Course Outcome (COs)

	At the end of the course, the student will be able to	Bloom's Level
1.	**Analyze** the results from experiments and interpret the results with standard value	**L2**
2.	**Characterize** the pavement materials	**L2**
3.	**Perform** quality control tests on concrete and pavement materials	**L4**

	Program Outcome (POs)	PO No.
1.	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems	**PO 1**
2.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	**PO 8**
3.	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.	**PO 9**
4.	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.	**PO 10**

Assessment methods

1. Viva voce
2. Internal assessment
3. Weekly journal correction

Scheme of Continuous Internal Evaluation (CIE):

Components	Attendance/conduct of lab	Journal	Lab project	Total Marks
Maximum marks :25	10	10	5	25
Submission and certification of journal is compulsory to qualify for SEE Minimum marks required to qualify for SEE: 10 out of 25 marks				

Semester End Examination (SEE):

1.	It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.		
2.	Only one experiment to be conducted. In case, there are two parts then one experiment from each part.		
3.	Initial write up	10 marks	50 marks
	Conduct of experiment(s), result and conclusion	20 marks	
	One marks question	10 marks	
	Viva-voce	10 marks	
4.	Viva voce is conducted for individual student and not in group		
5.	Minimum passing marks to be scored in SEE: 20 out of 50 marks		

ENVIRONMENTAL STUDIES (MNC)

Subject Code:	18CV49	Credits:	MNC
Course Type:	HS	CIE Marks:	25 marks
Hours/week: L – T – P	2– 0– 0	SEE Marks:	-
Total Hours:	28	SEE Duration:	-

Course Learning Objectives (CLOs)

1. To understand the scope of Environmental Engineering.
2. Identify the Environmental impact due to Human activities.
3. To understand the concept of Disaster Management.
4. Identify the renewable and non renewable sources of energy.
5. Identify the various Legal aspects in Environmental Protection.

Pre-requisites: NIL

UNIT I — 06 Hours

Definition of Environment, Ecology and Eco-system, Structure and functions of ecosystem, balanced ecosystem, Introduction to Environmental Impact Assessment.

Natural Resources: Material Cycles - Oxygen, Carbon, Nitrogen and Hydrological cycle. Importance of water quality, Water borne diseases, Water induced diseases, Significance of Fluoride in drinking water.

UNIT II — 06 Hours

Energy - Different types of energy, Conventional and Non - Conventional sources – Advantages and Limitations of Wind Mills, Hydro Electric, Fossil fuel, Nuclear, Solar, Biomass and Bio-gas, Geothermal energy.

UNIT III — 06 Hours

Disasters - Natural Disasters: Meaning and nature of natural disasters, their types and effects (Floods, drought, cyclone, earthquakes, Tsunami). Man Made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution and marine pollution.

UNIT IV — 05 Hours

Disaster Management: International strategy for disaster reduction. Concept of disaster management and national disaster management framework

UNIT V — 05 Hours

Environmental Protection: Role of Government, Legal aspects, Initiatives by Non - Governmental Organizations (NGO), Environmental Education, Women Education. E waste and solid waste management rules

Text Books:

1. Benny Joseph, "**Environmental Studies**", Tata McGraw - Hill Publishing Company Limited (2005).
2. Ranjit Daniels R.J. and Jagdish Kirshnaswamy, **"Environmental Studies"**, Wiley India Private Ltd., New Delhi (2009).
3. Rajagopalan R. **"Environmental Studies – From Crisis to Cure"**, Oxford University Press (2005).
4. Sanjay K. Sharma, **"Environment Engineering and Disaster Management**", USP (2011).
5. Harsh K. Gupta, **"Disaster Management"**, Universities Press (India) Pvt. Ltd (2003).

References Books:

1. Raman Sivakumar, **"Principles of Environmental Science and Engineering"**, Second Edition, Thomson Learning, Singapore (2005).

2. Meenakshi P., **"Elements of Environmental Science and Engineering"**, Prentice Hall of India Private Limited, New Delhi (2006).
3. Prakash S.M., **"Environmental Studies"**, Elite Publishers, Mangalore (2007).
4. Erach Bharucha, "**Text Book of Environmental Studies**", for UGC, Universities Press (2005).
5. Tyler Miller Jr. G., **"Environmental Science – Working with the Earth"**, Tenth Edition, Thomson Brooks/Cole (2004).

Course Outcomes (COs)

	At the end of the course, the student will be able to	Bloom's Level
1	**Explain** the importance of the Environment	**L2**
2	**Evaluate** Environmental disasters caused by human activities	**L5**
3	**Outline** the water stress problems and energy crisis in present era.	**L2**
4	**Explain and classify** the Renewable and Non-Renewable sources of energy.	**L2**
5	**Summarize** the various Legislations related to Environment.	**L2**

Program Outcomes (POs)

1	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.	**PO6**
2	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	**PO7**

Content Delivery/Assessments methods and Scheme of Evaluation:

Course delivery methods	Assessment methods
1. Lecture and Board	1. Assignments and Open Book Assignment
2. NPTEL/ Edusat	2. Quizzes
3. Power Point Presentation	3. Internal Assessment Tests
4. Videos	4. Semester End Examination

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Quiz/Assignment/Activity	Total Marks
Maximum marks: 25	10+10 = 20	05	25
•Writing two IA tests is compulsory. •Minimum marks required: 10 out of 25 marks			