RV COLLEGE OF ENGINEERING®

(Autonomous Institution Affiliated to VTU, Belagavi)
R.V. Vidyaniketan Post, Mysore Road
Bengaluru – 560 059

Bachelor of Engineering (B.E.)
Scheme and Syllabus of III & IV Semesters

2018 SCHEME

CIVIL ENGINEERING

VISION

Leadership in Quality Technical Education, Interdisciplinary Research & Innovation, with a Focus on Sustainable and Inclusive Technology

MISSION

1. To deliver outcome based Quality education, emphasizing on Experiential Learning with the state of the art infrastructure.
2. To create a conducive environment for interdisciplinary research and innovation.
3. To develop professionals through holistic education focusing on individual growth, discipline, integrity, ethics and social sensitivity.
4. To nurture industry-institution collaboration leading to competency enhancement and entrepreneurship.
5. To focus on technologies that are sustainable and inclusive, benefiting all sections of the society.

QUALITY POLICY

Achieving Excellence in Technical Education, Research and Consulting through an Outcome Based Curriculum focusing on Continuous Improvement and Innovation by Benchmarking against the global Best Practices.

CORE VALUES

Professionalism, Commitment, Integrity, Team Work, Innovation

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2018 SCHEME

DEPARTMENT OF
CIVIL ENGINEERING

DEPARTMENT VISION

Excel in Education, Research and Consultancy in Civil Engineering with emphasis on Sustainable Development

DEPARTMENT MISSION

- Disseminating and integrating the knowledge of civil Engineering and allied fields
- Enhancing industry-institute interaction leading to interdisciplinary research.
- Imbibing wide-range of skills in cutting-edge technology for sustainable development.
- Motivate entrepreneurship and professional ethics to serve the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1. Successfully address technological and managerial challenges.
PEO2. Professionally design and execute Civil Engineering projects.
PEO3. Pursue advanced education, research and continue life-long learning process to remain active professionals.
PEO4. Play key roles in addressing societal needs through interdisciplinary approach.

PROGRAM SPECIFIC OUTCOMES (PSOS)

PSO	Description
PSO1	Apply knowledge of fundamental aspects to analyze and design civil engineering structures.
PSO2	Provide sustainable solutions to civil engineering problems.
PSO3	Employ codal provisions to arrive at comprehensive solutions to address societal needs
PSO4	Exhibit communication and teamwork skills.

Lead Society: American Society of Civil Engineers (ASCE)

ABBREVIATIONS

Sl. No.	Abbreviation	Meaning
1.	VTU	Visvesvaraya Technological University
2.	BS	Basic Sciences
3.	CIE	Continuous Internal Evaluation
4.	SEE	Semester End Examination
5.	CE	Professional Core Elective
6.	GE	Global Elective
7.	HSS	Humanities and Social Sciences
8.	CV	Civil Engineering
9.	ME	Mechanical Engineering
10.	EE	Electrical & Electronics Engineering
11.	EC	Electronics & Communication Engineering
12.	IM	Industrial Engineering & Management
13.	EI	Electronics & Instrumentation Engineering
14.	CH	Chemical Engineering
15.	CS	Computer Science & Engineering
16.	TE	Telecommunication Engineering
17.	IS	Information Science & Engineering
18.	BT	Biotechnology
19.	AS	Aerospace Engineering
20.	PH	Physics
21.	CH	Chemistry
22.	MA	Mathematics

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RV COLLEGE OF ENGINEERING®

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CIVIL ENGINEERING

THIRD SEMESTER CREDIT SCHEME							
Sl. No.	**Course Code**	**Course Title**	**BoS**	**Credit Allocation**			**Total Credits**
				L	**T**	**P**	
1.	18MA31C *	Engineering Mathematics - III	MA	4	1	0	**5**
2.	18CV32**	Civil Engineering Materials	CV	2	0	0	**2**
3.	18CV33	Surveying	CV	3	0	1	**4**
4.	18CV34	Concrete Technology	CV	3	0	1	**4**
5.	18CV35	Strength of Materials	CV	3	1	1	**5**
6.	18CV36	Water Supply Engineering	CV	3	0	0	**3**
7.	18DMA37***	Bridge Course: Mathematics	MA	2	0	0	**0**
8.	18HS38#	Kannada	HSS	1	0	0	**0**
Total Number of Credits							**23**
Total number of Hours/Week				**18+3***	**4**	**7.5**	

*Engineering Mathematics - III

Sl.No	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Linear Algebra, Laplace Transform and Combinatorics	18MA31A	CS& IS
2.	Discrete and Integral Transforms	18MA31B	EC,EE,EI &TE
3.	Engineering Mathematics -III	18MA31C	AS, BT,CH,CV,IM &ME

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Sl.No	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Environmental Technology	18BT32A	EE,EC,EI,CS,TE & IS
2.	Biology for Engineers	18BT32B	BT & AS
3.	Engineering Materials	18ME32	ME, CH & IM
4.	Civil Engineering Materials	18CV32	CV

***Bridge Course: Audit course for lateral entry diploma students

Sl.No	COURSE TITLE	COURSE CODE	PROGRAMS
1	Bridge Course Mathematics	18DMA37	AS,BT,CH,CV,EC,EE,EI,IM,ME&TE
2	Bridge Course C Programming	18DCS37	CS& IS

#Mandatory audit course for all students.

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CIVIL ENGINEERING

FOURTH SEMESTER CREDIT SCHEME

Sl. No.	Course Code	Course Title	BoS	Credit Allocation			Total Credits
				L	T	P	
1.	18MA41C*	Engineering Mathematics-IV	MA	4	1	0	**5**
2.	18BT42A **	Environmental Technology	BT	2	0	0	**2**
3.	18CV43	Fluid Mechanics	CV	3	0	1	**4**
4.	18CV44	Building Construction and Planning	CV	3	0	1	**4**
5.	18CV45	Structural Analysis- I	CV	4	0	0	**4**
6.	18CV46	Soil Mechanics	CV	3	0	0	**3**
7.	18CV47	Design Thinking lab	CV	0	0	2	**2**
8.	18DCS48***	Bridge Course: C Programming	CS	2	0	0	**0**
9.	18HS49	Professional Practice-I Communication Skills	HSS	0	0	1	**1**
Total Number of Credits							**25**
Total number of Hours/Week				**19+2**	**2**	**10+1**	

* ENGINEERING MATHEMATICS – IV

Sl.No.	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Graph Theory, Statistics and Probability Theory	18MA41A	CS & IS
2.	Linear Algebra, Statistics and Probability Theory	18MA41B	EC, EE, EI &TE
3.	Engineering Mathematics -IV	18MA41C	AS, CH, CV& ME

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Sl.No.	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Engineering Materials	18EC42	EC, EE, EI &TE
2.	Biology for Engineers	18BT42B	CS & IS
3.	Environmental Technology	18BT42A	CV, ME, IM,CH, BT &AS

*** Bridge Course: Audit course for lateral entry diploma students

Sl.No.	COURSE TITLE	COURSE CODE	PROGRAMS
1	Bridge Course Mathematics	18DMA48	CSE, ISE
2	Bridge Course C Programming	18DCS48	AS, BT,CH,CV,EC, EE, EI, IM, ME &TE

Note: Internship to be taken up during the vacation after the 4th semester

Semester: III						
ENGINEERING MATHEMATICS – III **(Theory)** **(Common to AS, BT, CH, CV, IM & ME)**						
Course Code	**:**	18MA31C		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	4:1:0		**SEE**	**:**	**100 Marks**
Total Hours	**:**	52L+13T		**SEE Duration**	**:**	**3.00 Hours**

Course Learning Objectives: The students will be able to	
1	Understand variation and external of functional.
2	Analyze the concept of periodic phenomena and develop Fourier series.
3	Solve initial value problems using Laplace transform.
4	Determine the approximate solutions of algebraic/transcendental and partial differential equations using numerical methods.
5	Use mathematical IT tools to analyze and visualize the above concepts.

Unit-I	**10 Hrs**
Calculus of Variations: Introduction to variation of functional, external of a functional, Euler's equation –special cases, problems. Geodesics, Hanging cable and Brachistochrone problems. Exploring geodesics graphically using MATLAB.	
Unit – II	**11 Hrs**
Fourier Series: Introduction, periodic function, even and odd functions. Dirichlet's conditions, Euler's formula for Fourier series, complex Fourier series, problems on time periodic signals (square wave, half wave rectifier, saw-tooth wave and triangular wave), Fourier sine series, Fourier cosine series. Exploring Fourier series using MATLAB.	
Unit –III	**11 Hrs**
Laplace and Inverse Laplace Transform: Existence and uniqueness of Laplace Transform (LT), transform of elementary functions, region of convergence. Properties - Linearity, scaling, s – domain shift, differentiation in the s – domain, division by t, differentiation and integration in the time domain. Transform of periodic functions (square wave, saw-tooth wave, triangular wave, full and half wave rectifier). Inverse Laplace transform – properties, evaluation using different methods. Convolution theorem (without proof), problems. Solution of ordinary differential equations. Exploring Laplace and inverse Laplace transform using MATLAB commands.	
Unit –IV	**10 Hrs**
Numerical Methods – I: Roots of algebraic and transcendental equations. Fixed point iteration method, Newton- Raphson method for multiple roots. Solution to system of linear equations – LU decomposition method, partition method. Sparse linear systems – Thomas algorithm for tridiagonal matrices. Computing numerical solutions using MATLAB.	
Unit –V	**10 Hrs**
Numerical Methods – II: Numerical solutions to partial differential equations – Finite difference approximation to derivatives, solution of Laplace equation in two dimension, heat and wave equations in one dimension (explicit methods). Exploring solution of PDE using MATLAB.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the fundamental concepts of variation of functionals, periodic phenomena, Laplace and inverse Laplace transforms and numerical techniques.
CO2:	Solve the problems on extremal of functional, Fourier series, Laplace and inverse Laplace transforms and basics of numerical methods.

CO3:	Apply the acquired knowledge to solve variational problems, half range series, differential equations using Laplace transform, system of linear equations and PDEs using finite difference technique.
CO4:	Analyze and interpret applications of functionals, complex Fourier series, IVP and BVP using LT, sparse linear systems and PDEs occurring in Engineering problems.

Reference Books	
1	Higher Engineering Mathematics, B.S. Grewal, 44th Edition, 2015, Khanna Publishers, ISBN: 81-7409-195-5.
2	Higher Engineering Mathematics, B.V. Ramana, 11th Edition, 2010, Tata McGraw-Hill, ISBN: 13-978-07-063419-0; ISBN: 10-0-07-063419-X.
3	Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, 2007, John Wiley & Sons, ISBN: 978-81-265-3135-6.
4	Numerical methods for scientific and engineering computation, M.K. Jain, S.R.K. Iyenger and R.K. Jain, 6th Edition, 2012, New Age International Publishers, ISBN: 9788122433234, 8122433235.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20. **Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.**

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	1	2	2	-	-	-	-	-	-	-	-	1
CO4	-	1	1	3	-	-	-	-	-	-	-	1

High-3 : Medium-2 : Low-1

Semester: III						
CIVIL ENGINEERING MATERIALS (Theory)						
Course Code	**:**	18CV32		**CIE**	**:**	**50 Marks**
Credits: L:T:P	**:**	2:0:0		**SEE**	**:**	**50 Marks**
Total Hours	**:**	26L		**SEE Duration**	**:**	**2.00 Hours**

Course Learning Objectives: The students will be able to	
1	Understand the behaviour and properties of Engineering materials
2	Recognize various types of engineering materials used in construction industry
3	Compare behaviour of various engineering materials in construction industry
4	Describe properties of Smart engineering materials and fibres in civil engineering

UNIT-I	**05 Hrs**
Stones: Engineering Rock Classification, Physical properties of minerals, major rock forming minerals, occurrence and use of minerals. Introduction to major rock types (Igneous, sedimentary and metamorphic rocks); their genesis, classification and structures; Engineering properties of rocks, advantages and disadvantages of different rock types at constructions sites. Common building stones in India and its uses as per IS codal recommendations.	
UNIT-II	**05 Hrs**
Construction and demolition waste: Waste disposal, categories of waste, properties of C&D waste, waste utilization criteria, Recyclable and non-recyclable C&D waste, BIS codal provisions **Fibres:** Carbon fibres, CFRP, Polyfibres, Pre-Preg Carbon fibres, reinforced polymers and polyesters	
UNIT-III	**05 Hrs**
Timber: Classification of timber, qualities of good timber, common timbers used for building work, Types of plywood, Ply board, properties and applications. Bamboo as building material **Glass:** Types of glass and its engineering properties for use in construction	
UNIT-IV	**05 Hrs**
Metals: Types and properties of Iron and Steel – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminium and application. HYSD and TMT bars **Materials:** Clay products, ceramics –Refractories Fibre Textiles – Geosynthetics for Civil Engineering applications, Polymers in Civil Engineering.	
UNIT-V	**06 Hrs**
Smart Construction Materials: Introduction, Shape memory alloys, Magnetostrictive Materials, Piezoelectric materials, Electro rheological and electrochromic materials- applications in civil engineering.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Explain the properties of engineering materials
CO2:	Select suitable various types of engineering materials to be used in construction industry and utilization of construction and demolition waste.
CO3:	Examine the behaviour of various engineering materials in construction industry
CO4:	Illustrate the properties of Smart engineering materials and fibres in civil engineering

Reference Books	
1.	Engineering and General Geology ,Parbin Singh, Edition 2013, S.K. Kataria & Sons, ISBN 10: 9350142678
2.	Engineering Materials 1, An Introduction to Properties, Applications and Design , D.R.H. Jones , Michael F. Ashby , Butterworth-Heinemann, 5th Edition, 2018, ISBN-10: 0081020511
3.	Engineering Materials , Rangawala, 43rd Edition,2007, Publisher: Charotar Publishing House Pvt. Ltd, ISBN-10: 9385039172
4.	Basic Civil Engineering, Sateesg Gopi , 2009, Pearson publication, ISBN 9788131729885

Continuous Internal Evaluation (CIE); Theory (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 15 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 30 marks each and the sum of the marks scored from three tests is reduced to 25. The marks component for Experiential Learning is 20.

Total CIE is 15(Q) +25(T) +10(EL) =50 Marks.

Semester End Evaluation (SEE); Theory (50 Marks)

SEE for 50 marks are executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 10 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 8 marks adding up to 40 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	1	-	-	-	-	1
CO2	3	2	-	-	-	-	1	-	-	-	-	1
CO3	3	2	-	-	-	-	1	-	-	-	-	1
CO4	3	2	-	-	-	-	1	-	-	-	-	1

High-3: Medium-2: Low-1

Semester: III						
SURVEYING (Theory &Practice)						
Course Code	**:**	18CV33		**CIE**	**:**	**100+50**
Credits: L:T:P	**:**	3:0:1		**SEE**	**:**	**100+50**
Total Hours	**:**	39L+33P		**SEE Duration**	**:**	**3 Hrs + 3 Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the concepts of surveying and leveling.
2	Identify the components of surveying and leveling.
3	Interpret the different measurement techniques for various applications.
4	Apply principles of surveying for solving relevant engineering problems.

UNIT-I	**08 Hrs**
Fundamentals of Maps: Maps - types; scales-types; measuring distance; finding direction and use of symbols. Map projection - Latitude, Longitude and time, Topographical survey – Toposheets and Principles of topo sheet numbering, Analysis of landforms using maps. **History of Surveying**: Definition of Surveying, Uses of Surveying, Basic principles of surveying, Classification of Surveys. Introduction to Chain surveying, Compass surveying, Plane table surveying and Theodolite surveying. Booking of chain survey work - Field book entries.	
UNIT-II	**07 Hrs**
Leveling: Principles and basic definitions, Fundamental axes and parts of a dumpy level, types of adjustments and objectives, temporary adjustments of a dumpy level, Types of leveling – Simple leveling, Profile leveling, fly leveling and cross sectioning. Booking of levels 1. Rise and fall method 2. Height of instrument method – comparison, Arithmetic checks. Numerical problems. **Contour Survey:** Contours and their characteristics, Methods of contouring – direct and indirect methods (squares and cross section methods), Uses of contours.	
UNIT-III	**08 Hrs**
Total Station: Introduction - Parts of a Total Station – Accessories – Advantages - Limitations and Applications, Field procedure for total station survey, data transfer, preparation of maps. Contour surveying using Total station. **Photogrammetry:** Principles of Photogrammetry, Types – Terrestrial and Aerial Photogrammetry, Advantages over ground survey methods - geometry of vertical photographs, scales of vertical photograph. Ground coordination- relief displacement, distance measurements in photographs – flight planning.	
UNIT-IV	**08Hrs**
Curve Setting: Curves- Necessity – types, simple curves – elements – Designation of curves- Methods of setting out simple curves by linear methods – Long chord method, successive bisection method, and chords produced method. Angular method of Rankine's deflection angle, Compound curve including numerical problems.	
UNIT-V	**08Hrs**
Introduction to modern surveying: GPS, DGPS, Drone surveying and LiDAR. **Remote Sensing and GIS:** Introduction, Principles, Types and Applications of Remote Sensing. Introduction to GIS, functions and advantages, sources of data for GIS. Geographical Information System, Key Components of GIS, Functions of GIS, Data Management and Transformation. Data input methods, data analysis. Overlay operations, Network analysis and Spatial analysis.	

Laboratory
I. Chain Surveying 1. To measure distance between two points using direct ranging and setting out perpendiculars. 2. Marking central line of a building using grid plan using chain and its accessories.
II. Levelling 3. To determine difference in elevation between two points using differential levelling technique, using height of the instrument method and rise and fall methods. 4. To perform profile levelling and to draw the longitudinal section and cross section to determine the depth of cut and height of filling for a given formation level.
III. Total station 5. Contour surveying using total station. 6. To determine the elevation, Distance and gradient between two inaccessible points using total station. 7. Traversing using total station.
IV. Curves 8. To set out simple curves using linear methods-perpendicular offsets from long chord and offsets from chord produced methods. 9. To set out simple curve using Rankine's deflection angles method. 10. To set out compound curve by angular method.
V. GIS 11. To generate thematic map using GIS Software.

Course Outcomes: After completing the course, the students will be able to	
CO1:	Describe fundamental concepts of Surveying, Levelling, Total station and application of remote sensing and GIS.
CO2:	Discuss components of all types of surveying.
CO3:	Apply the concepts of measurements in engineering problems.
CO4:	Demonstrate the applications of remote sensing and GIS for solving engineering problems.

Reference Books:	
1.	Surveying Vol.I and Vol.II, Punmia B.C, 16th Edition, 2016, Laxmi Publications, (P) Ltd, New Delhi ISBN-10: 9788170088530 ISBN-10: 8170088836
2.	Plane surveying, Chandra A.M, 2nd Edition, 2015, Newage International (P) Ltd., ISBN-10: 8122438806
3.	Fundamentals of Remote Sensing, George Joseph, 3rd Edition, 2018, Universities press, ISBN-10: 9386235463, ISBN-13: 978-9386235466.
4.	Surveying Vol.I & II,, Duggal S.K, 8th Edition, 2017, Tata Mc Graw Hill Publishing Co., ISBN-10: 9781259028991 ISBN-10: 978125902899
5.	Surveying, Vol.I & II, Arora K.R, 2016, Standard Book House, ISBN-10: 8189401246 ISBN-10: 8189401238

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Scheme of Continuous Internal Evaluation (CIE); Practical Test for 50 Marks
The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average marks (AM) over number of weeks is considered for 30 marks. At the end of the semester a test (T) is conducted for 10 marks. The students are encouraged to implement additional innovative experiments (IE) in the lab and are rewarded for 10 marks. Total marks for the laboratory is 50.
Total CIE is 30(AM) +10 (T) +10 (IE) =50 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)
SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Scheme of Semester End Examination (SEE); Practical Exam for 50 Marks
SEE for the practical courses will be based on experiment conduction with proper results, is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

Semester End Evaluation (SEE): Theory (100 Marks) + Practical (50 Marks) = Total 150 Marks

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	-	-	-	1	-	-	-	-	-	-
CO2	2	2	-	-	1	1	-	-	-	-	-	-
CO3	2	2	1	1	-	1	1	-	-	-	-	1
CO4	1	2	1	-	3	1	1	-	-	-	1	1

High-3: Medium-2: Low-1

Semester: III						
CONCRETE TECHNOLOGY (Theory &Practice)						
Course Code	**:**	18CV34		**CIE**	**:**	**100+50**
Credits: L:T:P	**:**	3:0:1		**SEE**	**:**	**100+50**
Total Hours	**:**	39L+33P		**SEE Duration**	**:**	**3Hrs + 3 Hrs**
Course Learning Objectives: The students will be able to						
1	Outline the manufacturing and types of cements and concrete and its application.					
2	Assess the methods of measuring properties of concrete					
3	Describe various strength of concretes and enhancing the properties of concrete using admixture					
4	Analyze the methods of mix proportion and importance of ready mix concrete					

UNIT-I	**07 Hrs**
Cement: Manufacturing of cement (dry and wet process), Hydraulic Cement, Bogue's compounds, Types of cement, Hydration, product of hydration and its importance, importance of water cement ratio, Transition zone, brief description of field and laboratory testing of cement. Water and its Quality, Gel space ratio (Numerical problems) **Aggregates:** Natural and alternate, Properties and Testing ,	
UNIT-II	**09 Hrs**
Concrete: Manufacturing Concrete: Mixing, Transporting, Placing, Compaction and Curing, Importance of Curing and Methods of Curing, Segregation, Bleeding. Workability: Factors affecting workability, Measurement by various tests, Recommendations of IS: 456-2000 - Sampling procedure, Acceptance criteria, Rheology- Importance, Bingham Parameters **Special Concrete:** High Strength concrete, High Performance Concrete, Self-Compacting Concrete, Fibre Reinforced Concrete, Geopolymer Concrete- Properties and applications.	
UNIT-III	**08 Hrs**
Admixtures: Chemical admixtures. Action of plasticizers, Water reducers, super plasticizers, accelerators, retarders, air entraining admixtures. Mineral admixtures: GGBS, fly ash, metakaolin, silica fume, Alccofine Significance of Durability in concrete – Cracking, chemical attack, Alkali aggregate reaction, Permeability, water absorption, Sorptivity.	
UNIT-IV	**08 Hrs**
Strength Compressive Strength Factors affecting, Abrams' law, Importance of Strength development with age, Maturity concept (Numerical Problems), accelerated curing, Relation between compressive and tensile strength, Flexural strength, Methods of finding the strength. Importance of Non-destructive tests, Rebound hammer test, Ultra sonic pulse velocity test. Procedure to conduct tests – Penetration and pull out test	
UNIT-V	**07 Hrs**
Concrete mix Design: Significance and objectives of concrete mix proportioning, General Considerations, Mix proportioning using IS 10262 : 2019 method (Numerical problems),Quality control, Frequency of testing	

Laboratory
1. Bulking of Sand and water absorption of coarse aggregates. 2. Specific gravity of cement 3. Consistency of cement, Initial and final setting time of cement 4. Compressive Strength of cement 5. Mix design and Workability tests on fresh concrete (Slump test, Compaction factor and Vee-Bee consistometer) 6. Tests on Hardened concrete properties (Compressive Strength, Split Tensile Strength) 7. Non destructive testing of concrete –Rebound hammer, UPV and location of Rebars using Profometer

8. Flow test on cement mortar
9. Demonstration experiments
   i. Soundness test on cement
   ii. Flexural strength of concrete
   iii. Tests on self compacting concrete

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the properties of cement and concrete
CO2:	Assess the quality of ingredients of concrete
CO3:	Identify the concrete for specific application
CO4:	Proportion the concrete mix for a particular requirement

Reference Books	
1.	Concrete technology, Shanthakumar.A.R, Apr 2018, Oxford University Press, New Delhi, ISBN-13: 978-0199458523
2.	Concrete Technology: Theory and Practice, M. S. Shetty A. K. Jain, 8th Edition, 2018, S Chand Publishing, ISBN-13: 978-9352533800
3.	Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta , Paulo J.M. Monteiro, 4th Edition, Jul 2017, McGraw Hill Education; ISBN-13: 978-9339204761.
4.	Properties of concrete, Neville. A.M, 5th Edition, 2012, Pearson Education, Inc, and Dorling Kindersley Publishing Inc., ISBN-13: 978-8131791073
5.	Concrete Technology: Theory and Practice, M.L. Gambhir, 5th Edition, 2017, McGraw Hill Education, ISBN-13: 978-1259062551
6.	Design of concrete mixes, N Krishna Raju, 5th Edition, 2018 reprint, CBS publishers and distributors, ISBN 9788123924670
7.	IS 10262: 2019, Concrete Mix proportioning guidelines IS 456:2000 Plain and Reinforced Concrete

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Scheme of Continuous Internal Evaluation (CIE); Practical Test for 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average mark (AM) over number of weeks is considered for 30 marks. At the end of the semester a test (T) is conducted for 10 marks. The students are encouraged to implement additional innovative experiments (IE) in the lab and are rewarded for 10 marks. Total marks for the laboratory is 50.

Total CIE is 30(AM) +10 (T) +10 (IE) =50 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Scheme of Semester End Examination (SEE); Practical Exam for 50 Marks
SEE for the practical courses will be based on experiment conduction with proper results, is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

Semester End Evaluation (SEE): Theory (100 Marks) + Practical (50 Marks) = Total 150 Marks

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2	3	-	2	2	2	3	1	-	-
CO2	2	2	1	2	-	1	3	2	3	2	-	-
CO3	2	2	2	-	-	1	3	2	3	2	-	-
CO4	2	2	-	1	-	2	3	1	3	2	-	-

High-3: Medium-2: Low-1

Semester: III						
STRENGTH OF MATERIALS (Theory &Practice)						
Course Code	**:**	18CV35		**CIE**	**:**	**100+50 Marks**
Credits: L:T:P	**:**	3:1:1		**SEE**	**:**	**100+50 Marks**
Total Hours	**:**	39L+26T+33P		**SEE Duration**	**:**	**3 Hrs+3 Hrs**

Course Learning Objectives: The students will be able to

1	Determine the two-dimensional stress systems and analyze the Shear force and bending moment for beam elements.
2	Evaluate the behaviour of column and strut under compression.
3	Compare the behaviour of solid and hollow shaft under various loading condition.
4	Examine the mechanical properties of various materials under tensile, compressive, torsion and impact loading.

Unit-I	**09 Hrs**
Simple stresses and strain: Hooke's law, Stress Strain behavior of mild steel and concrete; Analysis of bars of uniform and varying cross sections, Tapering and stepped bars; Analysis of Simple and Composite bars of equal and unequal lengths; Elastic constants (No derivation of interrelationship), Volumetric strain. - Numerical problems. **Two-Dimensional Stress Systems:** Introduction, Stress components on inclined planes, Principal Stresses, principal planes- Analytical methods of stress computations - Numerical problems. Temperature Stresses of homogeneous materials – Numerical problems.	
Unit-II	**8 Hrs**
Bending moment and shear force: shear force and Bending moment for Statically determinate beams, Sign conventions, Relationship between loading, shear force and bending moment. S.F and B M diagrams for cantilever statically determinate beams subjected to various vertical loads, moment, Couple and their combinations - Numerical problems.	
Unit-III	**8 Hrs**
Bending stress and shear stress in beams: Introduction, Assumptions in simple bending theory, Derivation of Bernoulli's equation, modulus of rupture, section modulus, flexural rigidity, expression for horizontal shear stress in beam, variation of bending stress and shear stress diagram for cross-sections-rectangular, T and I sections - Numerical problems.	
Unit-IV	**7 Hrs**
Deflection of determinate Beams: Introduction, Elastic curve –Derivation of differential equation of flexure, Sign convention, Slope and deflection using Macaulay's method for statically determinate beams subjected to various vertical loads, moment, couple and their combinations. Numerical problems.	
Unit V	**7 Hrs**
Analysis of columns and struts: Introduction, short and long columns, radius of gyration, slenderness ratio, buckling load, effective length, Euler's theory of columns, Derivation of Euler's Buckling load for columns with different end conditions, Limitations of Euler's theory, Rankine's formula. Numerical problems on solid and hollow column section. Eccentric columns – Problems.	

Laboratory	
1.	Dimensionality of bricks, Water absorption, Initial rate of absorption
2.	Specific gravity of coarse and fine aggregate
3.	Fineness modulus of Fine and Coarse aggregate
4.	Compressive strength tests on building blocks (brick, solid blocks and hollow blocks)
5.	Tension test on Mild steel and HYSD bars
6.	Compression test on HYSD, Cast iron
7.	Bending Test on Wood under two-point loading.
8.	Shear Test on Mild steel – single and double shear
9.	Impact test on Mild Steel (Charpy& Izod)

Course Outcomes: After completing the course, the students will be able to	
CO1:	Illustrate the mechanical behaviour of various elements
CO2:	Apply the basic concepts of mechanics in determining the stress developed in the materials
CO3:	Evaluate the behaviour of materials under various loading condition
CO4:	Examine the mechanical properties of various materials under different loading conditions

Reference Books	
1.	Mechanics of Materials, R. C. Hibbler, ,SI Edition, April 2018, Pearson Publications, ISBN-13: 978-9332584037
2.	Elements of Strength of Materials, Timoshenko and Young, 5th Edition, Affiliated East-West Press, 2011 ISBN: 9788176710190.
3.	Mechanics of Materials, F.P.Beer and R.Johnston, 7th Edition, McGraw-Hill Publishers, 2007 ISBN 978-0073398235.
4.	Strength of Materials, S. Ramamrutham, R. Narayanan, 18th Edition, DhanapathRai Publishing company, New Delhi ,2014 ISBN 9789384378264

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Scheme of Continuous Internal Evaluation (CIE); Practical Test for 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average marks (AM) over number of weeks are considered for 30 marks. At the end of the semester a test (T) is conducted for 10 marks. The students are encouraged to implement additional innovative experiments (IE) in the lab and are rewarded for 10 marks. Total marks for the laboratory is 50.

Total CIE is 30(AM) +10 (T) +10 (IE) =50 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Scheme of Semester End Examination (SEE); Practical Exam for 50 Marks

SEE for the practical courses will be based on experiment conduction with proper results, is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

Semester End Evaluation (SEE): Theory (100 Marks) + Practical (50 Marks) = Total 150 Marks

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	1	2	-	-	-	-	-	-	-	1
CO3	-	1	-	3	-	-	-	-	-	-	-	-
CO4	-	-	2	3	-	-	-	-	-	-	-	-

High-3: Medium-2: Low-1

Semester: III						
WATER SUPPLY ENGINEERING (Theory)						
Course Code	**:**	18CV36		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	3:0:0		**SEE**	**:**	**100 Marks**
Total Hours	**:**	39L		**SEE Duration**	**:**	**3.00 Hours**

Course Learning Objectives: The students will be able to	
1	To analyse the variation of water demand and to estimate water requirement for a community
2	To evaluate the sources and conveyance systems for raw and treated water
3	To study drinking water quality standards and to illustrate qualitative analysis of water
4	To design physical, chemical and biological treatment methods to ensure safe and potable water Supply.

UNIT-I	**06 Hrs**
Introduction: Water crisis, Conservation of water resources, Need for protected water supply. **Demand of Water**: Types of water demands -domestic demand, institutional and commercial, public use, fire demand. Factors affecting per capita demand. Population forecasting - different methods with merits and demerits. Variations in demand of water. Peak factor, Design period and factors governing design period. Numerical problems.	
UNIT-II	**08 Hrs**
Quality of Water: Objectives of water quality management, Concept of safe water, wholesomeness and palatability. Water borne, water based, water washed and vector diseases. **Examination of Water**: Sampling - Objectives, Methods, Preservation techniques. Physical, Chemical and Microbiological Examinations, (IS: 3025and IS: 1622) using analytical & Instrumental techniques. Drinking water BIS, ICMR standards & WHO guidelines, Health significance of Fluoride, Nitrates, Hardness and Heavy metals like Mercury and Cadmium. **Sources:** surface and subsurface sources -suitability with regard to quality and quantity.	
UNIT-III	**08 Hrs**
Collection and Conveyance of Water: Intake structures -different types of intakes – river, canal and reservoir intake. Design problems. Design of the economical diameter for the rising main; Pipe appurtenances. Pipe materials: different materials with advantages and disadvantages. **Pumps:** Types of pumps with working principles. Numerical Problems**.** **Water Treatment:** Objectives, Treatment flow chart – significance of each unit	
UNIT-IV	**10 Hrs**
Aeration : Principle of working and types of aerators, Design of cascade aerator **Screening:** Types and design of bar screen. **Sedimentation** -theory, settling tanks, types, design. **Coagulation aided sedimentation**-types of coagulants, chemical feeding, flash mixing, flocculators - design of all units **Filtration:** mechanism -theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning. Design of slow and rapid sand filter without under drainage system.	
UNIT-V	**07 Hrs**
Disinfection: Theory of disinfection, methods of disinfection, chlorination, chlorine demand, residual chlorine, break point chlorination. Numerical problems. **Miscellaneous Treatment**: Softening, Fluoridation and De-fluoridation, Activated carbon treatment **Distribution system:** Methods- Gravity, Pumping, Combined gravity and pumping system. Layouts: Dead end, Radial, Grid iron, Circular system. Network analysis in distribution system – Hardy cross method, Numerical problems. Hazen- Williams formula. EPANET and WATERGEMS.	

Course Outcomes: After completing the course, students will be able to	
CO1:	Estimate average and peak water demand for a community.
CO2:	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
CO3:	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
CO4:	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Reference Books	
1.	Water Supply Engineering: Environmental Engineering - Vol. I – 2017 Santosh Kumar Garg, Khanna Publisher, ISBN-10: 9788174091208
2.	Water & Waste Water Technology, Mark.J Hammer, 2008, John Wiley & Sons Inc., New York,.
3.	Environmental Engineering, I-Water Supply Engineering, B.C. Punmia and Ashok Jain, 2010, Laxmi Publications (P)Ltd., New Delhi.
4.	Environmental Engineering, Howard S. Peavy, Donald R. Rowe, George T, 2017, McGraw Hill International Edition, New York, ISBN-10: 9351340260
5.	CPHEEO Manual on water supply and treatment engineering, Ministry of Urban Development, Government of India, New Delhi, 3rd Edition, 2018, Akalank Publications; ISBN-10: 8176393819

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	1	-	-	-	-	1
CO2	2	3	1	-	-	2	1	2	-	-	-	1
CO3	3	2	1	1	-	2	1	3	-	-	-	1
CO4	3	3	3	-	-	2	2	1	-	-	-	1

High-3: Medium-2: Low-1

Semester: III						
MATHEMATICS **Bridge Course** **(Common to all branches)**						
Course Code	**:**	18DMA37		**CIE**	**:**	**50 Marks**
Credits: L:T:P	**:**	2:0:0		**SEE**	**:**	**50 Marks**
Audit Course				**SEE Duration**	**:**	**2.00 Hours**

Course Learning Objectives: The students will be able to

1	Understand the concept of functions of several variables, types of derivatives involved with these functions and its applications, approximate a function of single variable in terms of infinite series.
2	Acquire concepts of vector functions, scalar fields and differential calculus of vector functions in Cartesian coordinates.
3	Explore the possibility of finding approximate solutions using numerical methods in the absence of analytical solutions of various systems of equations.
4	Recognize linear differential equations, apply analytical techniques to compute solutions.
5	Gain knowledge of multiple integrals and their applications.
6	Use mathematical IT tools to analyze and visualize the above concepts.

Unit-I	**05 Hrs**
Differential Calculus: Taylor and Maclaurin series for function of single variable. Partial derivatives – Introduction, simple problems. Total derivative, composite functions. Jacobians – simple problems.	
Unit – II	**05 Hrs**
Vector Differentiation: Introduction, simple problems in terms of velocity and acceleration. Concepts of gradient, divergence – solenoidal vector function, curl – irrotational vector function and Laplacian, simple problems.	
Unit –III	**06 Hrs**
Differential Equations: Higher order linear differential equations with constant coefficients, solution of homogeneous equations - Complementary functions. Non homogeneous equations –Inverse differential operator method of finding particular integral based on input function (force function).	
Unit –IV	**05 Hrs**
Numerical Methods: Solution of algebraic and transcendental equations – Intermediate value property, Newton-Raphson method. Solution of first order ordinary differential equations – Taylor series and 4^{th} order Runge-Kutta methods. Numerical integration – Simpson's $1/3^{rd}$, $3/8^{th}$ and Weddle's rules. (All methods without proof)**.**	
Unit –V	**05 Hrs**
Multiple Integrals: Evaluation of double integrals, change of order of integration. Evaluation of triple integrals. Applications – Area, volume and mass – simple problems.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the concept of partial differentiation, double integrals, vector differentiation, solutions of higher order linear differential equations and requirement of numerical methods.
CO2:	Solve problems on total derivatives of implicit functions, Jacobians, homogeneous linear differential equations, velocity and acceleration vectors.
CO3:	Apply acquired knowledge to find infinite series expansion of functions, solution of non-homogeneous linear differential equations and numerical solution of equations.
CO4:	Evaluate triple integrals, area, volume and mass, different operations using del operator on scalar and vector point functions, numerical solution of differential equations and numerical integration.

Reference Books	
1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2015, ISBN: 978-81-933284-9-1.
2	Higher Engineering Mathematics, B.V. Ramana, 11th Edition, 2010, Tata McGraw-Hill, ISBN: 978-0-07-063419-0.
3	N.P. Bali & Manish Goyal, A Text Book of Engineering Mathematics, 7th Edition, 2010, Lakshmi Publications, , ISBN: 978-81-31808320.
4	Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016, ISBN: 978-0470458365.

Continuous Internal Evaluation (CIE); Theory (50 Marks)
CIE is executed by way of quizzes (Q) and tests (T**)**. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. The two tests are conducted for 30 marks each and the sum of the marks scored from two tests is reduced to 30. **Total CIE is 20(Q) +30(T)=50 Marks.**

Semester End Evaluation (SEE); Theory (50 Marks)
SEE for 50 marks is executed by means of an examination. The Question paper for the course consists of five main questions, one from each unit for 10 marks adding up to 50 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Semester: III						
KANNADA (KALI, LIPI AND ANUBHAVA) **(Common to all branches)**						
Course Code	**:**	18HS38		**CIE**	**:**	**50 Marks**
Credits: L:T:P	**:**	1:0:0		**SEE**	**:**	**NA**
Total Hours	**:**	18Hrs		**CIE Duration**	**:**	**90 Minutes**

Course Learning Objectives: The students will be able to

1	Learn basic communication skills in Kannada language (Vyavaharika Kannada).
2	Read and understand simple words and sentences of newspaper and hoardings in Kannada language
3	Enable to Identify grammar or common language structure.
4	Appreciate the importance of Kannada language and literature.
5	Imbibe ethical, moral, national and cultural values through various forms of literature through Kannada language.

KANNADA KALI (spoken Kannada) (to those students who does not know Kannada)	
Unit-I	**06 Hrs**
1. **namaskaara** Introducing the self, enquiring about mother tongue, native place, profession etc., interrogative particles 2. **niivucennaagiddiiraa?** Enquiring about the welfare, personal pronouns, possessive forms 3. **nimageeenubeeku?** 4. **nimagekannadagottaa?** 5. **nanagemeeshTrakelasaishTa** 'yes'/'no'/'not' type of interrogative and assertive sentences, modal verbs and negations.	
Unit – II	**06 Hrs**
6. **oLLeya*college*** Qualitative and quantitative adjectives 7. **aakaaSadabaNNaniili** Locative case markers, post positions and colours 8. **ivattueshTanetaariikhu?** Cardinal numbers, numeral adjectives, ordinal numbers, human numerals, weekdays and kinship words 9. ***College*bassueshTuganTege ide?** Dative case markers, 10. **naanubengaLuuralliiddiini** Present tense, habitual future tense form of verb root IRU	
Unit –III	**06 Hrs**
11. ***RV college*allioduttiini** Introducing few frequently used verb forms like nooDu, maaDu, hoogu, koDu, keeLu, kuDi, hoDi, bari etc.,. Simple present tense and habitual future tense form of human and non-human verbs. 12. ***Record*bariibeeku** Definitive, permissive and prohibitive form of verbs 13. **bengaLuurigeyaavaagabandri?** Past tense form of verbs(human and non-human) 14. **dinanityadasambhaashaNe** Few simple conversations retlated to day-to-day activities 15. Few ritual words/sentences which are frequently used in spoken Kannada **Note**: Introducing few ritualistic words/sentences/phrases in each lesson.	

KANNADA LIPI (to those students who know only speaking and does not know reading & writing)	
Unit –I	**04 Hrs**
1. Introduction of Kannada alphabets (primary letters).	
Unit –II	**05 Hrs**
2. Combination of secondary symbols of vowels with consonants (‘kaagunita’).	
Unit –III	**05 Hrs**
3. Secondary symbols of consonants and its combination with other consonants both homogenous and heterogeneous (‘Somyouktaakshara’).	
Unit –IV	**04 Hrs**
4. Framing simple sentences and reading paragraphs.	

ಕನ್ನಡ ಅನುಭವ (ಕನ್ನಡ ಕಲಿತವರಿಗೆ)	
Unit –I	**06 Hrs**
೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ (ಇತಿಹಾಸ) – ಡಾ. ಎಂ.ಚಿದಾನಂದ ಮೂರ್ತಿ ೨. ವಿಜ್ಞಾನ ಬರವಣಿಗೆಗಳ ಭಾಷಾಂತರ(ವಿಜ್ಞಾನ ಸಾಹಿತ್ಯ) – ಜೆ. ಆರ್. ಲಕ್ಷ್ಮಣರಾವ್ ೩. ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ (ಕಾವ್ಯ) – ಡಾ. ಡಿ.ವಿ. ಗುಂಡಪ್ಪ ೪. ರಾಧಾಕೃಷ್ಣನ್ (ವ್ಯಕ್ತಿಚಿತ್ರ) – ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್	
Unit –II	**06 Hrs**
೫. ಕುಚೇಲನ ಭಾಗ್ಯ (ಸಣ್ಣಕಥೆ) – ಮಾಸ್ತಿ ವೆಂಕಟೇಶ ಅಯ್ಯಂಗಾರ್ ೬. ಎದೆತುಂಬಿ ಹಾಡಿದೆನು (ಕಾವ್ಯ) – ಡಾ. ಜಿ. ಎಸ್ ಶಿವರುದ್ರಪ್ಪ ೭. (ಮುಕ್ತ ಪ್ರಬಂಧ) – ‘ಗೌತಮ’ ೮. ಮೂರ್ಖರ ರಾಜ್ಯದಲ್ಲಿ (ಜನಪದಕಥೆ) ೯. ವಚನ ಸಾಹಿತ್ಯ ಮತ್ತುದಾಸ ಸಾಹಿತ್ಯ – ಸರ್ವಜ್ಞ, ಬಸವಣ್ಣ ಮತ್ತು ಪುರಂದರದಾಸರು	
Unit –III	**06 Hrs**
೧೦. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ (ವ್ಯಕ್ತಿಚಿತ್ರ) – ಎಸ್. ರಾಮಮೂರ್ತಿ ೧೧. ರತ್ನನ್ ಪರ್ಯಂಚ (ಪದ್ಯ) – ಜಿ. ಪಿ.ರಾಜರತ್ನಂ ೧೨. ಶಲ್ಯ ಪರ್ವ (ಮಹಾಭಾರತದಒಂದು ಪ್ರಸಂಗ)– ಎ. ಆರ್. ಕೃಷ್ಣಶಾಸ್ತ್ರಿ ೧೩. ಆಡಳಿತ ಕನ್ನಡ – ಎಚ್. ಜಿ. ಶ್ರೀನಿವಾಸ ಪ್ರಸಾದ್	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand and converse in Kannada at places/situations like canteen, mess, hotel, hostel, while travelling in auto/bus/train/bus station/railway station/post office/bank; conversing with general public, over phone etc.,.
CO2:	Enable to write the proper sentences in Kannada language.
CO3:	Learn Language and Grammar skills for writing Kannada language.
CO4:	Create interest towards Kannada Literature and administrative language.

Reference Books	
1	Kannada Kali**,** H. G. Srinivasa Prasad & S. Ramamurthy, 5th Edition, 2019, RV College of Engineering Bengaluru.
2	Kannada Lipi, H. G. Srinivasa Prasad & S. Ramamurthy, 5th Edition, 2019, RV College of Engineering Bengaluru.
3	Kannada Anubhava**,** K. N. Subramanya, S. Narahari, H. G. Srinivasa Prasad, S. Ramamurthy and S. Sathyanarayana, 5th Edition, 2019, RV College of Engineering Bengaluru.

4	Spoken Kannada**,** Kannada Sahithya Parishat, Bengaluru.
5	Kannada Manasu**,** Prasaranga kannada vishwavidyalaya, Hampi.

Continuous Internal Evaluation (CIE); (50 Marks)

Award of **CIE** will be based on the two written test that will be conducted during the semester period. The CIE will be calculated based on the average score obtained in the two tests. In the case of Kannada Kali CIE will be based on oral examination process. The CIE will be based on average of two tests conducted during the semester period. **Total CIE marks: (T1+T2)/2. T1 is the marks obtained for Test 1 out of maximum of 50 marks. T2 is the marks obtained for Test 2 out of maximum of 50 marks.**

Semester: IV						
ENGINEERING MATHEMATICS – IV (Theory) (Common to AS, CH, CV & ME)						
Course Code	**:**	18MA41C		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	4:1:0		**SEE**	**:**	**100 Marks**
Total Hours	**:**	52L+13T		**SEE Duration**	**:**	**3.00 Hours**

Course Learning Objectives: The students will be able to

1	Understand practical situations in various areas of engineering and science to formulate linear programming problems to get optimum solution.
2	Apply the knowledge of differential and integral calculus to functions of complex variables.
3	Analyze the set of data and fit suitable approximating curves.
4	Interpret concept of probability to solve random physical phenomena and implement the proper distribution model.
5	Use mathematical IT tools to analyze and visualize the above concepts.

Unit-I	**10 Hrs**
Linear Programming: Mathematical formulation of Linear Programming Problem (LPP). Solving LPP using Graphical, Simplex and Big M methods. Exploring optimization techniques using MATLAB.	
Unit – II	**11 Hrs**
Complex Analysis: Analytic function – Cauchy-Riemann equations in Cartesian and polar forms, harmonic functions. Construction of analytic functions by Milne-Thomson method. Complex potential, stream and potential functions. Complex integration – Cauchy's theorem, Taylor's and Laurent's series, singularities, poles, residues, residue theorem, problems (all theorems without proof).	
Unit –III	**11 Hrs**
Statistics: Central moments, mean, variance, coefficients of skewness and kurtosis in terms of moments. Curve fitting by method of least squares, fitting of curves – polynomial, exponential and power functions. Correlation and linear regression analysis, application problems. Simulation using MATLAB.	
Unit –IV	**10 Hrs**
Probability and Distributions: Random variables – discrete and continuous. Probability distribution function, cumulative distribution function. Binomial, Poisson, Exponential and Normal distributions. Simulation using MATLAB.	
Unit –V	**10 Hrs**
Joint Probability Distribution and Markov Chain: Joint distribution of random variables – Expectation, covariance and correlation. Markov chain – Stochastic matrices, higher transition probabilities, regular stochastic matrices, probability vector.	

Course Outcomes: After completing the course, the students will be able to

CO1:	Understand the concept of linear programming problems (LPP), analytic functions, statistical measures, curve fitting and random variables.
CO2:	Solve problems on LPP graphically, analytic functions, correlation between two variables and probability distribution functions.
CO3:	Apply gained knowledge for curve fitting, solution of LPP using simplex method, Taylor's and Laurent's series and different distributions.
CO4:	Estimate optimal solution of LPP using Big M method, regression lines, residues and regular stochastic matrices.

Reference Books	
1	Higher Engineering Mathematics, B.S. Grewal, 44th Edition, 2015, Khanna Publishers, ISBN: 81-7409-195-5.
2	Higher Engineering Mathematics, B.V. Ramana, 11th Edition, 2010, Tata McGraw-Hill, ISBN: 13-978-07-063419-0; ISBN: 10-0-07-063419-X.
3	Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, 2007, John Wiley & Sons, ISBN: 978-81-265-3135-6.
4	Probability, Statistics and Random Processes, T. Veerarajan, 3rd Edition, 2008, Tata McGraw-Hill, ISBN: 978-0-07- 066925-3.

Continuous Internal Evaluation (CIE); Theory (100 Marks)
CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20. **Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.**

Semester End Evaluation (SEE); Theory (100 Marks)
SEE for 100 marks are executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	1	2	2	-	-	-	-	-	-	-	-	1
CO4	-	1	1	3	-	-	-	-	-	-	-	1

High-3: Medium-2: Low-1

Semester IV						
ENVIRONMENTAL TECHNOLOGY (Theory) (Common to All Non Circuit Branches)						
Course code	**:**	**18BT42A**		**CIE**	**:**	**50Marks**
Credits: L:T:P	**:**	**2:0:0**		**SEE**	**:**	**50Marks**
Total Hours	**:**	**26L**		**SEE Duration**	**:**	**90 min**

Course learning objectives: The student will be able to

1.	Understand the various components of environment and the significance of the sustainability of healthy environment.
2.	Recognize the implications of different types of the wastes produced by natural and anthropogenic activity.
3.	Learn the strategies to recover the energy from the waste.
4.	Design the models that help mitigate or prevent the negative impact of proposed activity on the environment.

Unit I	**06 Hrs**
Introduction: Environment - Components of environment, Ecosystem. Impact of anthropogenic activities on environment (agriculture, mining and transportation), Environmental education, Environmental acts & regulations, role of non-governmental organizations (NGOs), EMS: ISO 14000, Environmental Impact Assessment. Environmental auditing.	
Unit II	**06 Hrs**
Environmental pollution: Air pollution – point and non point sources of air pollution and their controlling measures (particulate and gaseous contaminants). Noise pollution, Land pollution (sources, impacts and remedial measures). **Water management**: Water conservation techniques, water borne diseases & water induced diseases, arsenic & fluoride problems in drinking water and ground water contamination, advanced waste water treatment techniques.	
Unit III	**06 Hrs**
Waste management, Solid waste management, e waste management & biomedical waste management – sources, characteristics & disposal methods. Concepts of Reduce, Reuse and Recycling of the wastes. **Energy** – Different types of energy, conventional sources & non conventional sources of energy, solar energy, hydro electric energy, wind energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.	
Unit IV	**05 Hrs**
Environmental design: Principles of Environmental design, Green buildings, green materials, Leadership in Energy and Environmental Design (LEED), soilless cultivation (hydroponics), organic farming, use of biofuels, carbon credits, carbon foot prints, Opportunities for green technology markets, carbon sequestration.	
Unit V	**04 Hrs**
Resource recovery system: Processing techniques, materials recovery systems, biological conversion (composting and anaerobic digestion). Thermal conversion products (combustion, incineration, gasification, pyrolysis, use of Refuse Derived Fuels). Case studies of Biomass conversion, e waste.	

Course outcomes: After completing the course, the students will be able to	
CO1:	Identify the components of environment and exemplify the detrimental impact of anthropogenic activities on the environment.
CO2:	Differentiate the various types of wastes and suggest appropriate safe technological methods to manage the waste.
CO3:	Aware of different renewable energy resources and can analyse the nature of waste and propose methods to extract clean energy.
CO4:	Adopt the appropriate recovering methods to recover the essential resources from the wastes for reuse or recycling.

Text Books	
1.	Gilbert, M.M. Introduction to environmental engineering and science, Pearson Education. India: 3rd Edition (2015). ISBN: 9332549761, ISBN-13: 978-9332549760.
2.	Howard S. Peavy, Donald R. Rowe and George Tchobanoglous. 2000. Environmental Engineering, McGraw Hill Education, 5th Edition, 1 July 2017, ISBN-10**:** 9351340260, ISBN-13**:** 978-9351340263.
Reference Books	
1.	G. Tyler Miller (Author), Scott Spoolman (Author), (2012) Environmental Science – 15th Edition, Publisher: Brooks Cole, ISBN-13: 978-1305090446 ISBN-10: 130509044.
2.	Vijay Kulkarni and T. V. Ramachandra 2009. Environment Management. TERI Press; ISBN: 8179931846, 9788179931844.
3.	Suresh K. Dhameja (Author), Environmental Engineering and Management. S.K. Kataria and sons (2010). ISBN-10**:** 8185749450**,** ISBN-13: 978-8185749457.
4.	Linvil Gene Rich 2003. Environmental Systems Engineering, McGraw-Hill; ISBN: 9780070522503.

Continuous Internal Evaluation (CIE); Theory (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 15 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 30 marks each and the sum of the marks scored from three tests is reduced to 25. The marks component for Experiential Learning is 20.

Total CIE is 15(Q) +25(T) +10(EL) =50 Marks.

Semester End Evaluation (SEE); Theory (50 Marks)

SEE for 50 marks is executed by means of an examination. The Question paper for the course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 10 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 8 marks adding up to 40 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO PO mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1						3		2	-		-
CO2	2	3	3	2	1		3	3	2	-	2	1
CO3		3	1	3		2	3	3	2	-	1	2
CO4	1		2	1	3		2		2	-		2

High-3: Medium-2: Low-1

Semester: IV						
FLUID MECHANICS (Theory & Practice)						
Course Code	**:**	18CV43		**CIE Marks**	**:**	**100+50**
Credits: L:T:P	**:**	3:0:1		**SEE**	**:**	**100+50**
Total Hours	**:**	39L+33P		**SEE Duration**	**:**	**3Hrs + 3 Hrs**
Course Learning Objectives: The students will be able to						
1	Describe fundamental properties of fluids and its applications.					
2	Analyze hydrostatic laws and its applications to solve practical problem.					
3	Apply the principles of Kinematics and Hydro-Dynamics for practical applications					
4	Examine basic flow rate measurement techniques.					

UNIT-I	**08 Hrs**
Introduction: Definition of Properties and its usage for characterization of Fluid, Numerical Problems. **Fluid Pressure and its measurement :** Fluid pressure at a point, Pascal's law, Variation of pressure in a fluid, Atmospheric Absolute, Gauge, and Vacuum pressures, Measurement of pressure using Simple and Differential manometers, Numerical Problems. **Hydrostatic Forces on surfaces:** Total pressure and Center of pressure on submerged plane surfaces; horizontal, vertical and inclined plane surfaces submerged in liquid. (No Numerical Problems).	
UNIT-II	**08 Hrs**
Kinematics of Fluid Flow: Classification of flows: Steady and Unsteady, Uniform and Non-uniform, Laminar and Turbulent, Rotational and Irrotational flow. **Dynamics of Fluid Flow:** Laws of Mass, Energy and Momentum, Continuity equation (One Dimensional), Euler's equation, Bernoulli's equation, Modified Bernoulli's equation - limitations and its application - Orifice Meter & Venturimeter, Numerical Problems.	
UNIT-III	**08 Hrs**
Flow through pipes: Head losses - Major loss & Minor loss, Darcy - Weisbach Equation, Hydraulic Gradient line, Total Energy Line, Series and Parallel Network of pipes, Numerical Problems. **Orifice and mouth piece:** Hydraulic coefficients, Concept of Orifice and Mouthpiece (No Numerical Problems). **Notches and Weirs:** Definition of Notch and Weir, Flow through V-notch, Rectangular weir, Cippoletti weir, Corrections for Velocity of Approach, End Contractions, Numerical Problems.	
UNIT-IV	**08 Hrs**
Flow through Open Channel: Calculation of Velocity using Chezy's and Manning's experiments, Hydraulic Efficient Channels: Rectangular and Trapezoidal channel, Numerical Problems. Specific Energy, Critical Depth, Froude's Number, Specific Energy Diagram, Subcritical and Supercritical flows, Alternative Depths, Hydraulic Jump, Numerical Problems.	
UNIT-V	**07 Hrs**
Impact of Jet on Vanes: Impact of jet on vanes, Force exerted by the jet on a straight & curved vane (Stationary & Moving). Velocity triangles, Numerical Problems.	

Laboratory
1. Calibration of 90^0 V-notch. 2. Calibration of Rectangular notch. 3. Calibration of Cippoletti notch. 4. Calibration of Ogee weir. 5. Calibration of Venturimeter. 6. Calibration of orificemeter 7. Verification of Bernoulli's principle. 8. Determination of Hydraulic coefficients for orifice 9. Determination of Hydraulic coefficients for Mouthpiece. 10. Determination of friction factor for a given pipe. 11. Impact of jet on vanes. 12. Minor Losses in pipes (Bends in pipe, Sudden Expansion in pipe, Sudden Contraction in pipe).

Course Outcomes: After completing the course, the students will be able to	
CO1:	Describe the different properties of fluids, for the flow characterization and measurements.
CO2:	Explain the behavior of the fluids under static and dynamic conditions.
CO3:	Apply continuity equation and energy equation in solving problems on flow through conduits.
CO4:	Compute hydrostatic and hydrodynamic forces, flow profiles in channel transitions and analyze hydraulic transients.

Reference Books	
1.	Hydraulics and Fluid Mechanics including Hydraulic Machines, P.N. Modi and S.M Seth, 21st Edition 2017, Standard Book House, ISBN 978-81-89401-26-9.
2.	A text book of Fluid Mechanics and Hydraulics Machines, Dr. R.K.Bansal, 10th Edition, 2018, Laxmi Publication (P) LTD, ISBN-10: 8131808157
3.	Fluid Mechanics, 8th Edition 2016, Frank M White TATA McGraw Hill, New Delhi, ISBN-10: 9385965492, ISBN-13: 978-9385965494
4.	Flow in open Channels, K. Subramanya, 5th Edition ,20 April 2019, Tata McGraw Hill, McGraw-Hill; ISBN-10: 9353166292
5.	Fluid Mechanics with Engineering Applications, Daugherthy, R.L., Franzini, J.B., Finnemore, E.J., 1997, McGraw Hill, New York, ISBN-10: 9780070219144.
6.	Fluid Mechanics, Streeter, V. L.,Wylie, E. Benjamin: 9th Edition, 2017, Tata McGraw Hill Publications., ISBN-10: 0070701407

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Scheme of Continuous Internal Evaluation (CIE); Practical Test for 50 Marks
The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average mark (AM) over number of weeks is considered for 30 marks. At the end of the semester a test (T) is conducted for 10 marks. The students are encouraged to implement additional innovative experiments (IE) in the lab and are rewarded for 10 marks. Total marks for the laboratory is 50.
Total CIE is 30(AM) +10 (T) +10 (IE) =50 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)
SEE for 100 marks is executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Scheme of Semester End Examination (SEE); Practical Exam for 50 Marks
SEE for the practical courses will be based on experiment conduction with proper results, is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

Semester End Evaluation (SEE): Theory (100 Marks) + Practical (50 Marks) = Total 150 Marks

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	-	-	2	-	-	-	-	-	3	-	1
CO2	2	-	-	2	-	2	2	-	-	-	2	-
CO3	3	2	-	-	2	1	-	-	-	-	2	1
CO4	3	-	2	3	2	-	-	-	2	2	-	1

High-3: Medium-2: Low-1

Semester: IV						
BUILDING CONSTRUCTION AND PLANNING (Theory & Practice)						
Course Code	**:**	18CV44		**CIE**	**:**	**100+50 Marks**
Credits: L:T:P	**:**	3:0:1		**SEE**	**:**	**100+50 Marks**
Total Hours	**:**	39L+33P		**SEE Duration**	**:**	**3Hrs + 3Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the different building planning and drawing principles and components of a civil engineering structure
2	Distinguish between different forms and types of masonry
3	Relate the concepts of shoring, underpinning and scaffolding and design of types of staircases
4	To gain insights into types of roof, plastering, pointing and painting
5	Understand the basic concepts Green building construction, construction equipment and their application and need of construction safety.

UNIT-I	**09 Hrs**
Building Planning: Building Bye-laws, drawing requirements, principles of planning, FAR, Carpet Area, Plinth Area (only concepts) **Foundation**: Bearing Capacity of Soil, Safe Bearing Capacity of Soil, Allowable Bearing Capacity of Soil. Classification of Foundation, Masonry footings, Isolated footings, Combined and strap RCC footings, Raft footing, Grillage foundation, Pile foundations (Friction and Load bearing piles) **Plinth Beam**: Necessity of Plinth Beam	
UNIT-II	**08 Hrs**
Masonry: Load Bearing and partition walls, Stone-Rubble Masonry, Coursed Rubble Masonry, Un-coursed rubble masonry Random rubble masonry, Ashlar Masonry Bricks-Bonds in Brickwork, English Bond , Flemish Bond, Damp Proof construction, **Arches**: Classification, Functions. **Lintel and Chajja:** Functions and types **Stairs:** Components, Types-Dog legged and open well stairs, Geometrical design of stairs.	
UNIT-III	**08 Hrs**
Types of flooring: (Materials and method of laying), Granolithic, Mosaic Ceramic, Marble, Polished Granite types and applications, Industrial flooring. **Roofs:** Flat Roof (RCC) Sloped roof (R.C.C. and tile roof), Lean to roof, Wooden truss (King post and queen post trusses. **Plastering and Pointing**: Purpose, materials and methods of plastering and pointing, defects in plastering-Stucco plastering, lathe plastering. **Painting :**Purpose, Types, Application of paints to new and old surfaces, Distemper Plastic emulsion, Enamel, painting to walls and iron and steel surfaces, polishing wood surface	
UNIT-IV	**07 Hrs**
Scaffolding- Components, Types of Scaffolding. **Form work: Form** work Details, RCC columns, Beams, floors, Slip form Steel aluminium and Mivan shuttering. **Shoring**: Raking Shores, Flying Shores, Dead Shores **Underpinning**- Pit method, Pile method	
UNIT-V	**07 Hrs**
Construction equipment: Introduction, Factors for selecting equipment, various earth moving equipment's, Hoisting equipment's Concrete mixer and plants, Conveyors and rollers, Trenching machines. **Green building concepts:** Site selection, design concepts, , materials and different certifications programs **(IGBC AND LEED)** **Safety in construction Necessity** and types of Personal protective equipment.	

Laboratory
I. Using Auto CAD software: Prepare working drawing of components of building like 1. SSM footing 2. Fully Paneled and flush doors 3. Partly Paneled and Partly glazed window. 4. Doglegged & open well stairs **Functional design of buildings (Residential, public and industrial) – orientation and positioning of various components of buildings- Building standards – Bye laws- set back distances- calculation of carpet area, plinth area and FAR.** **II. Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following buildings** **1.** Primary health center **2.** Primary school building **3.** College canteen **4.** Office building. **III. Using Auto-CAD software: Development of Plan, Elevation, section, North Line and Schedule of Openings for following building.(with or without line diagram)** 1. Single Storey building. 2. Two Storey building. Residential Building with Pitched roof.
IV. Using AUTO-CAD software, DRAW simple residential building (plan being given). 1. Plumbing, sanitary layouts 2. electrical layouts

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand the fundamental of building Planning and construction
CO2:	Apply the various techniques and principles of building construction in Civil engineering
CO3:	Analysis different forms types methods of building construction for various building component
CO4:	Use of modern tools like AutoCAD for building planning and drawing

Reference Books	
1.	Building Construction, Sushil Kumar 20th Edition, 2017, Standard publisher dist. ISBN-10: 9788180141683
2.	Building Construction B.C. Punmia , Ashok Kumar Jain , Arun Kumar Jain, 11th Edition, 2016, Laxmi Publications; ISBN-10: 9788131804285
3.	Building Construction, S.G. Rangwala, 33rd Edition, 2016, Charotar Publishing House Pvt. Ltd.; ISBN-10: 9385039040
4.	Building Drawing with an Integrated Approach to Built Environment, CM Kale, MG Shah SY Patki, 5th Edition, 2017, McGraw Hill Education; ISBN-10: 0071077871
5.	National Building Code 2016, BIS , New Delhi
6.	Building Planning and Drawing , S. S. Bhavikatti, 30 June 2014, I K International Publishing House Pvt. Ltd, ISBN-13: 978-9382332565

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Scheme of Continuous Internal Evaluation (CIE); Practical Test for 50 Marks
The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average marks (AM) over number of weeks is considered for 30 marks. At the end of the semester a test (T) is conducted for 10 marks. The students are encouraged to implement additional innovative experiments (IE) in the lab and are rewarded for 10 marks. Total marks for the laboratory is 50.
Total CIE is 30(AM) +10 (T) +10 (IE) =50 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)
SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Scheme of Semester End Examination (SEE); Practical Exam for 50 Marks
SEE for the practical courses will be based on experiment conduction with proper results, is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

Semester End Evaluation (SEE): Theory (100 Marks) + Practical (50 Marks) = Total 150 Marks

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	2	1	-	-	-	-	1	-	-	-	-	-
CO4	-	1	-	-	3	-	-	-	-	-	-	1

High-3: Medium-2: Low-1

Semester: IV						
STRUCTURAL ANALYSIS-I (Theory)						
Course Code	**:**	18CV45		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	4:0:0		**SEE**	**:**	**100 Marks**
Total Hours	**:**	52L		**SEE Duration**	**:**	**3.00 Hours**

Course Learning Objectives: The students will be able to	
1	Identify and Distinguish different forms of structures.
2	Understand the basic concepts of static and dynamic behaviour of structural system.
3	Analyze determinate and indeterminate structures for unknown forces and deformation.
4	Evaluate the behaviour of beams truss arches and cables under different loading condition using force or deformation methods.

Unit-I	**10 Hrs**
Structural Systems: Forms of Structures**,** Conditions of equilibrium, Degrees of Freedom. Linear and Non-Linear Structures, 1D, 2D and 3D, Structures. Determinate & Indeterminate Structures, Static and Kinematical indeterminacy. **Analysis of Plane Trusses:** Introduction, Assumptions, Analysis of determinate trusses by Method of Joints and Method of sections.	
Unit-II	**12 Hrs**
Deflection of Beams: Moment Area Method – Simply supported beams, Cantilever Beam, and Over hanging**,** Conjugate beam Method – Simply supported beams, Cantilever Beam, and Over hanging beams. **Consistent deformation method**: Introduction**,** Analysis of Propped Cantilever**,** Analysis of Fixed Beams**.**	
Unit-III	**10 Hrs**
Arches: Introduction**,** Three Hinged Parabolic and circular Arches with supports at Same levels and different levels**,** Determination of Normal thrust, Radial Shear and bending moment - Problems. **Suspension Cables**: Analysis of Cables at Same levels and different levels – Numerical problems.	
Unit-IV	**10 Hrs**
Analysis of Beams: **Clapeyron's three moment theorem:** Introduction, derivation of three moment equation, application of equation to indeterminate beams, sinking of support. **Slope Deflection Method**: Introduction; Derivation of Slope-Deflection equations for beams. Analysis of Continuous beam by Slope –Deflection Equations. (No portal frames)	
Unit-V	**10 Hrs**
Energy Theorems: Introduction: Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force – Principle of virtual work, unit load method, Castigliano's theorem- Deflection of simple beams.	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Classify different forms of structures and illustrate their basic structural properties.
CO2:	Apply the basic concepts of analysis methods in determining unknown forces in the structures.
CO3:	Analyze the different forms of structural elements by suitable methods of analysis.
CO4:	Evaluate the behavior of structure under various loading conditions.

Reference Books	
1.	Structural Analysis, R C Hibbler, 8th Edition, 25 February 2011, Pearson Publications; Pearson Prentice Hall, ISBN-13: 978-0132570534.
2.	Elementary Structural Analysis, Norris C.H., Wilbur J.B., International Student Edition, 2005, McGraw Hill Internationa12l Book, ISBN 13: 978-8131721414
3.	Theory of Structures, S. Ramamrutham, 9th Edition ,2014, DhanpatRai Publishing Company Private Limited, New Delhi; ISBN-13: 978-9384378103.
4.	Basic Structural Analysis, Reddy C.S., 3rd Edition, 1 July 2017, Tata McGraw Hill Publication Company Ltd., New Delhi, ISBN 13: 978-0070702769.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.
Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	-	-	-	-	-	-	-	-	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-

High-3 : Medium-2 : Low-1

Semester: IV						
SOIL MECHANICS (Theory)						
Course Code	**:**	**18CV46**		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	**3:0:0**		**SEE**	**:**	**100 Marks**
Total Hours	**:**	**39L**		**SEE Duration**	**:**	**3.00 Hours**

Course Learning Objectives: The students will be able to	
1	Understanding of the significance of soil mechanics
2	Evaluate the index properties and engineering properties of different soils and Soil Structure
3	Analyze the behavior of soils in the presence of water
4	Analyze the influence of compaction on the engineering behavior of soils
5	Analyze the rate of movement of water through different soils
6	Evaluate the significance of shear strength of soils in different applications in civil engineering

UNIT-I	**08Hrs**
Index Properties :Definition, Basic Terminology, Phase Systems of Soil Mass, Void ratio, Porosity, Degree of saturation, Air content, Percentage Air Voids, Water content, Unit weight, Specific gravity – Interrelations and related problems, Tests for water content and specific gravity, Particle Size Distribution (Sieve analysis and Hydrometer analysis), Consistency of Soils- Atterberg Limits, Field Density and Density Index.	
UNIT-II	**08 Hrs**
Classification Of Soil: Soil Classification Purpose, Unified Soil Classification System, Indian Standard Soil Classification System **Clay Mineralogy and Soil Structure**: Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite. **Permeability:** Darcy's Law and its Limitations, Discharge Velocity and Seepage Velocity, Factors affecting Permeability, Aquifers and flow through aquifers, Determination of Coefficient of Permeability, Permeability of Stratified Soil Deposits, related problems.	
UNIT-III	**06 Hrs**
Compaction: Introduction, Compressibility, Compaction, Standard Proctor Test, Modified Proctor Test, Zero air voids line, Field Compaction Method, Placement Water Content, Field Compaction Control, Factors affecting Compaction, Effect of Compaction on Soil Properties, Compaction equipments**.**	
UNIT-IV	**08 Hrs**
Consolidation: Introduction, Effective stress theory, Piston-Spring Analogy, Primary and Secondary Consolidation, Terzaghi's Theory of One Dimensional Consolidation, Normally consolidated, under consolidated and over consolidated soils, Pre-consolidation pressure and its determination by Casagrande's method. Laboratory one dimensional consolidation test – Determination of Compression index and co-efficient of consolidation, Determination of co-efficient of consolidation by square root of time fitting method and logarithmic time fitting method.	
UNIT-V	**09 Hrs**
Shear Strength of Soils: Introduction, Mohr Circle for Two Dimensional Stress System, Mohr-coulomb failure theory, Total and effective shear strength parameters, Determination of Shear Parameters - Direct Shear Test, Triaxial Compression Test, Types of Shear Test based on Drainage Conditions, Unconfined Compression Test, Vane Shear Test, Skempton's Pore Pressure Parameters, Shear Strength of sands and clays, Sensitivity and Thixotropy	

Course Outcomes: After completing the course, the students will be able to	
CO1:	Describe the Index and Engineering properties of Soils and soil structure.
CO2:	Determine the permeability, compaction characteristics and shear parameters of soil.
CO3:	Evaluate index and Engineering properties of soils, analyze and interpret the experimental data to classify and identify soil.
CO4:	Predict the Suitability of soil for a particular project based on its Engineering properties

Reference Books	
1.	Soil Mechanics and Foundations, Punmia B.C,17th Edition,2017, Laxmi Publishing Co. New Delhi, ISBN-10: 8170087910.
2.	Soil Engineering in Theory and Practice, Alam Singh and Chowdhary G.R, 2001, CBS Publishers and Distributiors ltd., New Delhi, ISBN 9788123900391
3.	Foundation Analysis and Designs, Bowles JE, 5th Edition, 2017, McGraw Hill Publishing co., New York, ISBN-10: 9781259061035
4.	Soil Mechanics and Foundation Engineering, VNS Murthy, 1st Edition, 2015, UBS Publishers and Distributors, New Delhi, ISBN-10: 8123913621
5.	Basic and Applied Soil Mechanics, Gopal Ranjan and Rao ASR, 2016, New Age International (P) ltd, New Delhi, ISBN-10: 8122440398
6.	Geotechnical Engineering, Narasimha Rao AV and Venkatramaiah C, 2015, University press, India ltd, Hyderabad, ISBN-10: 8173711453

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Experiential Learning (EL). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Experiential Learning is 20.

Total CIE is 30(Q) +50(T) +20(EL) =100 Marks.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marksis executed by means of an examination. The Question paper for the course contains two parts, Part A and Part B. Part A consists of objective type questions for 20 marks covering the complete syllabus. Part B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	2	2	-	-	-	1	-	-	-	-	-	1
CO3	-	2	2	-	-	-	-	-	-	-	-	1
CO4	-	2	1	-	-	-	-	-	-	-	-	1

High-3: Medium-2: Low-1

Semester: IV						
C PROGRAMMING **Bridge Course** **(Common to all branches)**						
Course Code	**:**	18DCS48		**CIE Marks**	**:**	**50**
Credits: L:T:P	:	2:0:0		**SEE Marks**	**:**	**50**
Audit Course				**SEE Duration**	**:**	**2.00 Hours**

Course Learning Objectives: The students will be able to

1.	Develop arithmetic reasoning and analytical skills to apply knowledge of basic concepts of programming in C.
2.	Learn basic principles of problem solving through programming.
3.	Write C programs using appropriate programming constructs adopted in programming.
4.	Solve complex problems using C programming.

Unit – I	**4 Hrs**
Introduction to Reasoning, Algorithms and Flowcharts: Skill development – Examples related to Arithmetical Reasoning and Analytical Reasoning. Fundamentals of algorithms and flowcharts **Introduction to C programming:** Basic structure of C program, Features of C language, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types.	
Unit – II	**4 Hrs**
Handling Input and Output Operations Formatted input/output functions, Unformatted input/output functions with programming examples using different input/output functions. **Operators and Expressions** Arithmetic operators, Relational operators, Logical Operators, Assignment operators, Increment and decrement operators, Conditional operators, Bit-wise operators, Arithmetic expressions. Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and associativity.	
Unit – III	**6 Hrs**
Programming Constructs **Decision Making and Branching** Decision making with 'if' statement, Simple 'if' statement, the 'if…else' statement, nesting of 'if…else' statements, The 'else if' ladder, The 'switch' statement, The '*?:'* operator, The '*goto'* statement. **Decision making and looping** The while statement, The do while statement, The 'for' statement, Jumps in loops**.**	
Unit – IV	**6 Hrs**
Arrays One dimensional arrays, Declaration of one dimensional arrays. Initialization of one dimensional arrays, Two dimensional arrays, Initializing two dimensional arrays. **Character Arrays and Strings** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to screen, String handling functions.	
Unit – V	**8 Hrs**
User-defined functions Need for User Defined Functions, Definition of functions, Return values and their types, Function calls, Function declaration. Examples. **Introduction to Pointers:** Introduction, Declaration and initialization of pointers. Examples **Structures and Unions:** Introduction, Structure and union definition, Declaring structure and union variables, Accessing structure members. Example programs.	

PRACTICE PROGRAMS	
1.	Familiarization with programming environment, concept of naming the program files, storing, compilation, execution and debugging. Taking any simple C- code.(Example programs having the delimeters, format specifiers in printf and scanf)
2.	Debug the errors and understand the working of input statements in a program by compiling the C-code.
3.	Implement C Program to demonstrate the working of operators and analyze the output.
4.	Simple computational problems using arithmetic expressions and use of each operator (+,-,/,%) leading to implementation of a Commercial calculator with appropriate message: a)Read the values from the keyboard b) Perform all the arithmetic operations. c) Handle the errors and print appropriate message.
5.	Write a C program to find and output all the roots if a given quadratic equation, for non-zero coefficients. (Using if…*else* statement).
6a. **6b.**	Write a C program to print out a multiplication table for a given NxN and also to print the sum table using skip count 'n' values for a given upper bound. Write a C program to generate the patterns using for loops. Example: (to print * if it is even number) 1 ** 333 **** 55555
7a. **7b.**	Write a C program to find the Greatest common divisor(GCD)and Least common multiplier(LCM) Write a C program to input a number and check whether the number is palindrome or not.
8.	Develop a C program for one dimensional, demonstrate a C program that reads N integer numbers and arrange them in ascending or descending order using bubble sort technique.
9.	Develop and demonstrate a C program for Matrix multiplication: a) Read the sizes of two matrices and check the compatibility for multiplication. b) Print the appropriate message if the condition is not satisfied and ask user to re-enter the size of matrix. c) Read the input matrix d) Perform matrix multiplication and print the result along with the input matrix.
10.	Using functions develop a C program to perform the following tasks by parameter passing concept: a) To read a string from the user Print appropriate message for palindrome or not palindrome
11a. **11b.**	Write a C program to find the length of the string without using library function. Write a program to enter a sentence and print total number of vowels.
12.	Design a structure 'Complex' and write a C program to perform the following operations: i. Reading a complex number. ii. Addition of two complex numbers. iii. Print the result
13.	Create a structure called student with the following members student name, roll no, and a structure with marks details in three tests. Write a C program to create N records and a) Search on roll no and display all the records. b) Average marks in each test. c) Highest marks in each test

Course Outcomes: After Completing the course, the students will be able to	
CO1 :	Understand and explore the fundamental computer concepts and basic programming principles like data types, input/output functions, operators, programming constructs and user defined functions.
CO2 :	Analyze and Develop algorithmic solutions to problems.
CO3 :	Implement and Demonstrate capabilities of writing 'C' programs in optimized, robust and reusable code.
CO4 :	Apply appropriate concepts of data structures like arrays, structures implement programs for various applications

Reference Books	
1.	Programming in C, P. Dey, M. Ghosh, 5th Edition, 2007, Oxford University press, ISBN (13): 9780195687910.
2.	The C Programming Language, Kernighan B.W and Dennis M. Ritchie, 2nd Edition, 2005, Prentice Hall, ISBN (13): 9780131101630.
3.	Turbo C: The Complete Reference, H. Schildt, 4th Edition, 2000, Mcgraw Hill Education, ISBN-13: 9780070411838.
4.	Understanding Pointers in C, Yashavant P. Kanetkar, 4th edition, 2003, BPB publications, ISBN-13: 978-8176563581
5.	C IN DEPTH, S.K Srivastava, Deepali Srivastava, 3rd Edition, 2013, BPB publication, ISBN9788183330480

Continuous Internal Evaluation (CIE); Theory (50 Marks)

CIE is executed by way of quizzes (Q), tests (T**)** and lab practice (P). A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks the sum of the marks scored from quizzes would be reduced to 10 marks. The two tests are conducted for 30 marks each and the sum of the marks scored from two tests is reduced to 30. The programs practiced would be assessed for 10 marks (Execution and Documentation).

Total CIE is 10(Q) + 30(T) + 10(P) = 50 Marks.

Semester End Evaluation (SEE); Theory (50 Marks)

SEE for 50 marks is executed by means of an examination. The Question paper for the course consists of five main questions, one from each unit for 10 marks adding up to 50 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
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CO2	3	3	3	2	2	-	-	-	1	-	-	1
CO3	3	3	3	-	-	-	-	-	2	2	1	2
CO4	3	3	3	-	-	-	1	-	2	2	1	2

High-3: Medium-2 : Low-1

Semester: IV						
PROFESSIONAL PRACTICE – I COMMUNICATION SKILLS (Common to all Programmes)						
Course Code	**:**	**18HS49**		**CIE**	**:**	**50**
Credits: L:T:P	**:**	0:0:1		**SEE**	**:**	**50**
Total Hours	**:**	18 hrs /Semester		**SEE Duration**	**:**	**2 Hours**

Course Learning Objectives: The students will be able to	
1	Understand their own communication style, the essentials of good communication and develop their confidence to communicate effectively.
2	Manage stress by applying stress management skills.
3	Ability to give contribution to the planning and coordinate Team work.
4	Ability to make problem solving decisions related to ethics.

III Semester	**6 Hrs**
Communication Skills: Basics, Method, Means, Process and Purpose, Basics of Business Communication, Written & Oral Communication, Listening. **Communication with Confidence & Clarity**- Interaction with people, the need the uses and the methods, Getting phonetically correct, using politically correct language, Debate & Extempore.	
	6 Hrs
Assertive Communication- Concept of Assertive communication, Importance and applicability of Assertive communication, Assertive Words, being assertive. **Presentation Skills-** Discussing the basic concepts of presentation skills, Articulation Skills, IQ & GK, How to make effective presentations, body language & Dress code in presentation, media of presentation.	
	6 Hrs
Team Work- Team Work and its important elements Clarifying the advantages and challenges of team work Understanding bargains in team building Defining behaviour to sync with team work Stages of Team Building Features of successful teams.	
IV Semester	**6 Hrs**
Body Language & Proxemics - Rapport Building - Gestures, postures, facial expression and body movements in different situations, Importance of Proxemics, Right personal space to maintain with different people.	
	6Hrs
Motivation and Stress Management: Self-motivation, group motivation, leadership abilities, Stress clauses and stress busters to handle stress and de-stress; Understanding stress - Concept of sound body and mind, Dealing with anxiety, tension, and relaxation techniques**.** Individual Counseling & Guidance, Career Orientation. Balancing Personal & Professional Life-	
	6 Hrs
Professional Practice - Professional Dress Code, Time Sense, Respecting People & their Space, Relevant Behaviour at different Hierarchical Levels. Positive Attitude, Self Analysis and Self-Management. **Professional Ethics** - values to be practiced, standards and codes to be adopted as professional engineers in the society for various projects. Balancing Personal & Professional Life	

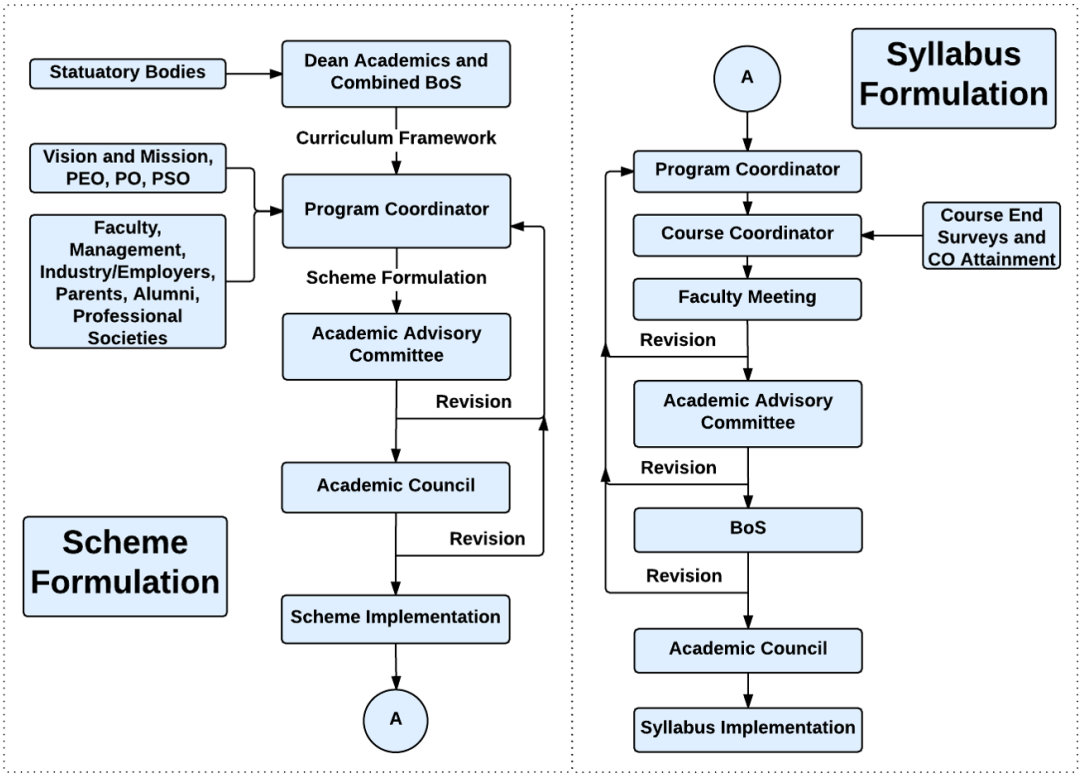
Course Outcomes: After completing the course, the students will be able to	
CO1:	Inculcate skills for life, such as problem solving, decision making, stress management
CO2:	Develop leadership and interpersonal working skills and professional ethics.
CO3:	Apply verbal communication skills with appropriate body language.
CO4:	Develop their potential and become self-confident to acquire a high degree of self

Reference Books	
1.	The 7 Habits of Highly Effective People, Stephen R Covey, Free Press, 2004 Edition, ISBN: 0743272455
2.	How to win friends and influence people, Dale Carnegie, General Press, 1st Edition, 2016, ISBN: 9789380914787
3.	Crucial Conversation: Tools for Talking When Stakes are High, Kerry Patterson, Joseph Grenny, Ron Mcmillan, McGraw-Hill Publication, 2012 Edition, ISBN: 9780071772204
4.	Aptimithra: Best Aptitude Book, Ethnus,Tata McGraw Hill, 2014 Edition, ISBN: 9781259058738

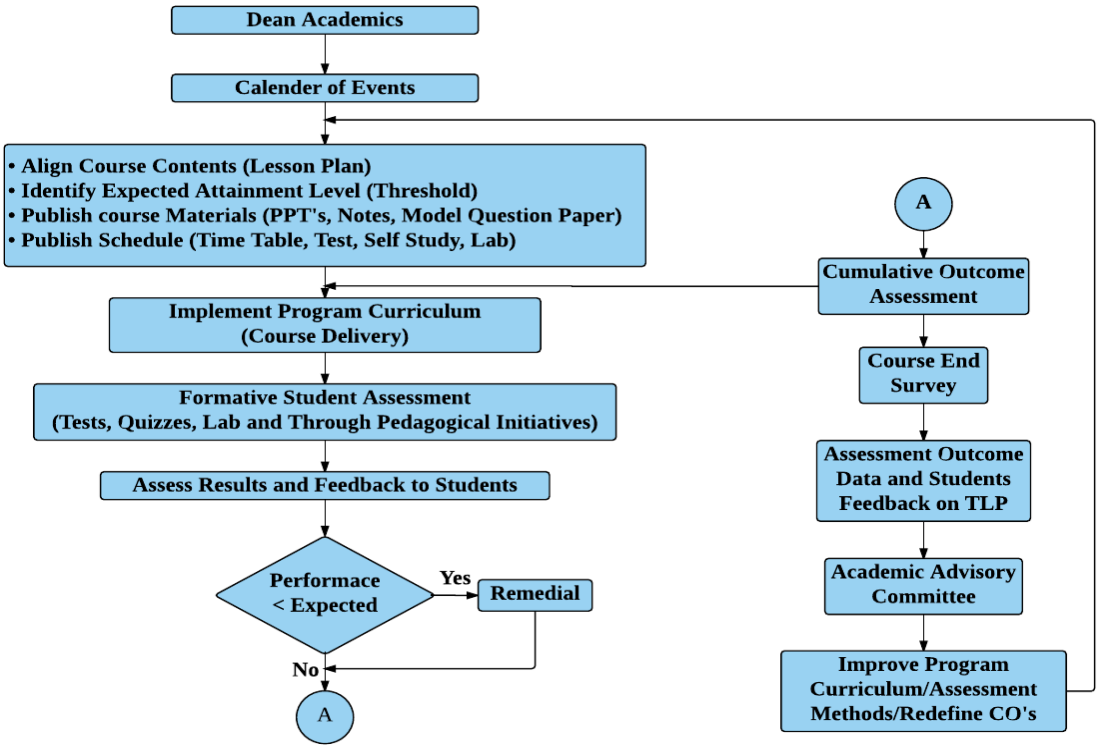
Scheme of Continuous Internal Examination and Semester End Examination

Phase	Activity	Weightage
Phase I III Sem	CIE will be conducted during the 3rd semester and evaluated for 50 marks. The test will have two components. The Quiz is evaluated for 15 marks and second component consisting of questions requiring descriptive answers is evaluated for 35 marks. The test & quiz will assess the skills acquired through the training module. SEE is based on the test conducted at the end of the 3rd semester The test will have two components a Quiz evaluated for 15 marks and second component consisting of questions requiring descriptive answers is evaluated for 35 marks.	50%
Phase II IV Sem	During the 4th semester a test will be conducted and evaluated for 50 marks. The test will have two components a Short Quiz and Questions requiring descriptive answers. The test & quiz will assess the skills acquired through the training module. SEE is based on the test conducted at the end of the 4th semester The test will have two components. The Quiz evaluated for 15 marks and second component consisting of questions requiring descriptive answers is evaluated for 35 marks	50%
Phase III At the end of IV Sem	At the end of the IV Sem Marks of CIE (3rd Sem and 4th Sem) is consolidated for 50 marks (Average of Test1 and Test 2 (CIE 1+CIE2)/2. At the end of the IV Sem Marks of SEE (3rd Sem and 4th Sem) is consolidated for 50 marks (Average of CIE 1 and CIE 2 (CIE 1+CIE2)/2.	

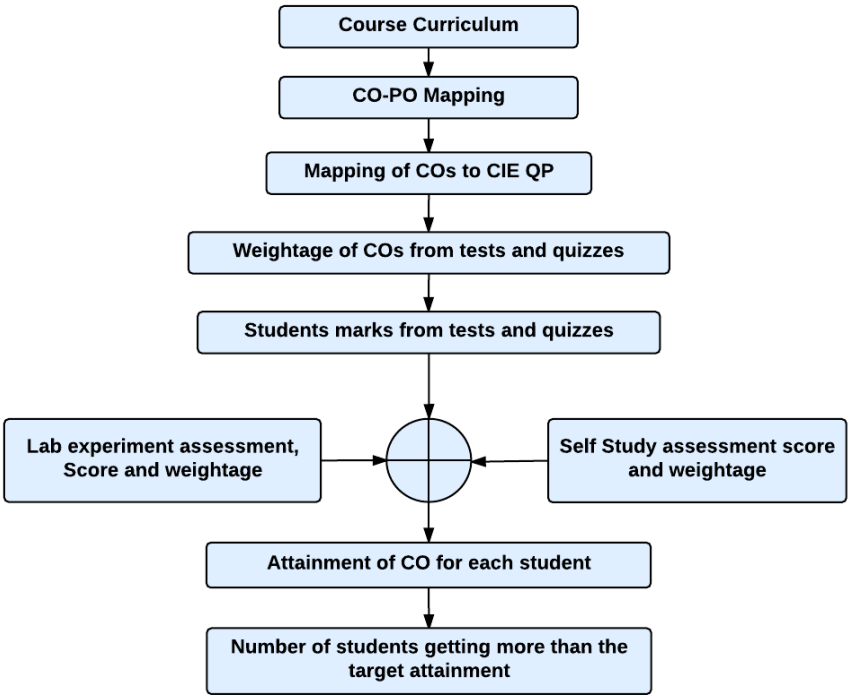
Curriculum Design Process



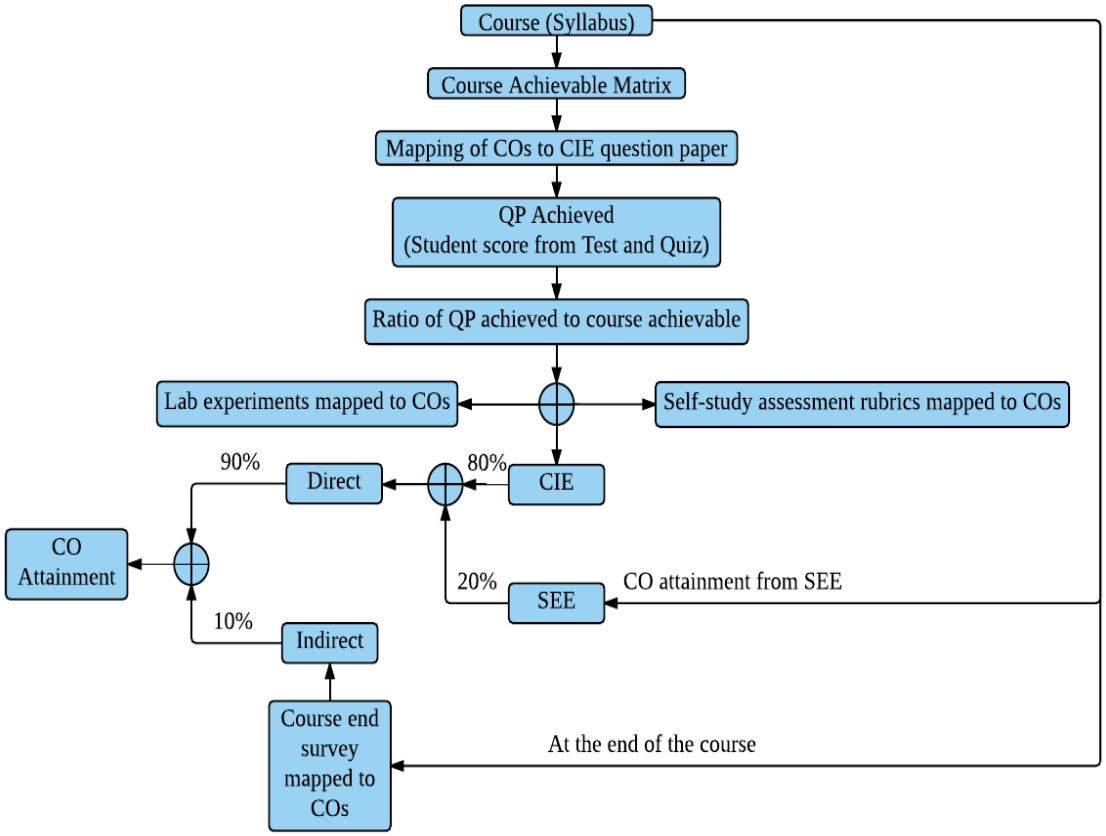
Academic Planning And Implementation



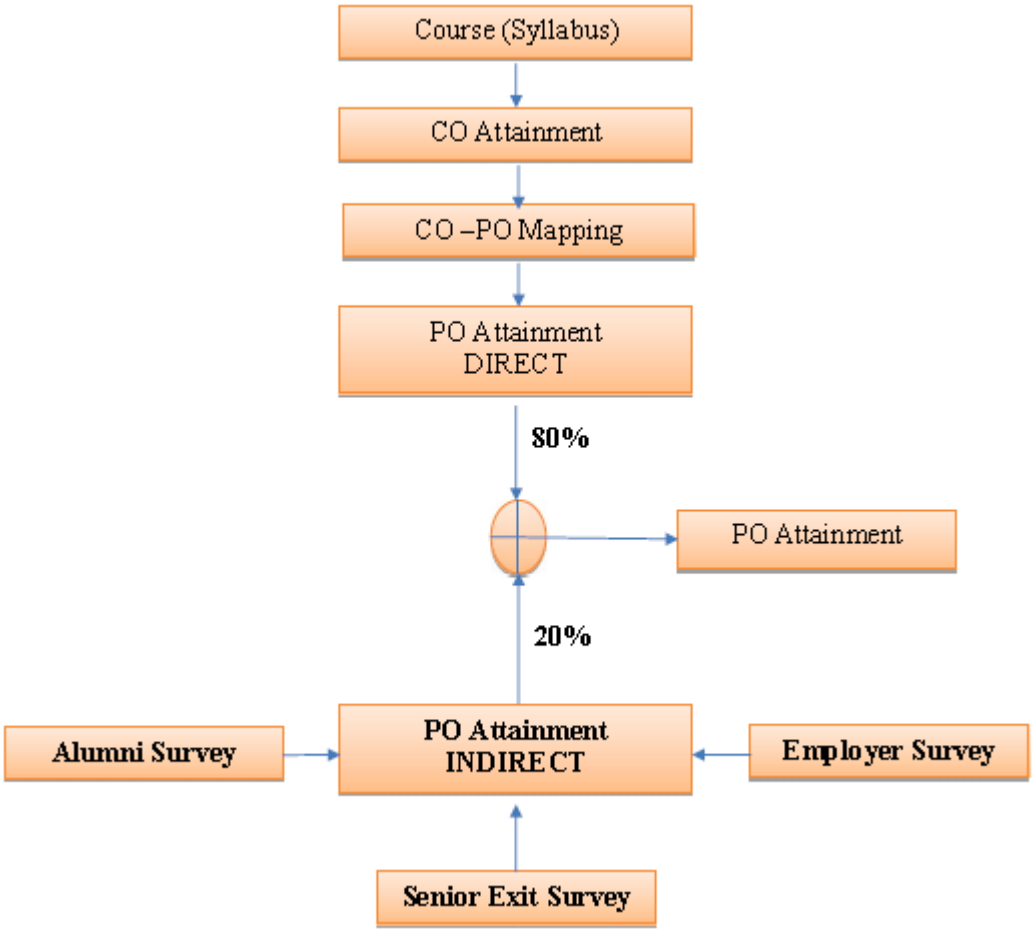
Process for Course Outcome Attainment



Final CO Attainment Process



Program Outcome Attainment Process



PROGRAM OUTCOMES (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, research literature, and analyse 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 public health and safety, and 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 modelling 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 the 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 and 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:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.