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RV COLLEGE OF ENGINEERING[®]

(An Autonomous Institution Affiliated to VTU, Belagavi) Approved by AICTE, New Dehi, Accredited By NBA, New Delhi RV Vidyaniketan Post, 8th Mile, Mysuru Road, Bengaluru--560 059.



Bachelor of Engineering (B.E)

CIVIL ENGINEERING

V COLLEGE OF ENGINEERING®

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(2018 Scheme)

III & IV Semester

ACADEMIC YEAR 2020-2021



Name : Raghavendra Rank : 739

Total Faculty with Number of Ph.D. Faculty Qualification





RVCE - Greaves Cotton Ltd Centre of excellence in e-mobility





RV Mercedes Benz Centre for Automotive Mechatronics

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

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	5
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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.	СН	Chemical Engineering		
15.	CS	Computer Science & Engineering		
16.	ET	Electronics & Telecommunication Engineering		
17.	IS	Information Science & Engineering		
18.	BT	Biotechnology		
19.	AS	Aerospace Engineering		
20.	PH	Physics		
21.	СН	Chemistry		
22.	MA	Mathematics		

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III Semester					
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4.	18CV34	Concrete Technology	8		
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7.	18DMA37	Bridge Course: Mathematics	15		
8.	18HS38	Kannada Course	17		

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RV COLLEGE OF ENGINEERING[®] (Autonomous Institution Affiliated to VTU, Belagavi) CIVIL ENGINEERING

	THIRD SEMESTER CREDIT SCHEME						
SI.	Course Code	Course Title	BoS	Credit Allocation			Total
No.	course coue			L	Т	P	Credits
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.	18HS38A/	Kannada Course:	HSS	1	0	0	1
	18HS38V	AADALITHA KANNADA (18HS38A) / VYAVAHARIKA KANNADA (18HS38V)					
	Total Number of Credits 24						24
	Total number of Hours/Week19+2*47.5						

*Engineering Mathematics - III

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

**

Sl.No	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Environmental Technology	18BT32A	EE,EC,EI,CS,ET & 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&ET
2	Bridge Course C Programming	18DCS37	CS& IS

#There are two text books prescribed by VTU for the Kannada Course:

- 1. Samskruthika Kannada (AADALITHA KANNADA-18HS38A);
- 2. Balake Kannada (VYAVAHARIKA KANNADA-18HS38V);

The first text book is prescribed for the students who know Kannada to speak, read and write (KARNATAKA STUDENTS). The second text book is for students who do not understand the Kannada language (NON-KARNATAKA STUDENTS)

RV COLLEGE OF ENGINEERING®

(Autonomous Institution Affiliated to VTU, Belagavi) CIVIL ENGINEERING

	FOURTH SEMESTER CREDIT SCHEME						
Sl.	Course Code	Course Title	BoS	Cred	it Alloc	ation	Total
No.	Course Coue	Course Title		L	Т	P	Credits
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
9.18HS49Professional Practice-I Communication SkillsHSS			HSS	0	0	1	1
	Total Number of Credits						25
	Total number of Hours/Week19+2210+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 &ET
3.	Engineering Mathematics -IV	18MA41C	AS, CH, CV& ME

**

Sl.No.	COURSE TITLE	COURSE CODE	PROGRAMS
1.	Engineering Materials	18EC42	EC, EE, EI &ET
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

	e	• 1	
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 &ET

Semester: III											
	ENGINEERING MATHEMATICS – III										
(Theory) (Common to AS, BT, CH, CV, IM & ME)											
Cou	rse Code	:	18MA31C			:	100 Marks				
Cree	lits: L:T:P	:	4:1:0		SEE	:	100 Marks				
Tota	l Hours	:	52L+13T		SEE Duration	:	3.00 Hours				
Cou	Course Learning Objectives: The students will be able to										
1	1 Understand variation and external of functional.										
2	Analyze the c	onc	ept of periodic phe	nomena and develop l	Fourier series.						
3	Solve initial v	valu	e problems using L	aplace transform.							
4	Determine the	e ap	proximate solution	s of algebraic/transcer	ndental and partial dif	fer	ential				
5	Lise methoms	ig n	1 IT tools to analyz	a and visualiza the ab	ova conconta						
5	Use mathema	tica		e and visualize the ab	ove concepts.						
				Unit-I			10 Hrs				
Calc	ulus of Variat	ions	5:								
Intro	duction to varia	atio	n of functional, ext	ernal of a functional, l	Euler's equation –spe	cial	l cases,				
prob	lems. Geodesic	s, H	langing cable and E	Brachistochrone proble	ems. Exploring geode	esic	s graphically				
using	g MATLAB.										
			J	J nit – II			11 Hrs				
Fou	rier Series:										
Intro	duction, period	lic 1	function, even and	odd functions. Diric	hlet's conditions, Eu	ler'	s formula for				
Four	ier series, com	pley	x Fourier series, p	oblems on time peri	odic signals (square	wa	ve, half wave				
recti	fier, saw-tooth	wav	ve and triangular wa	ive), Fourier sine serie	es, Fourier cosine ser	ies.	Exploring				
Four	ter series using	NI F	AILAB.	nit III			11 Hrs				
Lan	lace and Inver	so T	anlaco Transform	· · · · · · · · · · · · · · · · · · ·			11 1115				
Exis	tence and uniqu	uene	ess of Laplace Tra	nsform (LT) transfor	m of elementary fur	nctio	ons region of				
conv	ergence. Prope	ertie	s - Linearity, scal	ing, s – domain shi	ft. differentiation in	the	s = domain.				
divis	ion by t, diffe	rent	tiation and integra	tion in the time dom	ain. Transform of p	eric	odic functions				
(squ	are wave, saw-t	ootl	h wave, triangular v	wave, full and half wa	ve rectifier).						
Inve	rse Laplace tra	nsf	orm – properties,	evaluation using diff	Ferent methods. Con	volu	ution theorem				
(with	nout proof), pro	bler	ms. Solution of ord	inary differential equa	tions.						
Expl	oring Laplace a	ind	inverse Laplace tra	nsform using MATLA	AB commands.						
Unit –IV 10 Hrs											
Nun	nerical Method	ls –	I:								
Root	s of algebraic a	ind t	transcendental equa	tions. Fixed point iter	ation method, Newto	n-	Raphson				
meth	method for multiple roots.										
Solu	tion to system of	of li	near equations – L	J decomposition meth	nod, partition method	. Sp	arse linear				
syste	systems – Thomas algorithm for tridiagonal matrices. Computing numerical solutions using										
MA	MAILAB.										
NI	norical Mathad	G	<u> </u>	Jimt – V							
Num	perical solution	us —	nartial differential	equations Finite di	fference approvimati	on i	to derivatives				
solut	ion of Lanlace		partial unrecential	nsion heat and wave	equations in one di	me	is universe in the second seco				
meth	ods) Exploring	s so	lution of PDE using	MATLAR			ision (explicit				
men	ious). Exploring	- 30		- ···· · · · · · · · · · · · · · · · ·							
Cou	Course Outcomes: After completing the course, the students will be able to										

	1 0 /
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, 44 th Edition, 2015, Khanna Publishers, ISBN: 81-7409-195-5.
2	Higher Engineering Mathematics, B.V. Ramana, 11 th Edition, 2010, Tata McGraw-Hill, ISBN: 13-978-07-063419-0; ISBN: 10-0-07-063419-X.
3	Advanced Engineering Mathematics, Erwin Kreyszig, 9 th 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, 6 th 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

Semester: III											
CIVIL ENGINEERING MATERIALS											
				(Theory)							
Cou	Course Code : 18CV32 CIE : 50 Marks										
Crec	lits: L:T:P	:	2:0:0		SEE	:	50 Marks				
Total Hours:26LSEE Duration:2.00 H						2.00 Hours					
Cou	rse Learning	Obj	ectives: The studen	ts will be able to							
1	Understand t	he b	ehaviour and proper	ties of Engineering 1	naterials						
2	Recognize va	ariou	is types of engineeri	ing materials used in	construction industr	У					
3	Compare bel	navio	our of various engine	eering materials in co	onstruction industry						
4	Describe pro	pert	ies of Smart enginee	ring materials and fi	bres in civil enginee	ring					
UNIT-I 05 Hrs											
Ston	Stones: Engineering Rock Classification, Physical properties of minerals, major rock forming										
mine	rals, occurren	minerals, occurrence and use of minerals. Introduction to major rock types (Igneous, sedimentary and									

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

e properties of C&D waste

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	ng 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	
	05 II

UNIT-IV	05 Hrs
Metals: Types and properties of Iron and Steel - Manufacturing process of steel - Advanta	ges of new
alloy steels - Properties and advantages of aluminium and application. HYSD and TMT bar	'S
Materials: Clay products, ceramics -Refractories Fibre Textiles - Geosynthetics for Civil	
Engineering applications, Polymers in Civil Engineering.	

UNIT-V06 HrsSmart Construction Materials: Introduction, Shape memory alloys, Magnetostrictive Materials,
Piezoelectric materials, Electro rheological and electrochromic materials- applications in civil
engineering.

Course	e 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, 5 th 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

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	
Cou	Course Learning Objectives: The students will be able to							
1	Understand the	co	ncepts of surve	ying and leveling.				
2	2 Identify the components of surveying and leveling.							
3	3 Interpret the different measurement techniques for various applications.							
4	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 - Topo	sheets 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	el. types of				
adjustments and objectives temporary adjustments of a dumpy level. Types of leveling	y = Simple				
leveling Profile leveling fly leveling and cross sectioning Booking of levels 1 Rise and fa	all method				
2 Height of instrument method – comparison Arithmetic checks Numerical problems	in moulou				
2. Height of institution method comparison, Artificities Methods of contouring direct a	nd indianat				
Contour Survey: Contours and their characteristics, Methods of contouring – direct a	na mairect				
methods (squares and cross section methods), Uses of contours.					
	AS Ure				
0111-111	00 1115				
Total Station: Introduction - Parts of a Total Station – Accessories – Advantages - Limi	tations and				
Applications, Field procedure for total station survey, data transfer, preparation of map	s. Contour				
surveying using Total station.					
Photogrammetry: Principles of Photogrammetry, Types – Terrestrial and Aerial Photog	rammetry,				
Advantages over ground survey methods - geometry of vertical photographs, scales of verti	cal				
photograph. Ground coordination- relief displacement, distance measurements in photograp	ohs – flight				
planning.	C				
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, successiv	e bisection				
method, and chords produced method. Angular method of Rankine's deflection angle,	Compound				
curve including numerical problems.	1				
UNIT-V	08Hrs				
Introduction to modern surveying: GPS, DGPS, Drone surveying and LiDAR.					
Remote Sensing and GIS: Introduction, Principles, Types and Applications of Remot	e 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	1. 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	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, 16 th Edition, 2016, Laxmi Publications, (P) Ltd, New Delhi ISBN-10: 9788170088530 ISBN-10: 8170088836
2.	Plane surveying, Chandra A.M, 2 nd Edition, 2015, Newage International (P) Ltd., ISBN-10: 8122438806
3.	Fundamentals of Remote Sensing, George Joseph, 3 rd Edition, 2018, Universities press, ISBN-10: 9386235463, ISBN-13: 978-9386235466.
4.	Surveying Vol.I & II,, Duggal S.K, 8 th 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.

					CO-1	PO Ma	pping					
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

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

	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	
Cou	rse Learning Objec	tive	es: The students w	rill be able to				
1	Outline the manufa	ctu	ring and types of c	ements and concrete	and its application	l .		
2	2 Assess the methods of measuring properties of concrete							
3	3 Describe various strength of concretes and enhancing the properties of concrete using admixture							
4	4 Analyze the methods of mix proportion and importance of ready mix concrete							

07 Hrs

08 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,

09 Hrs **UNIT-II** 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 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)
- Tests on Hardened concrete properties (Compressive Strength, Split Tensile Strength) 6.
- 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

- **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, 8 th Edition, 2018, S Chand Publishing, ISBN-13: 978-9352533800
3.	Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta, Paulo J.M. Monteiro, 4 th Edition, Jul 2017, McGraw Hill Education; ISBN-13: 978-9339204761.
4.	Properties of concrete, Neville. A.M, 5 th 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, 5 th 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	-	-

			Semester: III						
		STRE	NGTH OF MATE	RIALS					
Course Code		(19CV25	Theory & Practice) CIE		100	50 Morte		
Course Coue	•	3.1.1		SFF	•	100+50 Marks			
Total Hours	•	30I ±26T±33P		SEE SEE Duration	•	3 H	$r_{S} \downarrow 3$ Hrs		
Course Learning (· bi	octives: The stude	nte will be able to	SEE Duration	•	5 11	15+5 1115		
Determine the ty	vuju voji	limensional stress	weters and analyze	the Shear force and	1 ha	ndino	moment for		
1 beam elements.	0-t	innensional suess s	systems and analyze	e the Shear force and	100	numg	, moment 101		
2 Evaluate the beha	avio	our of column and	strut under compres	sion.					
3 Compare the beh	avi	our of solid and ho	llow shaft under va	rious loading condit	ion				
Examine the med	hai	nical properties of	various materials ur	der tensile, compres	ssiv	e, tor	sion and		
⁴ impact loading.				, I					
			[]nit_]				00 Hrs		
Simple stresses on	l at	noin. Upoko'a lou	UIIII-I	wight of mild staal a	ad a	onor	09 HIS		
of hore of uniform	ı sı	d vorving groups and	, Stress Stralli Della	d stopped horse An			Simple and		
Composite bars of	anc	al and unequal ler	othe: Flastic const	ants (No derivation	of	interr	elationship)		
Volumetric strain	equ Nu	merical problems	ignis, Elastic const		01	men	elationship),		
Two-Dimensional	Stra	ess Systems: Intro	fuction Stress com	ponents on inclined	nla	nes P	rincipal		
Stresses, principal p	lan	es- Analytical met	nods of stress comp	utations - Numerica	l pr	oblen	is.		
Temperature Stresse	es o	f homogeneous ma	terials – Numerical	problems.	- r -				
		U	U nit-II	1			8 Hrs		
Bending moment a	nd	shear force: shear	force and Bending	moment for Statica	lly (leterr	ninate beams,		
Sign conventions, R	ela	tionship between lo	bading, shear force	and bending momen	t. S	.F an	d B M		
diagrams for cantile	ver	statically determin	ate beams subjecte	d to various vertical	loa	ds, m	oment,		
Couple and their con	mbi	inations - Numerica	al problems.						
Unit-III 8 Hrs									
Bending stress and	sh	ear stress in beam	s: Introduction, As	sumptions in simple	be	nding	theory,		
Derivation of Berno	ulli	i's equation, modul	us of rupture, section	on modulus, flexural	rig	idity,	expression		
for horizontal shear	stre	ess in beam, variati	on of bending stres	s and shear stress dia	agra	am for	cross-		
sections-rectangular	, I	and I sections - Nu	imerical problems.				7 11		
	•	L	nit-I V	Denieu (iem ef 1)	<u>.</u>		7 Hrs		
Deflection of determinate Beams: Introduction, Elastic curve – Derivation of differential equation of						equation of			
beams subjected to	uno vari	ious vertical loads	moment couple an	d their combination	can N	y ueu lumer	ical		
problems	var	ious vertical loads,	moment, coupie an		5. 1	umer	icai		
proorems.		Ţ	J nit V				7 Hrs		
Analysis of column	s a	nd struts: Introduc	ction, short and long	g columns, radius of	gvi	ation	slenderness		
ratio, buckling load, effective length, Euler's theory of columns, Derivation of Euler's Buckling load									
for columns with di	ffer	ent end conditions.	Limitations of Eul	er's theory, Rankine	's f	ormu	la. Numerical		
problems on solid an	nd l	hollow column sec	tion. Eccentric colu	mns – Problems.					
			Laboratory						
Laboration Junicipality of bricks Water absorption Initial rate of absorption									
2 Specific or	uut) ivit	v of coarse and find	e aggregate						
3. Fineness m	odu	lus of Fine and Co	arse aggregate						
4. Compressiv	e s	trength tests on bui	lding blocks (brick	, solid blocks and ho	ollo	w bloc	ks)		
5. Tension tes	t or	Mild steel and HY	SD bars		-		,		
6. Compressio	n te	est on HYSD, Cast	iron						
7. Bending Te	st c	on Wood under two	-point loading.						
8. Shear Test	on l	Mild steel – single	and double shear						
9. Impact test on Mild Steel (Charpy& Izod)									

Course	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, 5 th Edition, Affiliated East-West
	Press, 2011 ISBN: 9788176710190.

3.	Mechanics of Materials, F.P.Beer and R.Johnston, 7 th 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	-	-	-	-	-	-	-	-

	Semester: III									
	WATER SUPPLY ENGINEERING									
(Theory)										
Cou	rse Code	:	18CV36			CIE	:	100 Marks		
Crec	lits: L:T:P	:	3:0:0			SEE	:	100 Marks		
Tota	l Hours	:	39L			SEE Duration	:	3.00 Hours		
Cou	rse Learning Obj	ecti	ves: The stu	der	its will be able to	,				
1	To analyse the va	aria	tion of water	dei	nand and to estimate	water requirement f	or a	community		
2	To evaluate the s	our	ces and conv	eya	nce systems for raw	and treated water				
3	To study drinking	g wa	ater quality s	tan	dards and to illustrate	e qualitative analysis	of	water		
4	To design physic	al, o	chemical and	bio	ological treatment me	ethods to ensure safe	and	l potable		
	water Supply.									
				I	NIT_I			06 Hrs		
Intro	duction. Water cr	icic	Conservatio	no	f water resources No	and for protected wa	tor c			
	and of Water: Ty	1515	of water dem	on u	de domestic demand	institutional and co	mm	arcial public		
Dema	ire demand Eactor		of water defined from the formation of t	ani	ta demand Populatic	n forecasting diffe	111111 ront	methods with		
merit	s and demerits. Va	riat	ions in dema	api nd i	of water Peak factor	Design period and	factu	ors governing		
desig	n period. Numerica	al p	roblems.	nu		, Design period and	acti	Jis governing		
		- p	100101101	UN	NIT-II			08 Hrs		
Oual	ity of Water: Obi	ecti	ives of water	au	ality management. (Concept of safe wate	r. v	holesomeness		
and p	alatability. Water	bori	ne, water bas	ed.	water washed and ve	ector diseases.	-,			
1	J		-,	,						
Exan	nination of Wat	er:	Sampling -	- C	bjectives, Methods	, Preservation tech	niq	ues. Physical,		
Chen	nical and Microbio	log	ical Examina	tio	ns, (IS: 3025and IS:	1622) using analytic	al 8	k Instrumental		
techn	iques. Drinking wa	ater	BIS, ICMR	star	ndards & WHO guide	elines, Health signifi	can	ce of Fluoride,		
Nitra	tes, Hardness and I	Hea	vy metals lik	e N	Iercury and Cadmiur	n.				
Sour	ces: surface and su	ıbsu	irface sources	5 -S	uitability with regard	l to quality and quan	tity.			
				UN	IT-III			08 Hrs		
Colle	ction and Convey	and	ce of Water:	Int	ake structures -differ	ent types of intakes	– riv	ver, canal and		
reserv	voir intake. Design	pro	oblems.							
Desig	gn of the economic	al d	liameter for the	he 1	rising main; Pipe app	urtenances.				
Pipe	materials: different	t ma	aterials with a	ıdv	antages and disadvar	ntages.				
Pum	ps: Types of pump	s w	rith working p	orin	ciples. Numer	rical Problems.				
Wate	er Treatment: Obj	ecti	ives, Treatme	ent :	flow chart – significa	ance of each unit		10 11		
				UN				10 Hrs		
Aera	tion : Principle of	wor	rking and typ	es o	of aerators, Design of	t cascade aerator				
Scree	ening: Types and c	lesi	gn of bar scre	een.						
Sedir	nentation -theory,	. set	tling tanks, t	ype	s, design.	- 1 C - 1' C - 1	•	Cl 1 . (
Coag	Coagulation aided sedimentation -types of coagulants, chemical feeding, flash mixing, flocculators -									
design of all units										
FILTATION: mechanism -meory of intration, types of inters, slow sand, rapid sand and pressure filters										
drainage system										
Dicin	UNIT-V U/ Hrs Disinfaction Theory of disinfaction methods of disinfaction allowing theory allowing down 1 11									
chlor	ine break point ch	l uis Iori	nation Num		al problems	mormation, emorme	uen	land, residual		
Miscollanoous Trantmont: Softaning Eluoridation and Da fluoridation. Activated asthen treatment										
Dietr	ibution system · M	leth	ods- Gravity	- Pi	imping Combined of	ravity and numping	vai U Svet	em		
Lavo	uts Dead end Rad	lial	Grid iron C	, ru ircu	ilar system	ravity and pumping	syst	UIII.		
Netw	ork analysis in die	trih	ution system	_ F	Jardy cross method	Numerical problems	Ha	zen- Williame		
form	formula. EPANET and WATERGEMS.									

Course	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, 3 rd 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

				Semester: III						
	MATHEMATICS									
	Bridge Course									
	(Common to all branches)									
Cou	rse Code	:	18DMA37		CIE	:	50 Marks			
Cre	dits: L:T:P	:	2:0:0		SEE	:	50 Marks			
	Audit	Co	urse		SEE Duration	:	2.00 Hours			
Cou	rse Learning O	bje	ctives: The student	s will be able to						
1	Understand the	cc	oncept of functions	of several variables, t	ypes of derivatives in	ıvol	ved with			
	these functions	ar	id its applications, a	pproximate a function	n of single variable in	n tei	rms of			
-	infinite series.			1 (* 11 1 1 * 6			C			
2	Acquire concep	ots	of vector functions,	, scalar fields and diff	erential calculus of v	/ect	or functions			
	in Cartesian co	or	dinates.							
3	Explore the pos	ssi	bility of finding app	proximate solutions us	sing numerical metho	ods i	in the			
	absence of ana	lyt	ical solutions of var	ious systems of equat	ions.					
4	Recognize line	ar	differential equation	ns, apply analytical te	chniques to compute	sol	utions.			
5	Gain knowledg	ge o	of multiple integrals	and their application	s.					
6	Use mathemati	ca	I IT tools to analyze	and visualize the abo	ove concepts.					
			l	U nit-I			05 Hrs			
Diff	erential Calculu	s:								
Tayl	or and Maclaurin	1 Se	eries for function of	single variable. Parti	al derivatives – Intro	duc	tion, simple			
prob	lems. Total deriv	/ati	ive, composite funct	tions. Jacobians – sim	ple problems.					
			U	nit – 11			05 Hrs			
Vect	tor Differentiati	on	11	1 . 1 1 .		1.	. 1.			
Intro	duction, simple	pro	blems in terms of v	elocity and acceleration and	on. Concepts of grac	lien	t, divergence			
- 50		IIIC	\mathbf{I}	nit _III	nu Laplacian, simple	pre	06 Hrs			
Diff	erential Faustia	ne	•	III -111			00 1115			
High	er order linear d	iff	• erential equations w	ith constant coefficie	nts solution of home	JOPT	POUS			
equa	tions - Complem	nen	tary functions. Non	homogeneous equati	ons –Inverse differer	ntial	operator			
meth	nod of finding pa	rti	cular integral based	on input function (for	rce function).		operator			
	Unit –IV 05 Hrs									
Nun	nerical Methods	:					I			
Solu	tion of algebraic	e a	nd transcendental e	equations – Intermedi	iate value property,	Nev	vton-Raphson			
meth	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).										
L	Unit –V 05 Hrs									
Mul	tiple Integrals:									
Eval	uation of doubl	ei	integrals, change o	f order of integration	on. Evaluation of	tri	ple integrals.			
	Applications – Area, volume and mass – simple problems.									

Course	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:	2: 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.							

Refere	Reference Books						
1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44 th Edition, 2015, ISBN: 978-81-933284-9-1.						
2	Higher Engineering Mathematics, B.V. Ramana, 11 th Edition, 2010, Tata McGraw-Hill, ISBN: 978-0-07-063419-0.						
3	N.P. Bali & Manish Goyal, A Text Book of Engineering Mathematics, 7 th Edition, 2010, Lakshmi Publications, , ISBN: 978-81-31808320.						
4	Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10 th 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									
	ΥΥΔΥΔΗΔΡΙΚΑ ΚΑΝΝΑ ΠΑ									
	(Common to all branches)									
Co	urse Code	•	18HS38V		CIE	•	50 Marks			
Cre	dits. L.T.P	•	1.0.0		SFE	•	50 Marks			
		•	1.0.0		CIE Duration	•	00 Minutos			
10		•	101115		CIE Duration	•	50 Minutes			
Co	urse Learning O	hie	ctives of Vyayahar	ika Kannada: The s	tudents will be able i	to				
1	Motivate stud	ent	s to learn Kannada l	anguage with active i	nvolvement	.0				
2	Learn basic co	omr	nunication skills in	Kannada language (V	Vyavaharika Kannad	a)				
3	Importance of	f lea	rning local languag	e Kannada		u).				
	Importance of				AL AKE Kanna	da)				
	_		to those studen	ts who does not	ALAKE Kailla know Kannada)	ua)				
			to mose studen		Kilow Kalillaua)		411			
D	·	4.)-	Unit-1			4Hrs			
Pai Net	Control (Control and Control 	cuo 1 10	n): cal language Tins t	o learn the language y	vith easy methods. F	lint	s for correct and			
nol	ite conversation	His	torv of kannada lan	o learn the language v	with easy methods, I	m	s for correct and			
por		115		Unit – II			4Hrs			
Ka	nnada alphabtet	s ai	nd Pronunciation:							
Kar	nnada aksharma	le,	Kannada stress	letters (vattakshara)), Kannada Khagu	ınit	ha, Pronunciation,			
me	norisation and us	age	of the Kannada let	ters.	-					
			t	J nit – III			4Hrs			
Ka	nnada vocabulai	ry f	or communication	:						
Sin	gular and Plural	nou	ns, Genders, Interro	ogative words, Anton	yms, Inappropriate	proi	nunciation, Number			
sys	tem, List of veget	abl	es, Fractions, Menu	of food items, Name	es of the food items,	wo	rds relating to time,			
WO	ds relating to a	irec	ctions, words relation	ng to numan s teeling	gs and emotion, Par	ts o	of the numan body,			
wo	us relating to rela	ano	пыпр. І	Init _IV			4Hrs			
Ka	nnada Gramma	r in	Conversations				••••			
No	ins. Pronouns. I	Jse	of pronouns in K	annada sentences. A	diectives and its u	sag	e. Verbs. Adverbs.			
Cor	ijunctions, Prepor	sitio	ons, Questions cons	tructing words, Simpl	le communicative se	ntei	nces in kannada.			
Act	ivities in Kannad	a, \	ocabulory, Conver	sation.						
			•							
Co	Course Outcomes: After completing the course, the students will be able to									
1	Usage of local la	ang	uage in day today a	ffairs.						
2	Construction of	sim	ple sentences accor	ding to the situation.						
3	Usage of honori	fic	words with elderly	people.						
4	Easy communication	atio	n with everyone.							
Rei	Reference Books:									
1	Vyavaharika	Kar	inada patyapustha	ka, L. Thimmesh,	and V. Keshav	vam	urthy, Prasaranga			
	Kannada Kali	VIII V	N Subramanya	S Narahari H G	Srinivasa Presed	P	amamurthy and S			
2	Sathvanaravana	1. 5 ^t	^h Edition. 2019 RV	College of Engineeri	ing Bengaluru	, K	amamuruny allu S.			
3	Spoken Kannad	., <u>.</u> la. I	Kannada Sahithya P	arishat, Bengaluru.						
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ವ್ಯಾವಹಾರಿಕ ಕನ್ನಡ (Kannada Version)	
ಅಧ್ಯಾಯ – I	4Hrs
ಸ್ಥಳೀಯ ಅಥವಾ ಪ್ರಾದೇಶಿಕ ಭಾಷಾ ಕಲಿಕೆಯ ಅವಶ್ಯಕತೆ, ಭಾಷಾ ಕಲಿಕೆಯ ಸುಲಭ ವಿಧಾನಗಳು, ಸಂಭಾಷಣೆಗಾಗಿ ಸು	ಲಭ ಸೂಚ್ಯಗಳು
ಕನ್ನಡ ಭಾಷೆಯ ಇತಿಹಾಸ.	
ಅಧ್ಯಾಯ – II	4Hrs
ಕನ್ನಡ ಅಕ್ಷರಮಾಲೆ ಹಾಗೂ ಉಚ್ಛಾರಣೆ:	
ಕನ್ನಡ ಅಕ್ಷರಮಾಲೆ, ಒತ್ತಕ್ಷರ, ಕಾಗುಣಿತ, ಉಚ್ಚಾರಣೆ, ಸ್ವರಗಳು ಉಚ್ಚಾರಣೆ, ವ್ಯಂಜನಗಳ ಉಚ್ಚಾರಣೆ.	
ಅಧ್ಯಾಯ – III	4Hrs
ಸಂಭಾಷಣೆಗಾಗಿ ಕನ್ನಡ ಪದಗಳು:	•
ಏಕವಚನ, ಬಹುವಚನ, ಲಿಂಗಗಳು (ಸ್ತ್ರೀಲಿಂಗ, ಪುಲ್ಲಿಂಗ) ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು, ವಿರುದ್ಧಾರ್ಥಕ ಪದಗಳು, ಅಸಮ	ಂಜಸ ಉಚ್ಚಾರಣೆ,
ಸಂಖ್ಯಾ ವ್ಯವಸ್ಥೆ, ಗಣಿತದ ಚಿಹ್ನೆಗಳು, ಭಿನ್ನಾಂಶಗಳು.	
ತರಕಾರಿಗಳ ಹೆಸರುಗಳು, ತಿಂಡಿಗಳ ಹೆಸರುಗಳು, ಆಹಾರಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಪದಗಳು, ಕಾಲ/ಸಮಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ಪ	ಪದಗಳು, ದಿಕ್ಕುಗಳ
ಹೆಸರುಗಳು, ಭಾವನೆಗೆ ಸಂಬಂಧಿಸಿದ ಪದಗಳು, ಮಾನವ ಶರೀರದ ಭಾಗಗಳು, ಸಂಬಂಧದ ಪದಗಳು, ಸಾಮಾನ್ಯ	ಸಂಭಾಷಣೆಯಲ್ಲಿ
ಬಳಸುವಂತಹ ಪದಗಳು.	
ಅಧ್ಯಾಯ – IV	4Hrs
ಸಂಭಾಷಣೆಯಲ್ಲಿ ಕನ್ನಡ ಬಳಕೆ:	•
ನಾಮಪದಗಳು, ಸರ್ವನಾಮಗಳು, ನಾಮವಿಶೇಷಣಗಳು, ಕ್ರಿಯಾಪದಗಳು, ಕ್ರಿಯಾವಿಶೇಷಣಗಳು, ಕನ್ನಡದಲ್ಲಿ	ಸಂಯೋಜನೆಗಳು,
ಉಪಸರ್ಗಗಳು, ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು, ವಿಚಾರಣೆಯ / ವಿಚಾರಿಸುವ / ಬೇಡಿಕೆಯ ವಾಕ್ಯಗಳು. ಕನ್ನಡದಲ್ಲಿ ಚಟುವಟಿಕೆಗ	ಗಳು,
ಶಬ್ಧಕೋಶ, ಸಂಭಾಷಣೆ.	
ವ್ಯವಹಾರಿಕ ಕನ್ನಡದ ಕಲಿಕಾ ಫಲಿತಾಂಶಗಳು :	
CO1: ನಿತ್ಯ ಜೀವನದಲ್ಲಿ ಆಡುಭಾಷೆಯ ಬಳಕೆ.	
CO2: ಸಂದರ್ಭ, ಸನ್ನಿವೇಶಕ್ಕನುಗುಣವಾಗಿ ಸರಳ ಕನ್ನಡ ವಾಕ್ಯಗಳ ಬಳಕೆ.	
CO3: ಗೌರವ ಸಂಬೋಧನೆಯ ಬಳಕೆ.	
CO4: ಇತರರೊಡನೆ ಸುಲಭ ಸಂವಹನ.	
word distant.	

ಆಧಾರ ನ	ಪುಸ್ತಕಗಳು :
1	ವ್ಯವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕ, ಎಲ್.ತಿಮ್ಮೇಶ್ ಮತ್ತು ವಿ.ಕೇಶವಮೂರ್ತಿ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿದ್ಯಾಲಯ, ಬೆಳಗಾಂ.
2	ಕನ್ನಡ ಕಲಿ, ಕೆ.ಎನ್.ಸುಬ್ರಹ್ಮಣ್ಯಂ, ಎನ್.ಎಸ್.ನರಹರಿ, ಎಚ್.ಜಿ.ಶ್ರೀನಿವಾಸ 'ಪ್ರಸಾದ್, ಎಸ್.ರಾಮಮೂರ್ತಿ ಮತ್ತು ಎಸ್.ಸತ್ಯನಾರಾಯಣ, 2ನೇ ಮುದ್ರಣ 2019, ರಾ.ವಿ.ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಬೆಂಗಳೂರು.
3	ಮಾತನಾಡುವ ಕನ್ನಡ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್, ಬೆಂಗಳೂರು.

Continuous Internal Evaluation (CIE); (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Activity. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks and the sum of the marks scored from two quizzes is reduced to 10. The two tests are conducted for 50 marks each and the sum of the marks scored from two tests is reduced to 30. The marks component for Activity is 10. Total CIE is 10(Q) + 30(T) + 10(A) = 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 only objective type questions for 40 marks covering the complete syllabus. Part – B consists of essay type questions for 10 marks.

Semester: III											
AADALITHA KANNADA											
(Common to all branches)											
Cou	rse Code	:	18HS38A	СІЕ	:	50 Marks					
Cred	dits: L:T:P	:	1:0:0	SEE	:	50 Marks					
Total Hours : 16Hrs CIE Duration : 90 Minutes											
ಆಡಳಿತ ಕನ್ನಡ (ಕನ್ನಡಿಗರಿಗಾಗಿ)											
ಆಡಳಿತ ಭಾಷಾ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ											
1	1 ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.										
2	ಕನ್ನಡ ಭಾಷೆಯ	ವ್ಚಾ	್ಯಕರಣದ ಬಗ್ಗೆ ಆ	ಶಿವು ಮೂಡಿಸುವುದು.							
3	ಕನ್ನಡ ಭಾಷಾ ಪರಿಚಯಿಸುವುದ	ಬ ರಿ.	ರಹದಲ್ಲಿ ಕಂಡ	ಬಬರುವ ದೋಷಗಳು ಹಾಗೂ ಅವುಗಳ ನಿವಾರಣೆ ಮತ	್ತು ಲೇ	ಖನ ಚಿಹ್ನೆಗಳನ್ನು					
4	ಸಾಮಾನ್ಯ ಅರ್ಜಿ	ಗಳು	, ಸರ್ಕಾರಿ ಮತ	್ತುಅರೆಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.							
5	ಭಾಷಾಂತರ, ಪ್ರ	ಬಂರ	ಿರಚನೆ, ಕನ್ನಡ	ಭಾಷಾಭ್ಯಾಸ ಮತ್ತುಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿ	ಕೊಡುಾ	ಶ್ರದು.					
				ಅಧ್ಯಾಯ –I		4Hrs					
ಕನ್ನಡ	ಭಾಷೆ – ಸಂಕ್ಷಿಪ್ತ	ವಿವ	ರಣೆ:	-		I					
ಪ್ರಸ್ತಾತ	ವನೆ—ಕನ್ನಡ ಭಾಷೆ,	ಶ್ರಾತ	ವಣ (ಕವನ)– ಸ	ದ.ರಾ.ಬೇಂದ್ರೆ (ಕವಿ), ಬೆಲ್ಜಿಯ ಹಾಡು (ಕವನ) –ಸಿದ್ದಲಿಂಗಯ್ಯ (ಕವಿ)						
ಆಡಳಿ	ತ ಭಾಷೆಕನ್ನಡ, ಆ	ಡಳಿ	ತ ಭಾಷೆಯ ಲಕ್ಷ	ಣಗಳು, ಆಡಳಿತ ಭಾಷೆಯ ಪ್ರಯೋಜನಗಳು.							
				ಅಧ್ಯಾಯ –II		4 Hrs					
ಭಾಷಾ	ತ್ರಯೋಗದಲ್ಲಾಗು	ುವ ಅ	ಲೋಪದೋಷಗಳ	ಸಿ ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ:		·					
ಪ್ರಸ್ತಾತ ಮಹಾ ಗೌರವ	ವನೆ– ಕಾಗುಣಿತದ ುಪ್ರಾಣಗಳ ಬಳಕೆಂ ನ ಸೂಚಕಗಳ ಬಳ	ಪ್ರಸ್ತಾವನೆ– ಕಾಗುಣಿತದ ತಪ್ಪು ಬಳಕೆಯಿಂದಾಗುವ ಲೋಪದೋಷಗಳು ಅಥವಾ ಸಾಧುರೂಪಗಳ ಬಳಕೆ, ಅಲ್ಪ ಪ್ರಾಣ ಮತ್ತು ಮಹಾಪ್ರಾಣಗಳ ಬಳಕೆಯಲ್ಲಿನ ವ್ಯತ್ಯಾಸದಿಂದಾಗುವ ಲೋಪದೋಷಗಳು, ಲೇಖನ ಚಿಹ್ನೆಗಳು, ಕನ್ನಡ ಭಾಷೆಯಲ್ಲಿನ ಲೋಪದೋಷಗಳು ಗೌರವ ಸೂಚಕಗಳ ಬಳಕೆ, ಭಾಷಾ ಬರಹದಲ್ಲಿ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನಿತರಕ್ರಮ, ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ.									
erant – III dura											
				ಲ್ಲಿ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೇಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ –III	ರ್ುಗಳ ಲ	vಪಯೋಗ. 4Hrs					
ಪತ್ರ ವ	ನ್ಯವಹಾರ:			ಲ್ಲಿ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ −Ⅲ	ಶ್ರೆಗಳ ಲ	vಪಯೋಗ. 4Hrs					
ಪತ್ರ ಪ ಪ್ರಸ್ತಾತ	<mark>ನ್ಯವಹಾರ:</mark> ವನೆ– ಖಾಸಗಿ ಪತ್ರ	, ವ್ಯ	ವಹಾರ, ಆಡಳಿತ	ಲ್ಲ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅನ ಅಧ್ಯಾಯ −III ಪತ್ರಗಳು, ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು ಮತ್ತು ಮಾದರಿಗಳು.	ರ್ುಳ ಲ	vಪಯೋಗ. 4Hrs					
ಪತ್ರ ಇ ಪ್ರಸ್ತಾತ	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ	್ರವ್ಯ	ವಹಾರ, ಆಡಳಿತ	ಲ್ಲ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಶನ ಜಹ್ನಗಳು ಮತ್ತು ಅನ ಅಧ್ಯಾಯ −III ಪತ್ರಗಳು, ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು ಮತ್ತು ಮಾದರಿಗಳು. ಅಧ್ಯಾಯ −IV	ರುಗಳ ೮	vಪಯೋಗ. 4Hrs 4Hrs					
ಪತ್ರ ಷ ಪ್ರಸ್ತಾತ ಪ್ರಬಂಗ	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ಧ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ	್ರ ವ್ಯ ನರಚ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ	ಲ್ಲಿ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನಅರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅನ ಅಧ್ಯಾಯ −III ಪತ್ರಗಳು, ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು ಮತ್ತು ಮಾದರಿಗಳು. ಅಧ್ಯಾಯ −IV oತರ:	้ จักร ย 	Vಪಯೋಗ. 4Hrs 4Hrs					
ಪತ್ರ ಪ ಪ್ರಸ್ತಾತ ಪ್ರಬಂದ ಕನ್ನಡ	<mark>ನ್ಯವಹಾರ:</mark> ವನೆ– ಖಾಸಗಿ ಪತ್ರ ಧ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ	್ರ ವ್ಯ: ನರಚ ೋಡಿ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ	ಲ್ಲ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ −III ಪತ್ರಗಳು, ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು ಮತ್ತು ಮಾದರಿಗಳು. ಅಧ್ಯಾಯ −IV ಂತರ: ಬಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು,	ಶ್ರೆಗಳ e	ಉಪಯೋಗ. 4Hrs 4Hrs ಶದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ ಇ ಪ್ರಸ್ತಾತ ಪ್ರಬಂದ ಕನ್ನಡ ತದ್ಭವ ಆಡಲ	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ಧ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನಡದ ಕಲಿಕಾ	್ರ ವ್ಯ ನರಚ ೧೯೯ ನುಗ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ ತಿಗಟ್ಟುಗಳು, ಶಬ್ಧ ತಾಂಶಗಳು:	ಲ್ಲಿ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ −III ಅಧ್ಯಾಯ −IV ಂತರ: ಬಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ್ಧಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ	ಶ್ರೆಗಳ e ವಿರುದ್ಧಕ ನಗಳು.	ಉಪಯೋಗ. 4Hrs 4Hrs ಸದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ ತ ಪ್ರಸ್ತಾತ ಕನ್ನಡ ತದ್ಭವ ಆಡಳಿ	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ಧ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನ್ನಡದ ಕಲಿಕಾ . ಕನ್ನಡ ಬರಹ	<u>ರ ವ್ಯ</u> ನರಚ ೂಡ ಹಲಿ ದಲಿ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ ತಿಗಟ್ಟುಗಳು, ಶಬ್ಧ ತಾಂಶಗಳು: ವಾಕರಣದ ಬಳಿ	ಲ್ಲ ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ −III ಅಧ್ಯಾಯ −IV ಂತರ: ಶಿಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ್ಧಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ	ವುಗಳ e ವಿರುದ್ಧಃ ನಗಳು.	ುಪಯೋಗ. 4Hrs 4Hrs ಸದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ ಪ್ರಸ್ತಾತ ಪ್ರಸ್ತಾತ ಕನ್ನಡ ತದ್ಭವ ಆಡಳಿ CO1	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ರಬ್ಧ ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧ ಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನ್ನಡದ ಕಲಿಕಾ I: ಕನ್ನಡ ಬರಹ 2. ಕನ್ನಡದಲ್ಲಿ ಪ	್ರ ವ್ಯ ನರಚ ನಾಂಡ ಫಲ್ಲಿ ಬ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ ತಿಗಟ್ಟುಗಳು, ಶಬ್ಯ ತಾಂಶಗಳು: ವ್ಯಾಕರಣದ ಬಳಿ ರರೆಯುವಿಕೆ.	ಲಧ್ಯಾಯ –III ಶಕ್ರಾಯ –III ಶಕ್ರಾಯ –IV ಅಧ್ಯಾಯ –IV ಂತರ: ಬಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ನ್ನಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ	ವುಗಳ e ವಿರುದ್ಧಕ ನಗಳು.	Nಪಯೋಗ. 4Hrs 4Hrs ಶದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ ಪ್ರಸ್ತಾತ ತ್ರಬಂದ ಕನ್ನಡ ತದ್ಭವ CO1 CO2 CO3	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ರ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನ್ನಡದ ಕಲಿಕಾ I: ಕನ್ನಡ ಬರಹ 2: ಕನ್ನಡದಲ್ಲಿ ಪ್ 3: ಕನ್ನಡ ಸಾಹಿತ	್ರ ವ್ಯ ನರಚ ನಾಂಡ ಫಲಿ ವರ್ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ್ರ ಸ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ ಡಿಗಟ್ಟುಗಳು, ಶಬ್ಧ ತಾಂಶಗಳು: ವ್ಯಾಕರಣದ ಬಳ ಾರೊಯುವಿಕೆ.	ಲಧ್ಯಾಯ –III ಅಧ್ಯಾಯ –III ಶತ್ರಗಳು, ಅರ್ಜಿಯ ವಿವಿಧ ಬಗೆಗಳು ಮತ್ತು ಮಾದರಿಗಳು. ಅಧ್ಯಾಯ –IV ಂತರ: ಹಿಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ ಕೆಕೆ.	ವಿರುದ್ಧ ವಿರುದ್ಧ ನಗಳು.	ಉಪಯೋಗ. 4Hrs 4Hrs ಶದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ 2 ಪ್ರಸ್ತಾಂ ಪ್ರಬಂಗ ಕನ್ನಡ ತದ್ಭವ ಆಡಳಿ CO1 CO2 CO3	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ಧ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನ್ನಡದ ಕಲಿಕಾ L: ಕನ್ನಡ ಬರಹ 2: ಕನ್ನಡದಲ್ಲಿ ಪ 3: ಕನ್ನಡ ಸಾಹಿತ 3: ಕನ್ನಡ ಸಾಹಿತ	್ರ ವ್ಯ ನರಚ ನಾಡಿ ನರ ಪ್ರ ಸ ಹ ರಲ್ಲಿ ಸ್ಥ ಹ	ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ನಿನಡಿಗಳು, ಅನ ಡಿಗಟ್ಟುಗಳು, ಶಬ್ಧ ತಾಂಶಗಳು: ವ್ಯಾಕರಣದ ಬಳ ನೆಯುವಿಕೆ.	2 ಅನುಸರಿಸಬೇಕಾದ ಇನ್ನತರಕ್ರಮ, ರೀಖನ ಜಹ್ನಗಳು ಮತ್ತು ಅಂ ಅಧ್ಯಾಯ –III ಶಧ್ಯಾಯ –IV ಂತರ: ಹಿಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ ಕೆಕೆ.	ವಿರುದ್ಧ ವಿರುದ್ಧ ನಗಳು.	Nಪಯೋಗ. 4Hrs 4Hrs ಶದಗಳು, ತತ್ಸಮ–					
ಪತ್ರ ಪ್ರಸ್ತಾತ ತ್ರಭ್ರವ ಕನ್ನಡ ತದ್ಭವ CO1 CO2 CO3 ಆಧಾ 1	ನ್ಯವಹಾರ: ವನೆ– ಖಾಸಗಿ ಪತ್ರ ರ, ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ಶಬ್ಧಸಂಗ್ರಹ, ಜೆ ಗಳು, ದ್ವಿರುಕ್ತಿಗಳು, ತ ಕನ್ನಡದ ಕಲಿಕಾ I: ಕನ್ನಡ ಬರಹ 2: ಕನ್ನಡ ದಲ್ಲಿ ಪ 3: ಕನ್ನಡ ಸಾಹಿತ 5 ಪುಸ್ತಕಗಳು : ಆಡಳಿತ ಕನ್ನ ಬೆಳಗಾಂ.	್ರ ವ್ಯ ನರಜ ನಾಂಡ ಫಲ್ಲಿ ಸ ದಲ್ಲಿ ಸ ಹ	ವಹಾರ, ಆಡಳಿತ ವಹಾರ, ಆಡಳಿತ ನೆ ಮತ್ತು ಭಾಷಾ ತಿನುಡಿಗಳು, ಅನ ಡಿಗಟ್ಟುಗಳು, ಶಬ್ ತಾಂಶಗಳು: ವ್ಯಾಕರಣದ ಬಳ ರರೆಯುವಿಕೆ. ನಗೂ ಸಂಸ್ಕೃತಿಂ ಪಠ್ಯಪುಸ್ತಕ, ಎಲ	ಲಧ್ಯಾಯ –III ಶಧ್ಯಾಯ –III ಶಧ್ಯಾಯ –IV ಅಧ್ಯಾಯ –IV ಂತರ: ಬಕರಣಾವ್ಯಯಗಳು, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥಗಳು, ಸಮೂಹಕ್ಕೆ ಒಂದು ಶಬ್ಧ, ಅನ್ಯದೇಶೀಯ ಪದಗಳು, ದೇಶೀಯಪರ ತಕೆ.	ವಿರುದ್ಧ ವಿರುದ್ಧ ನಗಳು.	Nಪಯೋಗ. 4Hrs 4Hrs ಶದಗಳು, ತತ್ಸಮ–					

Continuous Internal Evaluation (CIE); (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Activity. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks and the sum of the marks scored from two quizzes is reduced to 10. The two tests are conducted for 50 marks each and the sum of the marks scored from two tests is reduced to 30. The marks component for Activity is 10. Total CIE is 10(Q) + 30(T) + 10(A) = 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 is for 40 marks. It consists of simple grammar and essay type questions.

Semester: IV											
ENGINEERING MATHEMATICS – IV											
(Theory)											
(Common to AS, CH, CV & ME)											
Cou	rse Code	:	18MA41C		CIE	:	100 Marks				
Cre	dits: L:T:P	:	4:1:0		SEE	:	100 Marks				
Tota	al 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 kn	owle	edge of differential a	and integral calculus	to functions of comp	lex	variables.				
3	Analyze the s	set o	f data and fit suitabl	e approximating curv	ves.						
4	Interpret cond	cept	of probability to sol	lve random physical J	phenomena and impl	eme	ent the proper				
	distribution n	node	el.								
5	Use mathema	ntica	l IT tools to analyze	and visualize the abo	ove concepts.						
	•										
				Unit-I			10 Hrs				
Line	ear Programm	ing:									
Mat	hematical form	ulati	on of Linear Progra	mming Problem (LPI	P). Solving LPP usir	ıg G	raphical,				
Sim	plex and Big M	met	thods. Exploring op	timization techniques	using MATLAB.						
			U	nit – II			11 Hrs				
Con	nplex Analysis	:									
Ana	lytic function –	Cau	chy-Riemann equat	tions in Cartesian and	l polar forms, harmo	nic 1	functions.				
Con	struction of ana	lytic	e functions by Milne	e-Thomson method. (Complex potential, s	trear	n and				
pote	ntial functions.	Cor	nplex integration –	Cauchy's theorem, 1	aylor's and Laurent	s sei	ies,				
sing	ulaillies, poles,	1051		nit –III	fems without proof		11 Hrs				
Stat	istics.		0				11 1115				
Cont	ral moments r	noon	variance coefficie	nts of skawness and l	kurtosis in terms of	non	onte Curvo				
fittir	a by method o	f lea	st squares fitting of	curves – polynomial	exponential and po	wer	functions				
Corr	elation and line	ar r	eoression analysis	application problems	Simulation using M		AB				
0011	charlon and mix	Jul 1	U	nit –IV	Simulation using in		10 Hrs				
Pro	bability and D	istri	butions:								
Ran	dom variables -	- dis	crete and continuou	s. Probability distribu	tion function cumu	lativ	e distribution				
func	tion. Binomial.	Poi	sson. Exponential a	nd Normal distributio	ons. Simulation using	g M	ATLAB.				
	,		U	nit –V			10 Hrs				
Join	t Probability I	Disti	ribution and Mark	ov Chain:							
Join	t distribution of	f ran	dom variables – Ex	pectation, covariance	and correlation. Ma	rkov	r chain –				
Stoc	hastic matrices	, hig	her transition proba	bilities, regular stoch	astic matrices, proba	ıbili	y vector.				
	Stochastic matrices, ingher transition productifies, regular stochastic matrices, productifity votor.										
Cou	Course Outcomes: After completing the course, the students will be able to										
CO	L: Understand	l the	concept of linear pr	rogramming problem	s (LPP), analytic fun	ctio	ns, statistical				
	measures.	curve	e fitting and random	variables.	· · · · ·						
1	measures, curve fitting and random variables.										

stochastic matrices.

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

Semester IV										
ENVIRONMENTAL TECHNOLOGY										
(Theory)										
	(Common to All Non Circuit Branches)									
Cou	Course code:18BT42ACIE:50Marks									
Cree	lits: L:T:P	:	2:0:0	:	SEE	:	50Mark	S		
Tota	l Hours	:	26L		SEE Duration	:	90 min			
Cou	rse learning ob	jec	tives: The student	will be able to						
1.	Understand the healthy enviro	e va nm	arious components ent.	of environment and the	significance of the	e su	stainabili	ty of		
2.	Recognize the activity.	im	plications of differ	ent types of the wastes p	broduced by natura	al a	nd anthro	pogenic		
3.	Learn the strat	egi	es to recover the en	nergy from the waste.						
4.	Design the mo environment.	del	s that help mitigate	e or prevent the negative	e impact of propos	ed a	activity or	n the		
				Unit I				06 Hrs		
Intr	oduction: Envir	on	ment - Component	s of environment, Ecosy	stem. Impact of a	nth	opogenic	;		
activ	vities on environ	me	nt (agriculture, min	ning and transportation),	, Environmental e	duc	ation,			
Envi	ronmental acts	& r	egulations, role of	non-governmental organ	nizations (NGOs),	EN	AS: ISO 1	4000,		

Environmental Impact Assessment. Environmental auditing.

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 dis	seases,
arsenic & fluoride problems in drinking water and ground water contamination, advanced waste	water
treatment techniques.	
Unit III	06 Hrs
Unit III Waste management, Solid waste management, e waste management & biomedical waste mana	06 Hrs gement
Unit III Waste management, Solid waste management, e waste management & biomedical waste mana – sources, characteristics & disposal methods. Concepts of Reduce, Reuse and Recycling of the	06 Hrs gement wastes.
Unit III Waste management, Solid waste management, e waste management & biomedical waste mana – sources, characteristics & disposal methods. Concepts of Reduce, Reuse and Recycling of the Energy – Different types of energy, conventional sources & non conventional sources of energy	06 Hrs gement wastes. 7, solar
Unit III Waste management, Solid waste management, e waste management & biomedical waste mana – sources, characteristics & disposal methods. Concepts of Reduce, Reuse and Recycling of the Energy – Different types of energy, conventional sources & non conventional sources of energy energy, hydro electric energy, wind energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hy	06 Hrs gement wastes. /, solar /drogen

Unit II

Unit IV05 HrsEnvironmental 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 V04 HrsResource 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.

06 Hrs

Course of	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: 3 rd										
	Edition (2015). ISBN: 9332549761, ISBN-13: 978-9332549760.										
2.	Howard S. Peavy, Donald R. Rowe and George Tchobanoglous. 2000. Environmental Engineering,										
	McGraw Hill Education, 5 th Edition, 1 July 2017, ISBN-10: 9351340260, ISBN-13: 978-										
	9351340263.										
Refe	rence 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
TT' 1 2 1	a 10	A T	1									

	Semester: IV									
FLUID MECHANICS (Theory & Practice)										
Cou	rse Code	:	18CV43		CIE Marks	:	100+50			
Credits: L:T:P		:	3:0:1		SEE	:	100+50			
Tota	l Hours	: 39L+33P			SEE Duration	:	3Hrs + 3 Hrs			
Cou	rse Learning Ob	ject	ives: The students v	will be able to						
1	Describe fundat	mer	ntal properties of fluid	ds and its applicati	ons.					
2	Analyze hydros	tati	c laws and its applica	ations to solve prac	ctical problem.					
3	Apply the princ	iple	es of Kinematics and	Hydro-Dynamics	for practical applic	atic	ons			
4	Examine basic	flov	v rate measurement te	echniques.						

UNIT-I	08 Hrs
Introduction: Definition of Properties and its usage for characterization of Fluid, Numerical F	roblems.
Fluid Pressure and its measurement : Fluid pressure at a point, Pascal's law, Variation of pr	essure in a
fluid, Atmospheric Absolute, Gauge, and Vacuum pressures, Measurement of pressure using S	simple and
Differential manometers, Numerical Problems.	_
Hydrostatic Forces on surfaces:	
Total pressure and Center of pressure on submerged plane surfaces; horizontal, vertical and ind	clined
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	s equation,
Bernoulli's equation, Modified Bernoulli's equation - limitations and its application - Orific	e Meter &
Venturimeter, Numerical Problems.	
UNIT-III	08 Hrs
Flow through pipes:	
Head losses - Major loss & Minor loss, Darcy - Weisbach Equation, Hydraulic Gradient line,	Fotal
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, Corre	ections 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 Chann	els:
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 & Mov	ving).
Velocity triangles, Numerical Problems.	

Laboratory

- 1. Calibration of 90° 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 O	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.
CO 4:	Compute hydrostatic and hydrodynamic forces, flow profiles in channel transitions and analyze hydraulic transients.

Refer	rence Books
1.	Hydraulics and Fluid Mechanics including Hydraulic Machines, P.N. Modi and S.M Seth, 21 st 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, 10 th Edition, 2018, Laxmi Publication (P) LTD, ISBN-10: 8131808157
3.	Fluid Mechanics, 8 th Edition 2016, Frank M White TATA McGraw Hill, New Delhi, ISBN-10: 9385965492, ISBN-13: 978-9385965494
4.	Flow in open Channels, K. Subramanya, 5 th 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: 9 th 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.

					CO-	PO Ma	pping					
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

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

	Semester: IV							
	BUILDING CONSTRUCTION AND PLANNING							
Com	ma Cada		(The	eory & Practice			100 + 50 Montra	
Coul	ite Loue	•	3.0.1		SFF	•	100+50 Marks	
Tata	1 II.o. 1.1	•	20L + 22D		SEE SEE Duration	•	100 ± 30 Walks	
	II ПOUIS na Laaming Ob	ioo	59L+55r	will be able to	SEE Duration	•	3HIS + 3HIS	
Cour	Understand the different building planning and drawing principles and comparents of a civil							
1	engineering stru	ictu	ire	ing and drawing	g principles and comp	011		
2	Distinguish bet	wee	en different forms an	d types of maso	nry			
3	Relate the conc	epts	s of shoring, underpi	inning and scaff	olding and design of t	ype	es of staircases	
4	To gain insights	s int	to types of roof, plas	stering, pointing	and painting			
5	Understand the	bas	ic concepts Green b	uilding construc	tion, construction equ	iipi	ment and their	
5	application and	nee	ed of construction sa	lfety.				
D 'I	1. DI . 1	. '1		T-I .			09 Hrs	
Build	Dinth Area (onl	3u1l	ding Bye-laws, dra	wing requirement	its, principles of plan	1111	ng, FAR, Carpet	
Four	, Plinti Area (oni	y c Cai	oncepts)	Rearing Canacit	v of Soil Allowable I	Rea	ring Canacity of	
Soil.	Classification of	f Fo	oundation. Masonry	footings. Isola	ted footings. Combined	ned	and strap RCC	
footi	ngs, Raft footing,	Gr	illage foundation, P	ile foundations (Friction and Load be	ariı	ng piles)	
Plint	h Beam: Necessi	ity (of Plinth Beam					
			UNI	T-II			08 Hrs	
Mase	onry: Load Bear	ing	and partition walls,	Stone-Rubble M	Masonry, Coursed Ru	ıbb	le Masonry, Un-	
cours	sed rubble maso	nry	Random rubble n	nasonry, Ashlar	Masonry Bricks-Bo	ond	s in Brickwork,	
Engl	ish Bond , Flemis	sh E	Bond, Damp Proof c	onstruction,				
Arch	es: Classification	1, F	unctions.					
Linto Stair	el and Chajja: F	unc Tyr	tions and types	onen well stairs	Geometrical design	of e	tairs	
Stall	s. components,	ւ չի	UNI	F-III	Geometrical design (лз	08 Hrs	
Type	es of flooring (Mat	terials and method	of laving) Gra	nolithic Mosaic	C	eramic Marble	
Polis	hed Granite type	s an	d applications. Indu	strial flooring.	nontine, wiosaie	C	eranne, wardet,	
Roof	s: Flat Roof (RC	C) (Sloped roof (R.C.C.	and tile roof), L	ean to roof, Wooden	tru	ss (King post	
and c	and queen post trusses.							
Plast	tering and Point	ing	: Purpose, materials	and methods of	plastering and pointin	ıg,	defects in	
plast	ering-Stucco plas	teri	ng, lathe plastering.					
Pain	ting :Purpose, Ty	pes	s, Application of pai	nts to new and o	old surfaces, Distempt	er F	Plastic emulsion,	
Enan	Enamel, painting to walls and iron and steel surfaces, polishing wood surface							
Cast	falding Common	a	UNI	1-1V			07 Hrs	
Scan	olaing- Compon	ent	s, Types of Scaffold	ing.	floors Slip form Stor	1 .	luminium and	
Miva	n shuttering	vor	k Details, KCC G	Jullins, Deallis,	noors, sup torm stee	7 a.	iuiiiiiiuiii anu	
Shor	ing: Raking Sho	·es.	Flying Shores, Dea	d Shores				
Und	erpinning- Pit m	etho	od, Pile method					
			UNI	T-V			07 Hrs	
Cons	struction equip	ner	nt: Introduction, Fa	actors for selec	ting equipment, var	iou	s earth moving	
equip	oment's, Hoisting	g e	quipment's Concret	e mixer and pl	ants, Conveyors and	ro	llers, Trenching	
mach	machines.							
Gree	en building con	cept	ts: Site selection, o	lesign concepts,	, materials and diff	ere	ent certifications	
prog	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
Function	onal design of buildings (Residential, public and industrial) - orientation and
positio	ning of various components of buildings- Building standards – Bye laws- set back
distanc	ces- 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

- 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
005.	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

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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.

					CO-	PO Ma	pping					
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

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

	Semester: IV							
	STRUCTURAL ANALYSIS-I							
			1	(Theory)				
Course Code		:	18CV45		CIE	:	100 Marks	
Credi	ts: L:T:P	:	4:0:0		SEE	:	100 Marks	
Total Hours		:	52L		SEE Duration	:	3.00 Hours	
Cours	se Learning Obj	ecti	ives: The studen	ts will be able to				
1	Identify and Dis	stin	guish different fo	orms of structures.				
2	2 Understand the basic concepts of static and dynamic behaviour of structural system.							
3	3 Analyze determinate and indeterminate structures for unknown forces and deformation.							
4	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 Freedor	n. Linear
and Non-Linear Structures, 1D, 2D and 3D, Structures. Determinate & Indeterminate St	ructures,
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	s of Fixed
Beams.	
Unit-III	10 Hrs
Arches: Introduction, Three Hinged Parabolic and circular Arches with supports at Same lev	els and
different levels, Determination of Normal thrust, Radial Shear and bending moment - Proble	ms.
Suspension Cables: Analysis of Cables at Same levels and different levels – Numerical prol	olems.
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 beam	s.
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	in energy
due to axial load, bending moment and shear force - Principle of virtual work, unit load	method,
Castigliano's theorem- Deflection of simple beams.	
5	

Course	e 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.

Referen	ce Books
1.	Structural Analysis, R C Hibbler, 8 th 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, 9 th Edition ,2014, DhanpatRai Publishing Company Private Limited, New Delhi; ISBN-13: 978-9384378103.
4.	Basic Structural Analysis, Reddy C.S., 3 rd 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
C01	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	1	-	-	-	-	-	-	-	-	-
CO4	2	3	2	-	-	-	-	-	-	-	-	-

	Semester: IV							
	SOIL MECHANICS							
				(Theory)				
Cours	e Code	:	18CV46		CIE	:	100 Marks	
Credit	ts: L:T:P	:	3:0:0		SEE	:	100 Marks	
Total Hours		:	39L		SEE Duration		3.00 Hours	
Cours	e Learning Obje	ecti	ves: The students v	will be able to				
1	Understanding	of t	he significance of so	oil mechanics				
2	Evaluate the ind	lex	properties and engin	neering properties of di	fferent soils and S	Soil	Structure	
3	Analyze the bel	nav	or of soils in the pro	esence of water				
4	4 Analyze the influence of compaction on the engineering behavior of soils							
5	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 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

06 Hrs

Course	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						

Refe	erence Books
1.	Soil Mechanics and Foundations, Punmia B.C,17 th Edition,2017, Laxmi Publishing Co. New Delhi,
	ISBN-10: 81/008/910.
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, 5 th Edition, 2017, McGraw Hill Publishing co., New York, ISBN-10: 9781259061035
4.	Soil Mechanics and Foundation Engineering, VNS Murthy, 1 st 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

	Semester: IV							
	Design Thinking Lab							
Cou	Course Code:18CV47CIE:50 Marks							
Cred	lits: L:T:P	:	0:0:2	S	SEE	:	50 Marks	
Hou	rs	:	26P	S	SEE Duration	:	02 Hours	
Cou	Course Learning Objectives: To enable the students to:							
	Knowledge	4pp	olication: Ac	quire the ability to make	links across o	liff	ferent areas of	
1	knowledge a	nd	to generate, o	develop and evaluate ideas	and information	on	so as to apply	
	these skills to) pi	ovide solution	ns of societal concern				
ſ	Communicat	tior	a: Acquire the	skills to communicate effect	ctively and to	pre	sent ideas	
4	clearly and c	ohe	erently to a sp	ecific audience in both the v	written and ora	1 fc	orms.	
3	Collaboratio	n:	Acquire colla	borative skills through work	king in a team	to a	achieve	
3	common goals.							
1	Independent	Le	arning: Lear	n on their own, reflect on the	eir learning an	d ta	ake	
4	appropriate action to improve it							

Guidelines for Design Thinking Lab:

- 1. The Design Thinking Lab (DTL) is to be carried out by a team of two-three students.
- 2. Each student in a team must contribute equally in the tasks mentioned below.
- 3. Each group has to select a theme that will provide solutions to the challenges of societal concern. Normally three to four themes would be identified by the by the department
- 4. Each group should follow the stages of Empathy, Design, Ideate, prototype and Test for completion of DTL.
- 5. After every stage of DTL, the committee constituted by the department along with the coordinators would evaluate for CIE. The committee shall consist of respective coordinator & two senior faculty members as examiners. The evaluation will be done for each student separately.
- 6. The team should prepare a Digital Poster and a report should be submitted after incorporation of any modifications suggested by the evaluation committee.

The Design Thinking lab tasks would involve:

- 1. Carry out the detailed questionnaire to arrive at the problem of the selected theme. The empathy report shall be prepared based on the response of the stake holders.
- 2. For the problem identified, the team needs to give solution through thinking out of the box innovatively to complete the ideation stage of DTL
- 3. Once the idea of the solution is ready, detailed design has to be formulated in the Design stage considering the practical feasibility.
- 4. If the Design of the problem is approved, the team should implement the design and come out with prototype of the system.
- 5. Conduct thorough testing of all the modules in the prototype developed and carry out integrated testing.
- 6. Demonstrate the functioning of the prototype along with presentations of the same.
- 7. Prepare a Digital poster indicating all the stages of DTL separately. A Detailed project report also should be submitted covering the difficulties and challenges faced in each stage of DTL.
- 8. Methods of testing and validation should be clearly defined both in the Digital poster as well as the report.

The students are required to submit the Poster and the report in the prescribed format provided by the department.

Course	Outcomes: After completing the course, the students will be able to
CO 1:	Interpreting and implementing the empathy, ideate and design should be implemented by
	applying the concepts learnt.
CO 2:	The course will facilitate effective participation by the student in team work and
	development of communication and presentation skills essential for being part of any of
	the domains in his / her future career.
CO 3:	Appling project life cycle effectively to develop an efficient prototype.
CO 4:	Produce students who would be equipped to pursue higher studies in a specialized area
	or carry out research work in an industrial environment.

Scheme of Evaluation for CIE Marks:

Evaluation will be carried out in three phases:

Phase	Activity	Weightage
Ι	Empathy, Ideate evaluation	10M
II	Design evaluation	15M
III	Prototype evaluation, Digital Poster presentation and report submission	25M
	Total	50M

Scheme of Evaluation for SEE Marks:

Sl. No.	Evaluation Component						
1.	Written presentation of synopsis: Write up	5M					
2.	Presentation/Demonstration of the project	15M					
3.	Demonstration of the project	20M					
4.	Viva	05M					
5.	Report	05M					
	Total	50M					

	CO-PO Mapping											
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	Μ	L	Μ	Μ	Μ	Μ	Μ
CO2	H	Н	Н	Н	M	Μ	L	Μ	M	Μ	М	М
CO3	H	Н	Н	Н	M	Μ	L	Μ	Μ	Μ	Μ	Μ
CO4	L	L	L	L	L	L	L	Μ	L	Μ	L	L

	Semester: IV							
	C PROGRAMMING							
			Bi	ridge Course				
			(Commo	on to all branche	es)			
Course	Code	:	18DCS48		CIE Marks	:	50	
Credits: L:T:P : 2:0:0			2:0:0		SEE Marks	:	50	
	Audit Course SEE Duration : 2.00 Hours							
Course	Course Learning Objectives: The students will be able to							
1.	Develop a programm	arithmo ning in	etic reasoning and a C.	nalytical skills to	apply knowledge of t	oasi	c concepts of	
2.	Learn bas	ic prin	ciples of problem s	olving through pi	ogramming.			
3.	Write C p	rograr	ns using appropriate	e programming co	onstructs adopted in pr	rogi	amming.	
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, Keyw	vords and				
Identifiers, Constants, Variables, Data types.					
Unit – II	4 Hrs				
Handling Input and Output Operations					
Formatted input/output functions, Unformatted input/output functions with program	nming examples				
using different input/output functions.					
Operators and Expressions					
Arithmetic operators, Relational operators, Logical Operators, Assignment operator	s, Increment and				
decrement operators, Conditional operators, Bit-wise operators, Arithmetic express	sions. 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 'ifelse' statement	ment, nesting of				
'ifelse' statements, The 'else if' ladder, The 'switch' statement, The '?:' open	ator, The 'goto'				
statement.					
Decision making and looping The while statement, The do while statement, The	e '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 ty	pes, Function				
calls, Function declaration. Examples.					
Introduction to Pointers: Introduction, Declaration and initialization of pointers. Examples					

Struc	tures and Unions: Introduction, Structure and union definition, Declaring structure and union
	Sies, Accessing structure members. Example programs.
PKA	CTICE PROGRAMS
1.	Familiarization with programming environment, concept of naming the program files,
	storing, compilation, execution and debugging. Taking any simple C- code. (Example
2	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 11else statement).
6a.	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.
6h	Write a C program to generate the patterns using for loops
00.	Example: (to print * if it is even number)
	1
	**
	333

	55555
7a.	Write a C program to find the Greatest common divisor(GCD)and Least common multiplier(
_	LCM)
7b.	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
10	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:
	Print appropriate message for palindrome or not palindrome
11a.	Write a C program to find the length of the string without using library function.
11b.	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 ton no and display all the records.

	b) Average marks in each test.c) Highest marks in each test
Cours	se 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, 5 th Edition, 2007, Oxford University press, ISBN (13): 9780195687910.				
2.	The C Programming Language, Kernighan B.W and Dennis M. Ritchie, 2 nd Edition, 2005, Prentice Hall, ISBN (13): 9780131101630.				
3.	Turbo C: The Complete Reference, H. Schildt, 4 th Edition, 2000, Mcgraw Hill Education, ISBN-13: 9780070411838.				
4.	Understanding Pointers in C, Yashavant P. Kanetkar, 4 th edition, 2003, BPB publications, ISBN-13: 978-8176563581				
5.	C IN DEPTH, S.K Srivastava, Deepali Srivastava, 3 rd 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												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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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

Civil Engineering

Semester: IV							
	PROFESSIONAL PRACTICE – I						
			COMM	UNICATION SKIL	LS		
			(Comm	on to all Programm	es)		
Cou	rse Code	:	18HS49		CIE	••	50
Crea	lits: L:T:P	:	0:0:1		SEE	:	50
Tota	l Hours	:	18 hrs /Semester		SEE Duration	:	2 Hours
Cou	rse Learning ()bje	ectives: The student	s will be able to			
1	Understand th	neir	own communication	n style, the essentials	of good communicat	ion	and develop
	their confiden	ice t	to communicate effe	ctively.	-		-
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						
Com	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.

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

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

6 Hrs

6 Hrs

6 Hrs

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-

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			

Refe	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, 1 st 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	CIE will be conducted during the 3 rd semester and evaluated for 50 marks.	50%
III Sem	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 3 rd 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.	
Phase II	During the 4 th semester a test will be conducted and evaluated for 50 marks.	50%
IV Sem	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 4 th 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	
Phase III	At the end of the IV Sem Marks of CIE (3 rd Sem and 4 th Sem) is consolidated if	for 50 marks
At the	(Average of Test1 and Test 2 (CIE 1+CIE2)/2.	
end of IV	At the end of the IV Sem Marks of SEE (3 rd Sem and 4 th Sem) is consolidated	for 50 marks
Sem	(Average of CIE 1 and CIE 2 (CIE 1+CIE2)/2.	



Curriculum Design Process

Academic Planning And Implementation



Process for Course Outcome Attainment







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.

Innovative Clubs of RVCE

1	Ashwa Racing	Ashwa Mobility Foundation (AMF) is a student R&D platform that designs and fabricates Formula theme race cars and future mobility solutions to tackle urban transportation problems.
2	Astra Robites	Team involved in the design, fabrication and building application specific robots.
3	Coding Club	To facilitate students the skills, confidence, and opportunity to change their world using coding and help them become successful in GSoC, ACM-ICPC, and other recognized coding competitions.
4	Entrepreneurship Development Cell	E-Cell is a student run body that aims to promote entrepreneurship by conducting workshops, speaker sessions and discussions on business and its aspects. We possess a mentor board to help startups grow.
5	Frequency Club	Team aims at contributing in both software and hardware domains mainly focusing on Artificial Intelligence, Machine Learning and it's advances.
6	Garuda	Design and development of supermileage urban concept electric car. Indigenous development of E-mobility products.
7	Jatayu	Build a low cost Unmanned Aerial Vehicle capable of Autonomous Navigation, Obstacle Avoidance, Object Detection, Localization, Classification and Air Drop of a package of optimum weight.
8	Solar Car	Build a roadworthy solar electric vehicle in order to build a green and sustainable environment.
9	Team Antariksh	Team Antariksh is a Space Technology Student Club whose goal is to understand, disseminate and apply the engineering skills for innovation in the field of Space technology. designing Nano-Satellite payload for ISRO PS4 Orbital platform, RVSAT-1 along with developing experimental rockets of various altitude.
10	Team Chimera	Building a Formula Electric Car through Research and Development in E-Mobility. Electrifying Formula Racing.
11	Helios Racing	Team involved in design, manufacturing and testing of All-Terrain Vehicles and other supportive tasks for the functioning of the team. Participating in BAJA competitions organized by SAE in India and the USA.
12	Team Hydra	Developing autonomous underwater vehicles and use it for various real world applications such as water purification, solid waste detection and disposal etc.
13	Team Krushi	Develop low cost equipments, which help farmers in cultivating and harvesting the crops. Use new technology applications to reduce the labour time hand cost for farmers. Aims at developing implants for Tractors.
14	Team vyoma	Design, fabrication and testing of radio controlled aircrafts and research on various types of unmanned aerial vehicles.
15	Team Dhruva	Organizing activities like quizzes based on astronomy.Stargazing and telescope handling sessions.Construction of a standard observatory. working on small projects with organizations like ICTS, IIA, ARIES etc.
16	Ham club	To popularize Amateur Radio as a hobby among students, alongside exploring technical innovations in the communications domain. Intended to provide human capital for service to the nation at times of natural calamities.







"Not me but you" " Education through Community Service & Community Service through education"

Cultural Activity Teams

- 1. AALAP (Music club)
- 2. DEBSOC (Debating society)
- 3. CARV (Dramatics club)
- 4. FOOTPRINTS (Dance club)
- 5. QUIZCORP (Quizzing society)
- 6. ROTARACT (Social welfare club)
- 7. RAAG (Youth club)
- 8. EVOKE (Fashion team)
- 9. f/6.3 (Photography club)
- 10. CARV ACCESS (Film-making club)





Leadership in Technical Education, Interdisciplinary Research & Innovation, with a Focus on sustainable and Inclusive Technologies.







To create a conducive environment for interdisciplinary research and innovation.



To develop professionals through holistic education focusing on individual growth, discipline, integrity, ethics and social sensitivity.



To nurture industry-institution collaboration leading to competency enhancement and entrepreneurship.

To focus on technologies that are sustainable and inclusive, benefitting all sections of the society.



RV COLLEGE OF ENGINEERING

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