



ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution
Vamanjoor, Mangaluru - 575028

Affiliated to VTU – Belagavi & Recognized by AICTE New Delhi
NBA – Accredited: B.E.(CSE,ECE,EEE, ME and CIV) & MBA
NAAC – Accredited with A+

B.E. SCHEME & SYLLABUS (With effect from 2021-22)

Civil Engineering

**SECOND YEAR
(III and IV Semester)**

2022 - 2023

III Semester (B.E. - Civil Engineering)

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAM301	Complex Analysis, Linear Algebra and Numerical Methods	MAT	MAT	2	2	-	03	50	50	100	3
2	PCC	21CIV302	Fluid Mechanics and Hydraulics (Integrated)	CIV	CIV	3	-	2	03	50	50	100	4
3	PCC	21CIV303	Building Construction Materials and Testing (Integrated)	CIV	CIV	3	-	2	03	50	50	100	4
4	PCC	21CIV304	Strength of Materials	CIV	CIV	2	2	-	03	50	50	100	3
5	PCC	21CIL305	Engineering Geology Laboratory	CIV	CIV	-	-	2	03	50	50	100	1
6	HSMC	21UHV306	Universal Human Values - II	COM		2	-	-	02	50	50	100	2
		21BFE306	Biology for Engineers	COM									
7	HSMC	21KBK307	Balake Kannada (Kannada for communication)/			--	2	--	02	50	50	100	1
		21KSK307	Saamskrutika Kannada (Kannada for Administration)										
		21CPC307	Constitution of India, Professional Ethics and Cyber Law										
8	SDC	21IEP308	IoT Enabled Prototyping	COM		-	-	2	03	50	50	100	1
9	SDC	21IOT309	Industry Oriented Training – Business Etiquettes	COM		-		2	02	50	-	50	-
Total						12	6	10	24	450	400	850	19
						OR	OR						
						13	4						
10	HSMC	21ENG310	Business Communication	ENG	-	-	2	-	02	50	50	100	-
11	MNCC	21MAL301	Additional Mathematics- I	MAT	MAT	2	1	-	03	50	50	100	-

IV Semester (B.E. - Civil Engineering)

SI. No.	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours/Week			Examination				Credits
						Theory Lecture	Tutorial	Practical /Drawin	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	21MAM401	Vector Integration, Curve Fitting and Statistical Methods	MAT	MAT	2	2	-	03	50	50	100	3
2	PCC	21CIV402	Concrete Technology and Practice (Integrated)	CIV	CIV	3	-	2	03	50	50	100	4
3	PCC	21CIV403	Surveying Theory and Practice (Integrated)	CIV	CIV	3	-	2	03	50	50	100	4
4	PCC	21CIV404	Transportation Engineering	CIV	CIV	2	2	-	03	50	50	100	3
5	PCC	21CIL405	Building Planning & Computer-aided Drafting Lab	CIV	CIV	-	-	2	03	50	50	100	1
6	UHV	21UHV406	Universal Human Values – II	COM		2	-	-	02	50	50	100	2
	HSMC	21BFE406	Biology for Engineers	COM									
7	HSMC	21KBK407	Balake Kannada (Kannada for communication)/		-	2	--	--	50	50	100	1	
		21KSK407	Saamskrutika Kannada (Kannada for Administration)										
		21CPC407	Constitution of India, Professional Ethics and Cyber Law										
8	SDC	21CTE408	Computational Tools for Engineers	COM		-	-	2	03	50	50	100	1
9	SDC	21IOT409	Industry Oriented Training – Computing Skills	COM		-	-	2	02	50	-	50	-
10	INT	21INT410	Summer Internship - I						03	50	50	100	2
Total						12	6	10	19	500	450	950	21
						OR	OR						
						13	4						
11	HSMC	21ENG410	Business Communication	ENG		-	2	-	02	50	50	100	-
12	MNCC	21MAL401	Additional Mathematics- II	MAT	MAT	2	1	-	03	50	50	100	-

Note: BSC: Basic Science Courses; ESC: Engineering Science Courses; HSMC: Humanity, Social Science and Management Courses; MNCC = Mandatory Non-Credit Course. INT: Internship, PCC: Professional Core Course; PEC = Professional Elective Course; OEC = Open Elective Course; UHV: Universal Human Values SDC: Ability Enhancement (Skill Development) Course.

One-hour Lecture (L) per week per semester = 1 Credit Two-hour Tutorial (T) per week per semester = 1 Credit Two-hour Practical/Laboratory/Drawing (P) per week per semester = 1 Credit Four hours of Self-study = 1 Credit.

Summer Internship-II: All the students admitted shall have to undergo mandatory internship of minimum 04 weeks during the IV and V semester vacation. Summer Internship shall be Carried Out – based on industrial/ Govt./NGO /MSME/ Rural Internship /Innovation/Entrepreneurship, Credited in V Semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during subsequent examination after satisfying the internship requirements.

21KKB307/407 Balake Kannada (Kannada for communication) is prescribed for students who have not studied Kannada at any level of schooling (State/Central-CBSC/ICSE) and are not able to speak, write, read and understand Kannada.

21KSK307/407 Saamskrutika Kannada (Kannada for Administration) is prescribed for students who satisfy any one of the following. i. Studied 1 – 10th standard in Kannada medium ii. Studied Kannada as first or second language during high school and cleared SSLC examination iii. Studied Kannada at any level of schooling and are able to speak, write and read Kannada. iv. Passed diploma or certificate course in Kannada conducted by a university established by law in India v. Passed Kava, Jana and Rathna examinations conducted by Kannada Sahithya Parishat vi. Passed the SSLC examination or any other examination declared as equivalent thereto by the state government or any examinations higher than SSLC examination a) in which the question papers on different subjects are answered in Kannada language or b) in which Kannada was the main or second language or an optional subject but not one of the subjects in a composite paper.

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs:

(a)The mandatory non – credit courses Additional Mathematics I and Business Communication prescribed for III semester and Additional Mathematics II prescribed for IV semester, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the students have to fulfil the requirements during subsequent semester/s to appear for SEE. (b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

Courses prescribed to lateral entry B. Sc degree holders admitted to III semester of Engineering programs:

Lateral entrant students from B.Sc. Stream, shall clear the Mandatory non-credit courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE Activity Points to be earned by students admitted to BE/B.Tech Day College Programs:

Over and above the academic grades, every student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to fifth semester are required to earn 50 Activity Points from the year of entry. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, minimum hours' requirement should be fulfilled. Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, Eighth Semester Grade Card shall be issued only after earning the required Activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

SEMESTER –III			
Complex Analysis, Linear Algebra and Numerical Methods			
(Common to CIV & MECH)			
Course Code	21MAM301	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To provide an insight into applications of complex variables and conformal mapping arising in potential theory. 2. To apply the knowledge of numerical methods in solving engineering problems. 3. To gain proficiency in solving system of equations using Linear Algebra. 			
Module-1		8 Hours	
<p>Complex Variables: Function of a complex variable, Analytic function, Cauchy - Riemann equations in Cartesian and Polar forms, properties of analytic functions (no proof). Construction of analytic functions – Milne Thompson method -Problems.</p> <p>Self-Study Topic: Properties of analytic functions – Harmonic & Orthogonal property.</p>			
Module-2		8 Hours	
<p>Transformations: Introduction. Discussion of conformal transformations: $w = z^2$, $w = e^z$, $w = z + \frac{1}{z}$, $z \neq 0$, Bilinear transformations- Problems.</p> <p>Complex integration: Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems.</p> <p>Self-Study Topic: Cauchy Residue theorem</p>			
Module-3		8 Hours	
<p>Numerical Methods-1: Finite differences - Interpolation/ extrapolation using Newton's forward and backward difference formula, Lagrange's formula and inverse interpolation formula</p> <p>Numerical integration - Trapezoidal rule and Simpson's 1/3rd and Simpson's 3/8 rule.</p> <p>Self-Study Topic: Newton's Divided Differences</p>			
Module-4		8 Hours	
<p>Numerical Methods-2: Numerical solutions to partial differential equations – Finite difference approximation to derivatives, solution of Laplace equation in two dimensions, heat and wave equations in one dimension (explicit methods).</p> <p>Self-Study Topic: Solution of Poisson's equation in two dimensions.</p>			
Module-5		8 Hours	
<p>Linear Algebra: Gauss Jordan method to find inverse, Matrix Inversion Method, Solution of a system of linear equations – LU Factorization method, partition method, Relaxation method, Cholesky method. (All problems restricted to matrices of order 3).</p> <p>Self-Study Topic: All methods above for matrices of order 4.</p>			

Course Outcomes:	
At the end of the course the student will be able to:	
21MAM301.1	To Construct the analytic function and apply the concepts of complex potentials to solve the problems arising in electromagnetic field theory.
21MAM301.2	Utilize conformal transformation arising in aero foil theory, fluid flow visualization and image processing.
21MAM301.3	Use Cauchy's integral theorem and formula to compute line integrals.
21MAM301.4	Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.
21MAM301.5	Examine a variety of partial differential equations and solution by numerical methods.
21MAM301.6	Apply the knowledge of various methods used in solving the system of linear equations.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44, 2015
2	Numerical methods for Engineering problems	N Krishna Raju and K U Muthu	Macmillan India Limited	2, 2008
Reference Books				
1	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	11, 2010
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10, 2016
3	Numerical methods for Engineers	Steven C Chapra and Raymond P Canale	McGraw Hill Education	6, 2012
4	Numerical methods for scientific and engineering computation.	M.K.Jain, S.R.K. Iyenger and R.K. Jain	New Age International Publishers	5, 2007

<p>Web links/Video Lectures/MOOCs</p> <p>https://youtu.be/41pu051ZJAo</p> <p>https://youtu.be/otTLkuh4dNU</p> <p>https://www.youtube.com/watch?v=1QjTzwEZ3pE</p> <p>https://youtu.be/LPMcjyxZ7eM</p> <p>https://youtu.be/H_L57dJqdM4</p> <p>https://youtu.be/BFYFkn-eOQk</p>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21MAM301.1		3	1											
21MAM301.2	3	1												
21MAM301.3	2	2												
21MAM301.4		3	1											
21MAM301.5		3	1											
21MAM301.6	1		3											

1: Low 2: Medium 3: High

Fluid Mechanics and Hydraulics			
Course Code	21CIV302	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	04	Exam Hours	03
<p>Course Learning Objectives:</p> <ol style="list-style-type: none"> 1. To describe the physical properties of the fluid and calculate fluid pressure. 2. To formulate the fundamental laws of fluid mechanics and Bernoulli's principle for practical applications. 3. To calculate the discharge over notches, weirs, orifice, mouthpiece and venturi meter. 4. To evaluate the energy loss through pipes by conducting studies on pipe networks. 5. To deduce the characteristics of turbines and jet of vanes. 6. To determine the efficiency of the centrifugal pumps and reaction turbines. 			
Module-1		8 Hours	
<p>Fluids & Their Properties: Concept of fluid, Systems of units. Properties of fluid; Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Newton's law of viscosity (theory & problems), Cohesion, Adhesion, Surface tension & Capillarity</p> <p>Fluid Pressure and Its Measurements: Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth, Types of pressure.</p>			
Module-2		8 Hours	
<p>Hydrostatic forces on Surfaces: Definition, Total pressure, centre of pressure, total pressure on horizontal, vertical and inclined plane surface, total pressure on curved surfaces, water pressure on gravity dams, Lock gates. Numerical Problems.</p> <p>Buoyancy and Flotation: Buoyancy, Force and Centre of Buoyancy, Meta centre and Meta centric height, Stability of submerged and floating bodies, Determination of Meta centric height, Experimental and theoretical method, Numerical problems.</p>			
Module-3		8 Hours	
<p>Dynamics of Fluid Flow: Introduction to fluid dynamics, Forces acting on the fluid in motion. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Modified Bernoulli's equation.</p> <p>Notches and Weirs: Introduction, Classification, discharge over rectangular, triangular, trapezoidal notches, Cippoletti notch, broad crested weirs. Numerical problems. Ventilation of weirs, submerged weirs.</p> <p>Orifice, Mouthpiece, and Venturimeter: Introduction, classification, flow through orifice, hydraulic coefficients and Numerical problems. Mouthpiece, classification, Borda's Mouthpiece (No Numerical problems). Venturi meter, Orifice meter, Pitot tube. Numerical Problems.</p>			
Module-4		8 Hours	
<p>Flow-through Pipes: Introduction. Major and minor losses in pipe flow. Darcy- Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe problems. Minor losses in pipe flow, equation for head loss due to sudden expansion. Numerical problems. Hydraulic gradient line, energy gradient line, Pipe Networks.</p> <p>Open Channel Flow Hydraulics: Uniform Flow: Introduction, Classification of flow through channels, Chezy's and Manning's equation for flow through open channel, Most economical channel sections, Uniform flow through Open channels, Numerical Problems.</p>			

Module-5	8 Hours
Impact of jet on curved vanes , momentum equation, Impact of jet on stationary and moving curved vanes	
Turbines - Pelton wheel and components, Velocity triangle Reaction turbine - Francis turbine, Working proportions	
Centrifugal Pumps - Work done and efficiency, Multi-stage pumps	
List of Laboratory Experiments related to above modules – 2 hours each	
<ol style="list-style-type: none"> 1. Determination of Cd and calibration of Venturimeter and Orifice meter. 2. Determination of hydraulic coefficients and calibration of small vertical orifice. 3. Determination of Cd and calibration of Rectangular and Triangular notch 4. Determination of Cd and calibration of Ogee and Broad crested weir 5. Determination of force exerted by a jet on flat and curved vanes. 6. Determination of efficiency of Pelton wheel turbine 7. Determination of efficiency of Francis turbine 8. Determination of efficiency of Kaplan turbine 9. Determination of efficiency of centrifugal pump 10. Determination of Major Loss in Pipes and Minor losses 	

Course Outcomes:	
At the end of the course the student will be able to:	
21CIV302.1	Apply knowledge of fundamental properties of fluids and fluid continuum.
21CIV302.2	Examine fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications.
21CIV302.3	Develop the discharge from orifice, mouthpiece and over notches and weirs.
21CIV302.4	Solve the energy loss through pipes by conducting investigations on pipe networks.
21CIV302.5	Interpret the characteristics of turbines and Jet of vanes
21CIV302.6	Design the centrifugal pump and estimate the efficiency.

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	A Textbook of Fluid Mechanics and Hydraulic Machines	Dr. R.K. Bansal	Laxmi Publications	Revised 9th Edition, 2017
2	Hydraulics and Fluid Mechanics, including Hydraulic Machines	P N Modi and S M Seth	Standard Book House	20 th edition, 2015
Reference Books				
1	Fluid Mechanics	Victor L Streeter, Benjamin Wylie E and Keith W Bedford	Tata McGraw Hill Publishing Co Ltd	2008
2	Fluid Mechanics and Hydraulic Machines	K Subramanya	Tata McGraw Hill Publishing Co. Ltd	2nd Edition 2018

Web links/Video Lectures/MOOCs/papers

1. <https://nptel.ac.in/>
2. <https://youtu.be/TKk3Sqbsdbg>
3. <https://youtu.be/z9wsUWaN-oY>
4. https://youtu.be/F_7OhKUYV5c
5. <https://searchworks.stanford.edu/view/10496310>
6. <https://searchworks.stanford.edu/view/13576277>
7. <https://searchworks.stanford.edu/view/11842972>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV302.1	-	2	-	3	-	-	-	-	3					
21CIV302.2	-	2	-	3	-	-	-	-	3					
21CIV302.3	-	2	-	3	-	-	-	-	3					
21CIV302.4	-	2	-	3	-	-	-	-	3					
21CIV302.5	-	2	-	3	-	-	-	-	3					
21CIV302.6	-	2	-	3	-	-	-	-	3					

1: Low 2: Medium 3: High

Building Construction Materials and Testing			
Course Code	21CIV303	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	04	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To recognize the good building materials and required testing to be used for the construction work 2. To identify types of suitable foundation, masonry and walls for different structures 3. To gain knowledge of structural components like lintels, arches, floors and roofs in the building construction. 4. To select the suitable doors, windows and ventilators required for the construction work. 5. To apply the concepts of different form works and stairs required for the construction work. 6. To use finishes in construction like plastering, pointing and painting of various structures. 			
Module-1		8 Hours	
Building Stone: Common building stones and their uses, quarrying, dressing of stones, deterioration and preservation.			
Building/masonry blocks: Introduction, Types: clay blocks, cement concrete blocks, Autoclaved Aerated Concrete Blocks; Requirement of good blocks; Manufacture of clay blocks; Tests on blocks: compressive strength, water absorption, efflorescence, dimension and warpage; quality of blocks as per BIS and their uses.			
Aggregates: definition: fine and coarse aggregate.			
Self-learning: Timber: Varieties and uses, defects in timber, seasoning of timber, Requirements of a good quality timber			
Module-2		8 Hours	
Foundation: Introduction, function and requirements of a foundation; Types of foundation: shallow foundation- spread, combined , strap, mat, size-stone foundation; deep foundation – pile foundation.			
Masonry: Definitions of terms used in masonry, bonds in brickwork: Header, Stretcher, English bond, Flemish bond, Stone masonry: Classification, characteristics of different stone masonry: rubble masonry, coursed rubble masonry, random rubble masonry, joints in stone masonry.			
Types of walls: load-bearing, partition walls, cavity walls.			
Module-3		8 Hours	
Lintels and Arches: Definition, function and classification of lintels, Balconies, chejja and canopy. Arches; Elements and Stability of an Arch. Floors: Requirement of good floor, Components of ground floor, Selection of flooring material Procedure for laying of Concrete (VDF), Mosaic, Kota, Slate, Marble, Granite, Tile flooring, Cladding of tiles.			
Roofs: Requirement of good roof, Types of roof, Elements of a pitched roof, Trussed roof, King post Truss, Queen Post Truss, Steel Truss, Different roofing materials, R.C.C. Roof.			
Module-4		8 Hours	
Doors, Windows and Ventilators: Location of doors and windows, technical terms, Materials for doors and windows: PVC, CPVC and Aluminum. Types of Doors and Windows: Paneled, Flush, Collapsible, Rolling shutter, Paneled and glazed Window, Bay Window, French window. Steel windows, Ventilators. Sizes as per IS recommendations.			
Stairs: Definitions, technical terms and types of stairs: Wood, RCC, Metal. Requirements of good stairs. Geometrical design of RCC doglegged and open-well stairs.			
Formwork: Introduction to formwork, scaffolding, shoring, underpinning			
8 Hours			

Module-5	8 Hours
Plastering and Pointing : Purpose, materials and methods of plastering: plastering- Sand faced plastering, Stucco plastering, lathe plastering and pointing, defects in plastering	
Damp proofing: Causes, effects and methods.	
Paints: Purpose, types, ingredients and defects	
List of Laboratory Experiments – 2 hours each	
Tests on Metals	
<ol style="list-style-type: none"> 1. Tension Test on Mild Steel Bar 2. Compression Test on Mild Steel 3. Single and Double Shear Test 4. Torsion Test on Mild Steel 5. Impact Tests – Izod and Charpy 6. Hardness Test (Brinell, Vickers and Rockwell) 	
Tests on Cement	
<ol style="list-style-type: none"> 1. Specific Gravity of Cement 2. Fineness of Cement 	
Tests on Aggregates	
<ol style="list-style-type: none"> 1. Specific Gravity Test on Fine and Coarse Aggregate 2. Bulk Density Test on Fine and Coarse Aggregate 3. Sieve Analysis of Fine and Coarse Aggregate 4. Moisture Content of Aggregates 5. Bulking of Sand 	
Tests on Burnt Clay Products	
<ol style="list-style-type: none"> 1. Test on Burnt Clay Building Bricks 2. Test on Burnt Clay Mangalore Roofing Tiles 3. Test on Cement Concrete Flooring Tiles. 4. Test on Laterite blocks 	

Course Outcomes:	
At the end of the course the student will be able to:	
21CIV303.1	Select suitable building materials and required testing methods for the construction work
21CIV303.2	Decide suitable type of foundation, masonry and walls based on requirement of construction
21CIV303.3	Apply the knowledge of using the structural components like lintels, arches, floors and roofs in the building construction.
21CIV303.4	Choose different types of doors, windows and ventilators suitable for the construction work.
21CIV303.5	Classify the various formworks and design suitable stairs required for the various buildings.
21CIV303.6	Exhibit the knowledge of building finishes required for the construction projects.

Sl No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Materials	Rangwala S.G	Charotar Publishing House, Anand, India.	39 th edition, 2012
2	Building Construction	Rangwala S.G	Charotar Publishing House, Anand, India	26 th edition, 2008
3	Building Construction	Sushil Kumar	Standard Publication and Distributors, New Delhi.	19 th edition, 2012
Reference Books				
1	Building Materials	P.C. Varghese	PHI Learning Pvt. Ltd. Publication	2 nd edition, 2015
2	Building Construction	B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain	Laxmi Publications Pvt. Limited	10 th edition, 2018
3	Testing of Engineering Materials	Davis, Troxell and Hawk	International Student Edition – McGraw Hill Book Co. New Delhi.	4 th edition, 1982
4	Building and construction materials-Testing and quality control	M L Gambhir and Neha Jamwal	McGraw Hill Education(India)Pvt. Ltd	2017
5	Mechanical Testing of Materials	Fenner, George	George Newnes Ltd. London	2016
6	Experimental Strength of Materials	Holes K A	English Universities Press Ltd. London	1993
7	Testing of Metallic Materials	Suryanarayana A K	Prentice Hall of India Pvt. Ltd. New Delhi	2018
8	Material Testing Laboratory Manual	Kukreja C B, Kishore K. and Ravi Chawla	Standard Publishers & Distributors	1996
9	National Building Code – SP 7:2016	Bureau of Indian standards	Bureau of Indian standards	2016

Web links/Video Lectures/MOOCs/papers

1. <https://sm-nitk.vlabs.ac.in/>

2. <https://archive.nptel.ac.in/courses/105/102/105102088/>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV303.1	2											2	1	2
21CIV303.2	2											2	1	2
21CIV303.3	2								2			2	1	2
21CIV303.4	2											2	1	2
21CIV303.5			2									2	1	2
21CIV303.6	2											2	1	2

1: Low 2: Medium 3: High

STRENGTH OF MATERIALS			
Course Code	21CIV304	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<p>This course will enable students</p> <ol style="list-style-type: none"> 1. To understand the basic concepts of the stresses and strains for different materials and the strength of structural elements. 2. To know the development of internal forces and resistance mechanisms for one-dimensional and two-dimensional structural elements. 3. To analyze and understand different internal forces and stresses induced due to representative loads on structural elements. 4. To determine the slope and deflections of beams. 5. To evaluate the behavior of torsion members, columns and struts. 			
Module-1		8 Hours	
<p>Simple Stresses and Strain: Introduction, Definition and concept and of stress and strain. Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials, factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship.</p>			
Module-2		8 Hours	
<p>Compound Stresses: Introduction, state of stress at a point, General two-dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses. Theory of failures: Max. Shear stress theory and Max. principal stress theory.</p> <p>Thin and Thick Cylinders: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lamé's equation, radial and hoop stress distribution.</p>			
Module-3		8 Hours	
<p>Shear Force and Bending Moment in Beams: Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations.</p>			
Module 4		8 Hours	
<p>Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections. Shear centre (only concept).</p> <p>Torsion in Circular Shaft: Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft.</p>			
Module-5		8 Hours	
<p>Deflection of Beams: Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment- curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple.</p>			

Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.

Course Outcomes:

At the end of the course the student will be able to:

21CIV304.1	Evaluate the strength of various structural elements internal forces subjected to compression, tension.
21CIV304.2	Evaluate the strength of various structural elements internal forces subjected to temperature rise, volumetric strain.
21CIV304.3	Interpret the behavior and strength of structural elements under the action of compound stresses and internal fluid pressures.
21CIV304.4	Develop the Bending moment and Shear force Diagrams for various beams
21CIV304.5	To analyze of members subjected to torsion and to analyze the basic concepts of failure
21CIV304.6	To suggest cost effective cross sections and material from the available materials in the field of construction and manufacturing and to understand the basic concepts of load carrying capacity of columns.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Strength of Materials	B.S. Basavarajiah, P. Mahadevappa	University Press (India) Pvt. Ltd.	3 rd edition, 2015
2	Mechanics of Materials	Ferdinand P. Beer, E. Russell Johnston and Jr. John T. De Wolf	Tata McGraw-Hill	2nd Edition 1992
Reference Books				
1	Elements of Strength of Materials	D.H. Young, S.P. Timoshenko	East West Press Pvt. Ltd.,	5th Edition, 2014
2	A Textbook of Strength of Materials	R K Bansal	Laxmi Publications	4th Edition, 2015
3	Strength of Materials	S.S. Rattan	McGraw Hill Education (India) Pvt. Ltd.,	2nd Edition, 2011
4	Analysis of Structures Vol. I	Vazirani, V N, Ratwani M M. and S K Duggal	Khanna Publishers, New Delhi.	17th Edition, 2015

Web links/Video Lectures/MOOCs/papers

1. <https://www.coursera.org/learn/mechanics-1>
2. <https://nptel.ac.in/courses/105/105/105105108/>
3. <http://nptel.vtu.ac.in/econtent/web/CV/18CV32/index.php>
4. <https://ocw.mit.edu/courses/mechanical-engineering/2-001-mechanics-materials-i-fall-2006/index.htm>
5. <https://nptel.ac.in/courses/112107146/>
6. <https://nptel.ac.in/courses/112107147/18>
7. <http://www.nptelvideos.in/2012/11/strengthof-materials-prof.html>

Course Articulation Matrix:

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV304.1	-	-	2	-	-	-	-	-	-	-	-	-	-	2
21CIV304.2	-	-	2	-	-	-	-	-	-	-	-	-	-	-
21CIV304.3	-	-	-	-	2	-	-	-	-	-	-	-	-	2
21CIV304.4	-	-	2	-	-	-	-	-	-	-	-	-	-	2
21CIV304.5	-	-	-	-	2	-	-	-	-	-	-	-	-	2
21CIV304.6	-	-	2	-	-	-	-	-	-	-	-	-	-	2

1: Low 2: Medium 3: High

ENGINEERING GEOLOGY LABORATORY			
Course Code	21CIL305	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To expose the students to identify the minerals and rocks based on their inherent properties and uses in civil engineering 2. To educate the students in the interpretation of the geological maps related to civil engineering projects. 3. To provide knowledge on extraction of drainage basin and geomorphological features by interpreting toposheets. 4. Students will learn the dip and strike, thickness of strata, bore hole problems related to geological formation related to foundation, tunnels, reservoirs and mining. 5. To make students well versed in usage of modern tools such as Satellite images and electrical resistivity meters 6. Inculcate in students, the importance of Field knowledge by visiting the sites to witness Faults, Folds, Joints, Unconformity etc. 			
LIST OF EXPERIMENTS:			
Identification of Minerals and Rocks			
<ol style="list-style-type: none"> 1. Identification of Rock Forming minerals using physical properties - Quartz group, Feldspar group, Clay group, Asbestos, Gypsum. 2. Identification and uses of i. Igneous rocks- Granites, Basalt ii. Sedimentary rocks- Sandstone, Shale, Laterite iii. Metamorphic rocks- Gneiss, Schist, Marble. 			
Structural Geology			
<ol style="list-style-type: none"> 1. Dip and Strike problems. Determine Apparent dip and True dip. (2 methods) 2. Calculation of Vertical, True thickness and width of the outcrops. (3 methods) 3. Borehole problems: Determination of subsurface behavior of rocks, their attitude related to foundation, tunnels, reservoirs and mining. Triangular and Square methods. (2 methods) 			
Study of Maps			
<ol style="list-style-type: none"> 1. Study of Toposheets and Interpretation (1 Toposheet) 2. Extraction of Drainage Basin, Manual Lineament mapping. (1 Toposheet) 3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc. (8 Maps) 			
Remote Sensing and Electrical Resistivity			
<ol style="list-style-type: none"> 1. Interpretation of Satellite Images. (1 Satellite image) 2. Interpretation of Electrical resistivity curves to find out subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone. 			
1. Open ended experiment covering the concept of entire syllabus			
Field work– To identify Minerals, Rocks, Geomorphology and Structural features with related to the Civil Engineering projects. To use and interpret toposheets. Provide a detailed report.			
Course Outcomes:			
At the end of the course the student will be able to:			
21CIL305.1	Identify the minerals, rocks and utilize them effectively in civil engineering practices.		
21CIL305.2	Apply structural Geology concepts for the safety, stability, economy and life of the Civil Engineering structures.		
21CIL305.3	Interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.		
21CIL305.4	Use topographical maps for the interpretation of various topographical features, lineaments and extract drainage basin.		

21CIL305.5	Learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.
21CIL305.6	Identify rocks, minerals and different structures & geomorphological features in the field.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Structural Geology	M P Billings	Pearson Education	3 rd edition, 2016
2	Textbook of Geology	P.K.Mukerjee	World Press Pvt. Ltd., Kolkatta	13 th reprint edition, 2019

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIL305.1	2	-	-	-	-	-	-	-	-	-	-	-	-	2
21CIL305.2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
21CIL305.3	-	-	-	-	2	-	-	-	-	-	-	-	-	2
21CIL305.4	2	-	-	-	-	-	-	-	-	-	-	-	-	2
21CIL305.5	-	-	-	-	2	-	-	-	-	-	-	-	-	2
21CIL305.6	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Universal Human Values- II			
Course Code	21UHV306/406	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:0)	SEE Marks	50
Credits	02	Exam Hours	02
Course Learning Objectives:			
<ol style="list-style-type: none"> To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement toward value-based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature. 			
Module-1			
Introduction to Value Education			
Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.			
Activities: Sharing about Oneself, Exploring Human Consciousness and Exploring Natural Acceptance. 5 Hours			
Module-2			
Harmony in the Human Being			
Understanding Human beings as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.			
Activities: Exploring Sources of Imagination in the Self, Exploring Harmony of Self with the Body and Exploring the difference of Needs of Self and Body. 5 hours			
Module 3			
Harmony in the Family and Society			
Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.			
Activities: Exploring the Feeling of Trust, Exploring the Feeling of Respect and Exploring the Feeling systems to fulfil Human Goal. 5 hours			
Module-4			
Harmony in the Nature/Existence			
Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence			
Activities: Exploring the Four Orders of Nature and Co-existence in Existence 3 hours			

Module-5	
Implications of the Holistic Understanding – a Look at Professional Ethics	
Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	
Activities: Exploring Ethical Human Conduct, Humanistic Models in Education and steps of Transition towards Universal Human Order	
5 hours	

Course Outcomes:	
At the end of the course the student will be able to:	
21UHV306.1	Practice the method of self-exploration to understand the basic human aspiration.
21UHV306.2	Distinguish between needs of self and body.
21UHV306.3	Evolve a program for self-regulation and health.
21UHV306.4	Differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them
21UHV306.5	Realize sustainable solutions to the problems in society and nature
21UHV306.6	Develop competence in professional ethics and strategies for the transition towards a value-based life/profession

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books, New Delhi	2, 2019
2	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books, New Delhi	2, 2019
Reference Books				
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	1999
2	Human Values	A.N. Tripathi	New Age Intl. Publishers, New Delhi	2004

Web links/Video Lectures/MOOCs/papers
1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
3. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
4. Economy of Permanence - J C Kumarappa
5. Bharat Mein Angreji Raj – Pandit Sunderlal

6. Rediscovering India - by Dharampal
7. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
8. India Wins Freedom - Maulana Abdul Kalam Azad
9. Vivekananda - Romain Rolland (English)
10. Gandhi - Romain Rolland (English)

11. UHV-I Teaching material (Presentations, Pre & Post Surveys etc.)
https://fdp-si.aicte-india.org/AicteSipUHV_download.php

12. Details of UHV-II: Universal Human Values – Understanding Harmony and Ethical Human Conduct
https://drive.google.com/file/d/1cznDaqDwKy_EKWmqJLWF94MeY4AXcsU/view?usp=sharing

13. Recorded FDP (Refresher 1 Part 1: Preparing to teach UHV-I in SIP)
<https://www.youtube.com/watch?v=kejuD4faDDE&list=PLWDeKF97v9SOjS4RanhaYj4YLilmqm5pj&index=1>

14. Resources, including the class notes and presentations
<https://drive.google.com/drive/folders/1nh9m5ibEtvMyqekeiexAJtfdNtm6t6-?usp=sharing>

15. Hindi Recording of 5-day UHV FDP
<https://www.youtube.com/playlist?list=PLWDeKF97v9SMRfe5PK1HPYnEcrJOL6K7>

16. English Recording of 5-day UHV FDP
<https://www.youtube.com/playlist?list=PLWDeKF97v9SP7wSlapZcQRrT7OH0ZIGC4>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21UHV306.1						2			3	2				
21UHV306.2						3	3							
21UHV306.3	2								3			2		
21UHV306.4						3	3	3						
21UHV306.5	2					2			3					
21UHV306.6						3	3			2				

1: Low 2: Medium 3: High

Biology for Engineers			
Course Code	21BFE306/406	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:0)	SEE Marks	50
Credits	02	Exam Hours	02
Course Learning Objectives:			
7. To bring awareness of biological concepts to engineering students 8. To introduce the building blocks of life and their complexity 9. To encourage interdisciplinary studies and projects 10. To appreciate the discoveries that mimic nature and its working 11. To inculcate nature-inspired design and operational principles			
Module-1			
Basic Cell Biology: Introduction to Biology, The cell: the basic unit of life, Expression of genetic information-protein structure and function, Cell metabolism; Cells respond to their external environments, Cells grow and reproduce, Cellular differentiation. 5 Hours			
Module-2			
Biochemistry and Molecular Aspects of Life: Biodiversity-Chemical bonds in Biochemistry; Biochemistry and Human biology, Protein synthesis -DNA; RNA, Transcription and translation factors play key roles in protein synthesis, Differences between eukaryotic and prokaryotic protein synthesis, Stem cells and their applications. 5 Hours			
Module-3			
Bioinspired Engineering based on human physiology: Circulatory system (artificial heart, pacemaker, stents), Nervous system (Artificial neural network), Respiratory system, sensory system (electronic nose, electronic tongue), Visual and auditory prosthesis (Bionic eye and cochlear implant). 5 Hours			
Module-4			
Relevance of Biology as an interdisciplinary approach: Biological observation that led to major discoveries, Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf), Bird flying (aircraft), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro). 5 Hours			
Module-5			
Bioinspired Algorithms and Applications: Genetic algorithm, Gene expression modelling, Parallel Genetic Programming: Methodology, History, and Application to Real-Life Problems, Dynamic Updating DNA Computing Algorithms, Bee-Hive: New Ideas for Developing Routing Algorithms Inspired by Honey Bee Behaviour. 5 Hours			

Course Outcomes:	
At the end of the course the student will be able to:	
21BFE306.1	Discuss how the cell forms the basic building block of life
21BFE306.2	Distinguish between transcription and translation
21BFE306.3	Describe the role played by proteins within the cell
21BFE306.4	Analyze the role of bioinspired design in novel applications
21BFE306.5	Apply bioinspired design principles to other domains
21BFE306.6	Implement a simple genetic algorithm

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Biology for Engineers	Thyagarajan.S., Selvamurugan. N., Rajesh.MP, Nazeer RA, Richard W. Thilagaraj, Barathi.S., and Jaganthan.M.K	Tata McGraw Hill	2012
2	Molecular Biology	Robert Weaver	McGraw-Hill	5, 2012
Reference books				
1	Lewin's Genes XII	Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick	Jones and Bartlett Learning	2017
2	Bioinspired Engineering	Jenkins, C.H.	Momentum Press	2012
3	Bio mimetics: Nature-Based Innovation	Yoseph Bar-Cohen	CRC Press	1, 2016
4	A Practical Guide to Bio-inspired Design	Hashemi Farzaneh, Helena, Lindemann, Udo,	Springer	2019

Web links/Video Lectures/MOOCs/papers

- <https://books.google.co.in/books?id=-2LNBQAAQBAJ&printsec=frontcover#v=onepage&q&f=false>
- <https://www.aminotes.com/2017/02/biology-for-engineers-module-1-cocepts.html>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21BFE306.1	2					1								
21BFE306.2		1				1								
21BFE306.3	2					2								
21BFE306.4		2										2		
21BFE306.5	2											2		
21BFE306.6		2										2		

1: Low 2: Medium 3: High

Balake Kannada

Course Code	21KBK307/407	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50
Credits	01	Exam Hours	02

Course Learning Objectives:

1. To enable the students to understand, speak, read and write the Kannada language.
2. To communicate in the Kannada language in their daily life with Kannada speakers
3. To give the overall information about the Kannada language and Karnataka state

Module- 1

Kannada Aksharamaale haagu Uchchaarane
(Kannada Alphabets and Pronunciation)

3 hours

Module-2

Sambhashanegaagi Kannada Padagalu
(Usage of Kannada Words in General Communication and Vocabulary)

3 hours

Module-3

Sambhashaneyalli Kannada
(Usage of Kannada in the proper manner - in Kannada Conversation)

3 hours

Module-4

Kannadadalli Chatuvati kegalu
(Activities related to the Kannada Language - Development of Skill vocabulary)

3 hours

Module-5

Karnataka raajya, Kannada Bhashe, Saahithyada bagege Maahithi
(Information about the Karnataka State, Kannada Language and Literature)

3 hours

Course Outcomes:

At the end of the course the student will be able to:

21KBK307.1	Write and read the Kannada alphabet
21KBK307.2	Communicate Kannada fluently
21KBK307.3	Communicate in Kannada in his day-to-day life
21KBK307.4	Build confidence to address large gatherings
21KBK307.5	Develop skills, vocabulary and fluency
21KBK307.6	Make use of state language and literature

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Balake Kannada	Dr L Thimmesha	Prasaranga VTU Belagavi	1 st Edition. 2020
2	Vyavaharika Kannada	Dr L Thimmesha, Prof V Keshavamoorthy	Prasaranga VTU Belagavi	1 st Edition. 2020
Reference Books				
1	Kannada Kali	Lingadevaru Halemane	Kannada University Hampi	Fourth Edition 2016
2	Spoken Kannada	N. D Krishnamurthy, Dr S. M. Rameshchandra Swamy, Abdul Rehman Pasha	Kannada Sahithya Parishat	2018

Web links/Video Lectures/MOOCs/papers

1. <https://youtu.be/daY6TRvHFB4>
2. <https://youtu.be/RuRmq7VyCaQ>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21KBK307.1	2									2				
21KBK307.2	2									2				
21KBK307.3	2									2				
21KBK307.4	2									2				
21KBK307.5	2									2				
21KBK307.6	2									2				

1: Low 2: Medium 3: High

Saamskruthika Kannada				
Course Code	21KSK307/407	CIE Marks	50	
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50	
Credits	01	Exam Hours	02	
Course Learning Objectives:				
<ol style="list-style-type: none"> 1. ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು ನುಡಿಯ ಪರಿಚಯ 2. ಕನ್ನಡದಲ್ಲಿ ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನಗಳ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವಿಷಯಗಳ ಪರಿಚಯ 3. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತದ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ 4. ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು 5. ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಅವುಗಳ ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳ ಪರಿಚಯ 6. ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು 				
Module-1				
<ol style="list-style-type: none"> 1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ; ಹಂಪ ನಾಗರಾಜಯ್ಯ 2. ಕನ್ನಡ ನಾಡು ನುಡಿ 3. ಕನ್ನಡ ಭಾಷೆ - ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ 				3 Hours
Module-2				
<ol style="list-style-type: none"> 4. ಕಾವ್ಯ ಭಾಗ- ಆಧುನಿಕ ಪೂರ್ವ (ವಚನಗಳು, ಕೀರ್ತನೆಗಳು, ತತ್ವಪದಗಳು, ಜನಪದ ಗೀತೆ) 5. ಕಾವ್ಯ ಭಾಗ - ಆಧುನಿಕ (ಡಿ ಎ ಜಿ, ದ.ರಾ.ಬೇಂದ್ರೆ, ಕುವೆಂಪು, ಕೆ.ಎಸ್. ಎನ್, ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಚಂದ್ರಶೇಖರ ಕಂಬಾರ, ಸಿದ್ದಲಿಂಗಯ್ಯ) 				3 Hours
Module-3				
<ol style="list-style-type: none"> 6. ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ 7. ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ 8. ಪತ್ರವ್ಯವಹಾರ - ಆಡಳಿತ ಪತ್ರಗಳು; ಸಾಮಾನ್ಯ, ಸಾರ್ಕಾರಿ ಪತ್ರಗಳು, ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು 				3 Hours
Module-4				
<ol style="list-style-type: none"> 9. ಡಾ.ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ -ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ ; ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ 10. ಯುಗಾದಿ; - ವಸುಧೇಂದ್ರ 				3 Hours
Module-5				
ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ				
<ol style="list-style-type: none"> 11. "ಕ" ಮತ್ತು "ಬ" ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕನ್ನಡ ಟೈಪಿಂಗ್ 12. ಕನ್ನಡ - ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ 13. ತಾಂತ್ರಿಕ ಪದಕೋಶ -ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು 				3 Hours

Course Outcomes:	
At the end of the course the student will be able to:	
21KSK307.1	ಕನ್ನಡ ನಾಡು ನುಡಿಯ ಅರಿವು ಹಾಗೂ ಸಂಸ್ಕೃತಿಯ ಹರಿವು
21KSK307.2	ಕವಿ ಕಾವ್ಯಗಳ ಪರಿಚಯ- ಕವಿತೆಗಳ ಮೂಲಕ ಬದುಕಿನ ನೈಜತೆಯ ಚಿತ್ರಣ
21KSK307.3	ಶುದ್ಧ ಕನ್ನಡದ ಬಳಕೆ, ಪತ್ರಗಳತ್ತ ಒಲವು, ಸುಲಭ ವ್ಯಾಕರಣ
21KSK307.4	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳು- ವ್ಯಕ್ತಿ ಪರಿಚಯ ಹಾಗೂ ಕತೆಯ ತಂತ್ರಗಾರಿಕೆ
21KSK307.5	ತಂತ್ರಾಂಶಗಳ ಬಳಕೆ, ಪಾರಿಭಾಷಿಕ ಪದಗಳ ಪರಿಚಯ
21KSK307.6	ಕನ್ನಡ ಭಾಷಾಜ್ಞಾನ, ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	ಆಡಳಿತ ಕನ್ನಡ	ಡಾ.ಎಲ್ .ತಿಮ್ಮೇಶ್ ಪ್ರೊ.ವಿ. ಕೇಶವಮೂರ್ತಿ	ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ	2019
2	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ	ಡಾ.ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ, ಡಾ.ಎಲ್ .ತಿಮ್ಮೇಶ್	ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ	2020
Reference Books				
1	ಕನ್ನಡ ಸಾಹಿತ್ಯಕೋಶ & ವ್ಯಾಕರಣ ಪುಸ್ತಕ	ರಾಜಪ್ಪ ದಳವಾಯಿ _____	ದಳವಾಯಿ ಪ್ರಕಾಶನ, ಬೆಂಗಳೂರು.	2008
2	ಕನ್ನಡ ಕ್ಲಿಷ್ಟಪದ ಕೋಶ (ಶಬ್ದದ ವ್ಯುತ್ಪತ್ತಿ ಸಹಿತ)	ಪ್ರೊ. ಜಿ. ವೆಂಕಟ ಸುಬ್ಬಯ್ಯ ಹಾಗೂ ರಾಜ್ಯಶ್ರೀ ಸತೀಶ್	ಪ್ರೀಸಮ್ ಬುಕ್ಸ್ ಪ್ರೈ.ಲಿ.	2006

<p>Web links/Video Lectures/MOOCs/papers</p> <ol style="list-style-type: none"> 1. https://youtu.be/HS8InQR36E4 2. https://youtu.be/C_SF24_ygxQ 3. https://youtu.be/wuT7UED7yuQ 4. https://youtu.be/pxLwNWXhbnQ 5. https://youtu.be/H6FXRSBNO4c
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Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21KSK307.1		2										2		
21KSK307.2		2										2		
21KSK307.3		2								2				
21KSK307.4		2										2		
21KSK307.5		2				2								
21KSK307.6						2				2				

1: Low 2: Medium 3: High

Constitution of India, Professional Ethics and Cyber Law			
Course Code	21CPC307/407	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1:0:0)	SEE Marks	50
Credits	01	Exam Hours	02
Course Learning Objectives: To			
<ol style="list-style-type: none"> 1. Know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and <i>the</i> duties of citizens 2. Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society. 3. Know about cybercrimes and cyber laws for cyber safety measures. 			
Module-1			
Introduction to Indian Constitution:			
The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.			
3 Hours			
Module-2			
Union Executive and State Executive:			
Parliamentary System, Federal System, Centre-State Relations. Union Executive - President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism. State Executives - Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts, Special Provisions (Articles 370,371,37JJ) for some States.			
3 Hours			
Module-3			
Elections, Amendments and Emergency Provisions:			
Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments - 7,9, 10,12,42,44,61,73,74,75,86, and 91,94,95,100,101,118 and some important Case Studies. Emergency Provisions, types of Emergencies and their consequences.			
Constitutional special provisions:			
Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.			
3 Hours			
Module-4			
Professional/ Engineering Ethics:			
Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of Ethics as defined in the website of Institution of Engineers (India): Profession, Professionalism, and Professional Responsibility. Clash of Ethics, Conflicts of Interest. Responsibilities in Engineering Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering, TPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.			
3 Hours			

Module-5

Internet Laws, Cyber Crimes and Cyber Laws:

Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000, Internet Censorship. Cybercrimes and enforcement agencies. **3 Hours**

Course Outcomes:

At the end of the course the student will be able to:

21CPC307.1	Discuss the constitutional knowledge and legal literacy
21CPC307.2	Review the Indian constitution
21CPC307.3	Analyze the role and functions of Union and state executives
21CPC307.4	Review the Electoral Process, the System of Election Commission and its functions
21CPC307.5	Discuss professional ethics and responsibilities of engineers
21CPC307.6	Analyze the cybercrimes and cyber laws for cyber safety measures

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Constitution of India, Professional Ethics and Human Rights	Shubham Singles, Charles E. Haries, et al	Cengage Learning India	2018
2	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018
Reference Books				
1	Introduction to the Constitution of India	Durga Das Basu	Prentice -Hall	2008
2	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthilkumar	Prentice -Hall	2004

Web links/Video Lectures/MOOCs/papers

- [1.https://www.constitutionofindia.net/constitution_of_india](https://www.constitutionofindia.net/constitution_of_india)
- [2. https://infosecawareness.in/cyber-laws-of-india](https://infosecawareness.in/cyber-laws-of-india)

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CPC307.1						2		2						
21CPC307.2								2				2		
21CPC307.3						2		2				2		
21CPC307.4						2		2						
21CPC307.5						2		2						
21CPC307.6								2				2		

1: Low 2: Medium 3: High

IOT ENABLED PROTOTYPING			
Course Code:	21IEP308	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Understand the IoT concepts such as sensing, actuation, and communication. 2. Development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication and Protocols 3. Understand the significance of Project Management and the different techniques of planning 4. To introduce fundamental aspects of intellectual property rights, Govt. policies on IPR, and patentability search techniques. 			
Module 1			
Internet of Things – Hardware / System Design			
Introduction to IoT fundamentals, Introduction to sensors, Difference between analog and Digital sensors, Interfacing Temperature, Light and Humidity sensor with Arduino, Interfacing Motors with Arduino, A simple program to control actuator based on the analog sensor. 6 Hours			
Module 2			
Internet of Things			
Networking in IoT:			
Introduction to wireless communication, Wifi Module ESP8266 interface with Arduino, Machine to Machine (M2M) communication using WiFi module. A simple demonstration of sensing temperature from one device and control actuator on a second device (M2M)			
IoT in Web/ Cloud Platform:			
Introduction to a web server - XAMPP(windows), A simple interactive web page using HTML5, Bootstrap (or CSS), and Javascript. Interfacing ESP8266 with webserver, ThingSpeak API, and MQTT protocol, A simple project to demonstrate the status of two IoT devices communicating with a Web Server. 6 Hours			
Module 3			
Project Planning and Management			
Project initiation, Project charter, Project planning, and implementation, Scheduling and costing, Project monitoring and control, Project closure and reports. 6 Hours			
Module 4			
Intellectual Property Rights			
Introduction and the need for intellectual property right (IPR) – Kinds of Intellectual Property Rights, Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application, Non - Patentable Subject Matter, Registration Procedure, Patentability search methods, Patent landscape, Freedom-to-market, National IPR Policy, Govt. initiatives and scheme in promoting IPR. 6 Hours			
Course Project			
Develop IoT-based prototypes (solutions) to solve any industrial or societal problems. The prototype building is teamwork of 3-5 students. The goals should be clearly defined and should use robust technologies and rigorous testing. 6 Hours			

Course Outcomes: At the end of the course, the student will be able to:	
21IEP308.1	Analyze the basics of IoT and protocols
21IEP308.2	Develop IoT-based prototypes to solve industrial and societal problems
21IEP308.3	Apply appropriate approaches to plan a new project and develop a project schedule.
21IEP308.4	Discuss the ethical aspects in IPR, Govt. policies on IPR, and conducting patentability searches
21IEP308.5	Inculcate the teamwork and communication skills

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Reference Books				
1	Internet of Things (A Hands-on-Approach)	Vijay Madiseti and Arshdeep Bahga	Orient Blackswan Private Limited	1 st Edition, 2015
2	Fundamentals of Intellectual Property	Dr. Kalyan C. Kankanala	Asia Law House	1st Edition, 2012
3	Project Management Absolute Beginner's Guide	Greg Horine	Pearson Education (US)	4 th Edition, 2017

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO 2
21IEP308.1			2		2				2	2				
21IEP308.2			2								3			
21IEP308.3					2						2			
21IEP308.4								1		2				
21IEP308.5								1	2	2				

1: Low 2: Medium 3: High

Industry Oriented Training - Business Etiquettes			
Course Code	21IOT309	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	-
Credits	-	Exam Hours	2
Course Learning Objectives:			
12. Know the components of self-introduction			
13. Develop a resume with the inclusion of core competencies			
14. Involve and contribute to group discussions			
15. Develop effective communication to succeed in the professional career			
16. Know the etiquettes of digital communication			
Module-1			
Self Introduction & Essentials of grooming			
Self Introduction: Learn the secret to introducing Yourself, Things to avoid when introducing yourself. Activity: Video record the self-introduction. Essentials of grooming: Creating the first impression, what does the well-dressed man wear? What does the well-dressed woman wear? Personal hygiene and habits 4 Hours			
Module-2			
Resume Writing			
Purpose, Identifying Relevant Competencies, Understanding Applicant Tracking Systems, Lists of Competencies, Writing Accomplishment/ Objective Statements, Finding the Right Words- Action verbs, The Most Popular Resume Format, Other Popular Resume Formats, Do's and Don'ts. Activity: Students have to submit a copy of their resume 4 Hours			
Module-3			
Group Discussion			
Types, process, Evaluation criteria, Do's and Don'ts Activity: Group discussions have to be held during the training sessions 4 Hours			
Module-4			
Communicate effectively			
Build a Story, Just a Minute, Group Activities, Team building activities, Role Play, Presentation Skills 4 Hours			
Module-5			
Digital right and wrong			
Virtual Communication: Agenda, being prepared, Dressing appropriately, background, Use Microphone and camera the right way, restraining from off tasks during virtual meetings, protecting confidential data during online presentations, time management 4 Hours			

Course Outcomes:	
At the end of the course the student will be able to:	
21IOT309.1	Articulate the essential components required for self-introduction in any business or a networking event and also recognize the need to dress appropriately for a successful career in the corporate
21IOT309.2	Develop a resume inclusive of core competencies, and action verbs which are compatible with Applicant Tracking Systems
21IOT309.3	Demonstrate the types, process and evaluation process of Group Discussion and carry out effective group discussions
21IOT309.4	Develop skills required for effective communication
21IOT309.5	Associate and be accustomed to the etiquette to be followed during online meetings

Sources	
1.	English for Common Interactions in the Workplace: Basic Level: Coursera: https://www.coursera.org/learn/english-common-interactions-workplace-basic-level
2.	Personal Communication-Introduce Yourself With Confidence: https://www.udemy.com/course/how-to-introduce-yourself/
3.	Professionalism, Grooming and Etiquette: https://www.edx.org/course/professionalism-grooming-and-etiquette
4.	How to Write a Resume: https://www.coursera.org/learn/how-to-write-a-resume#syllabus
5.	Group Discussion Strategies: https://www.udemy.com/course/group-discussion-strategies/
6.	Communication Strategies for a Virtual Age: https://www.coursera.org/learn/communication-strategies-virtual-age#syllabus
References	
1.	https://simplifytraining.com/course/personal-hygiene-and-good-grooming/
2.	https://www.udemy.com/course/group-discussion-strategies/
3.	https://www.educba.com/course/group-discussion/
4.	https://getrafiki.ai/meetings/rules-of-virtual-meeting-etiquette-every-sales-professional-should-follow/
5.	https://thedigitalworkplace.com/articles/online-meeting-etiquette-for-attendees/
6.	https://rigorousthemes.com/blog/virtual-meeting-etiquette-guidelines-ground-rules/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21IOT309.1									2	3		1		
21IOT309.2										3		1		
21IOT309.3									2	3	1	1		
21IOT309.4									2	3	1	1		
21IOT309.5									2	3	1	1		

1: Low 2: Medium 3: High

Additional Mathematics - I (A Bridge Course for Lateral Entry Students of BE Programmes) (Common to all Programmes)			
Course Code	21MAL301	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:1:0)	SEE Marks	50
Credits	-	Exam Hours	03
Course Learning Objectives:			
1. To familiarize concepts of Mathematics required for engineering study 2. To equip the students with standard concepts and tools to solve problems in their discipline of engineering.			
Module-1			
Complex Trigonometry: Complex Numbers, Definitions and properties. Modulus and amplitude of a complex number, De Moivre's Theorem, Argand diagram, Vector Algebra: Scalars and vectors. Addition and subtraction and multiplication of vectors- Dot and Cross products, problems.			
			8 Hours
Module-2			
Trigonometry: Trigonometric ratios, quadrant rule, trigonometric ratios of standard angles, compound angles, Sum and product formula and Hyperbolic functions Partial fraction: Type 1- Denominator is a product of non repeated linear factors, Type 2 -repeated linear factors and Type 3: Quadratic factors.			
			8 Hours
Module-3			
Differentiation: Derivative of a function, Derivative of a composite function, Differentiation of Implicit function, Differentiation of inverse trigonometric function, product formula, Quotient formula, Chain rule, nth derivative, Leibniz's Rule, angle between radius vector and tangent (only formula), angle between polar curves.			
			8 Hours
Module-4			
Integration: Definition, standard formulae, Integration by substitution, , Integration by partial fraction method, Integration by parts, Bernoulli's rule $\int e^{ax} \sin bx \, dx$ and $\int e^{ax} \cos bx \, dx$ Definite Integrals and properties of definite integrals. Application- Definite integral as an area.			
			8 Hours
Module-5			
Linear Algebra: Rank of matrices - Rank of a matrix by Echelon form, consistency of system of linear equations - homogeneous and non-homogeneous equations, Gauss – Elimination and Gauss - Seidel methods. Eigen values and Eigenvectors-properties, largest Eigenvalue by Rayleigh's power method. Diagonalization of a square matrix of order two.			
			8 Hours

Course Outcomes:	
At the end of the course the student will be able to:	
21MAL301.1	Apply complex numbers and vectors in Engineering Applications
21MAL301.2	Apply trigonometry in real life applications
21MAL301.3	Resolve the Rational fraction into partial fractions.
21MAL301.4	Compute derivative of different functions

21MAL301.5	Compare and different methods integration and select appropriate method to solve given problem
21MAL301.6	Analyze given problem and use appropriate method of solving given set of equations

Question paper pattern:

Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

SIN o.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44 th Edition, 2017
2	NCERT Text Book for Mathematics I PUC and II PUC	NCERT	NCERT	Reprint 2007
3	Higher Engineering Mathematics	H.K Dass and R Verma	C. Chand and Company	First Edition, 2011
Reference Books				
1	Advanced Engineering Mathematics – Volume I	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	10 th Edition 2010
2	"Higher Engineering Mathematics"	B.V.Ramana	Tata McGraw-Hill Publications	11 th Edition, 2010

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21MAL301.1	3	1										
21MAL301.2	3	1										
21MAL301.3	3		1									
21MAL301.4	3		1									
21MAL301.5	3		1									
21MAL301.6	3		1									

1: Low 2: Medium 3: High

Business Communication (A Bridge Course for Lateral Entry Students BE programmes)			
Course Code	21ENG310/410	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50
Credits	00	Exam Hours	02
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To enable the learner to communicate effectively in real-life situations. 2. To review English grammar effectively for study purposes across the curriculum. 3. To enhance English vocabulary and language proficiency. 4. To achieve better writing and presentation skills. 			
Module-1		2 Hours	
Subject Verb Agreement, Sequences of tenses, Active and Passive, Reported speech, Articles, Preposition.			
Module-2		2 Hours	
Vocabulary, One word substitutes, Confused words, Phrasal Verbs, Idioms and Phrases, Analogies.			
Module-3		2 Hours	
Technical vocabulary, Homophones, Homographs, Homonyms, Synonyms and Antonyms, Common errors in the English language, and Phrasal verbs.			
Module-4		2 Hours	
Formal letter writing, Covering letter with Resume, Email Etiquette Cloze passage.			
Module-5		2 Hours	
Communication skills: Group discussion, Etiquette of the job interview, Dialogues in various situations, Telephonic conversation.			

Course Outcomes:	
At the end of the course, the student will be able to:	
21ENG310.1	Analyze the concepts of grammar and its usage
21ENG310.2	Identify the nuances of phonetics, intonation and flawless pronunciation
21ENG310.3	Implement English vocabulary and language proficiency.
21ENG310.4	Apply the forms of writing skills at the professional level.
21ENG310.5	Demonstrate speaking ability in terms of fluency and comprehensibility.
21ENG310.6	Demonstrate competence in the four modes of literacy: Writing, Reading, Speaking and listening.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Communication skills	Sanjay Kumar and Pushp Lata	Oxford University Press	Second Edition, 2015
2	High School English Grammar and Composition	Wren and Martin	S Chand and Company Ltd	2015
Reference Books				
1	Practical English Usage	Michael Swan	Oxford University Press	2016
2	English Grammar in Use	Raymond Murphy	Cambridge University Press	Second Edition, 1994

Web links/Video Lectures/MOOCs

1. <https://englishforeveryone.org>
2. <https://owl.purdue.edu>
3. <http://guidetogrammar.org>

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21ENG310.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

SEMESTER –IV			
Vector Integration, Curve Fitting and Statistical Methods (Common to CIV&MECH)			
Course Code	21MAM401	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> To provide an insight into applications of vector integration and apply the least square method numerically to find the curve of best fit. To acquire the proficiency in variational calculus and solving ODEs arising in engineering applications using numerical method. To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in design engineering and microwave engineering. 			
Module-1		8 Hours	
Vector Integration: Line integrals, Applications to work done by a force , Theorems of Green, Gauss and Stokes (Without Proof), Self-Study Topic: Flux			
Module-2		8 Hours	
Curve fitting: Curve fitting by the method of least squares: straight line, parabola and exponential curve of the type $y = ax^b$. Calculus of Variations: Variation of function and Functional, variational problems, Euler's equation, Geodesics, Hanging chain problem. Self-Study Topic: Other forms of Euler's equation.			
Module-3		8 Hours	
Statistical Methods: Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation -problems. Regression analysis- lines of regression –problems. Probability: Introduction, Conditional probability and Baye's theorem – problems. Self-Study Topic: State and prove Baye's Theorem			
Module-4		8 Hours	
Probability Distributions: Random variables – discrete and continuous. Probability distribution function, cumulative distribution function. Binomial, Poisson, Exponential and Normal distribution – Problems. Self-Study Topic: Derivation of mean and standard deviation of Exponential and Normal distributions.			
Module-5		8 Hours	
Joint Probability Distribution: Joint distribution of random variables – Expectation, covariance and correlation. Markov chain: Stochastic matrices, higher transition probabilities, regular stochastic matrices, probability vector. Self-Study Topic: Higher transition matrix.			

Course Outcomes: At the end of the course the student will be able to:	
21MAM401.1	Analyze the concepts of Gradient, Divergence, Curl and apply Green's, Stokes, Divergence theorem in various engineering problems.
21MAM401.2	Apply the method of least squares to fit a curve for the given data.

21MAM401.3	Apply the concept of extremals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
21MAM401.4	Make use of the probability, correlation and regression analysis to fit a suitable mathematical model for the statistical data.
21MAM401.5	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
21MAM401.6	Construct joint probability distributions and apply the knowledge in attempting Engineering problems for feasible random events.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44, 2017
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10, 2016
3	Introductory Probability And Statistical Applications	B L Mayer	Wiley Eastern Limited	2 nd Edition
Reference Books				
1	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	11, 2010

Web links/Video Lectures/MOOCs	
1.	https://www.youtube.com/watch?v=AIxiYG-gZ00&list=PLHXZ9OQGMqxfW0GMqeUE1bLKaYor6kbHa
2.	https://www.youtube.com/watch?v=1RdWluX3XGc
3.	https://www.youtube.com/watch?v=6HeQc7CSkZs
4.	https://youtu.be/Ih0GJMzg0yg
5.	https://youtu.be/XQoLVI31ZfQ
6.	https://youtu.be/LzWHQgRLge0
7.	https://youtu.be/vv-l0vOayKM
8.	https://youtu.be/aztcS-3MwH0
9.	https://youtu.be/E4wyYQhcN_Y
10.	https://youtu.be/i3AkTO9HLXo

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21MAM401.1		3	1											
21MAM401.2	1		3											
21MAM401.3	3	1												
21MAM401.4		1		3										
21MAM401.5		2	2											
21MAM401.6	2		2											

1: Low 2: Medium 3: High

CONCRETE TECHNOLOGY AND PRACTICE			
Course Code	21CIV402	CIE Marks	50
Teaching Hours/Week (L: T:P)	(3:0:2)	SEE Marks	50
Credits	04	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Describe the basic Engineering Properties of the concrete 2. Demonstrate fresh properties of concrete 3. Demonstrate hardened properties of concrete 4. Design required grade of concrete using concrete mix design principles 5. Describe the different properties of special concretes. 6. Learn the procedure for testing concrete ingredients, and properties of concrete and bitumen materials as per standard code recommendations. 			
Module - 1: Concrete Ingredients			8 Hours
<p>Cement - Cement manufacturing process with flow charts. Steps to reduce carbon footprint, Bogue's compound and transition zone in cement paste, chemical composition and their importance, hydration of cement, types of cement. Quality of mixing water.</p> <p>Fine aggregate - Functions, requirement, Alternatives to Natural sand, M-sand introduction and manufacturing its significance and differences.</p> <p>Coarse aggregate - Importance of size, shape, and texture. Grading and blending of aggregate, Recycled aggregates.</p> <p>Chemical admixtures - plasticizers, accelerators, retarders, and air-entraining agents.</p> <p>Mineral Admixtures – Fly ash, GGBS, and Silica fume (Basic concepts)</p> <p>Testing of concrete ingredients</p>			
Module - 2: Fresh Concrete			8 Hours
<p>Workability - Factors affecting workability. Segregation and Bleeding. Measurement of workability – Slump, Compaction factor, Vee - Bee Consistometer tests.</p> <p>Process of manufacturing of Concrete - Batching, Mixing, Transporting, Placing, Compaction and Finishing.</p> <p>Curing - Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self-curing.</p> <p>Best practices of manufacturing concrete.</p>			
Module - 3: Hardened Concrete			8 Hours
<p>Strength - Factors influencing strength, W/C ratio, testing of hardened concrete,</p> <p>Creep - Factors affecting creep.</p> <p>Shrinkage of concrete - Factors affecting shrinkage, Types of Shrinkage.</p> <p>Durability - Definition, and significance of durability. Durability requirements as per IS-456, Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing, and thawing, Corrosion of reinforcement.</p> <p>In situ testing of concrete - Penetration and pull-out test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations</p>			
Module – 4: Concrete Mix Proportioning			8 Hours
<p>Concept of Mix Design with and without admixtures, variables in proportioning, and Exposure conditions. Examples of Mix Proportioning using IS – 10262: 2019.</p>			
Module – 5: Special Concretes			8 Hours
<p>Ready Mixed Concrete – manufacture as per standard practices, properties, advantages, and disadvantages.</p> <p>Self-Compacting concrete - concept, materials, tests, properties, application, and typical mix.</p> <p>Introduction: High Strength Concrete, High-Performance Concrete, Fiber-reinforced concrete, and Lightweight concrete.</p>			

List of Laboratory Experiments related to above modules – 2 hours each
<p>a. Tests on Cement Normal Consistency, Setting time – Initial and Final setting time, Compressive strength</p> <p>b. Tests on Aggregates Aggregate crushing, Impact, Abrasion, and Shape.</p> <p>c. Tests on Concrete Slump, Compacting, and Vee-Bee consistometer, Compressive, Split tensile, and Flexural strength,</p> <p>d. Tests on SCC SCC: Slump flow, V-Funnel, J-Ring and U-Box</p> <p>e. Tests on Non-Destructive Testing NDT tests by rebound hammer and pulse velocity test</p>
<p>Open-ended experiment covering the concept of the entire syllabus Design, development, and investigation of particular grade concrete mix using chemical and mineral admixture</p>

Course Outcomes: At the end of the course the student will be able to:	
21CIV402.1	Explain material characteristics and their influence on the microstructure of concrete
21CIV402.2	Examine the behaviour of concrete in the Fresh state
21CIV402.3	Analyze the behaviour of hardened concrete
21CIV402.4	Make use of professional codes to proportion different types of concrete mixes for required fresh and hardened properties.
21CIV402.5	Interpret knowledge of special concretes for different construction work based on the requirement.
21CIV402.6	Examine the physical properties of the Concrete and Highway materials

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	“Concrete Technology” - Theory and Practice	M.S. Shetty	Chand and Company, New Delhi,	Revised edition, 2018
2	Concrete Technology	Gambhir B L	Tata McGraw Hill, New Delhi	5 th edition, 2017
Reference Books				
1	Concrete Technology	Adam M. Neville and J. J. Brooks	Prentice-Hall.	2 nd Edition, 2012
2	Concrete Technology	A. R Santhakumar	Oxford University Press India	2 nd Edition, 2018
3	Concrete – Microstructure, properties, and materials	Mehta P, P Monteiro	Tata McGraw Hill Publications, New Delhi	4 th Edition, 2017
4	Highway Engineering	L R Kadiyali	Khanna Publishers, New Delhi	6 th Edition, 2013
5	Relevant I.S. codes		Bureau of Indian standards	

Weblinks / Video Lectures / MOOCs / papers

1. <http://nptel.ac.in/courses/105102012/>
2. <http://nptel.ac.in/courses/105104030/>
1. <http://nptel.ac.in/courses/105102012/>
2. <http://nptel.ac.in/courses/105104030/>
3. Cement <https://nptel.ac.in/courses/105102012/1>
4. Aggregates <https://nptel.ac.in/courses/105102012/6>
5. Mineral admixtures <https://nptel.ac.in/courses/105102012/11>
6. Chemical admixtures <https://nptel.ac.in/courses/105102012/9>
<https://nptel.ac.in/courses/105102012/10>
7. Concrete mix design <https://nptel.ac.in/courses/105102012/14>
8. Concrete production & fresh concrete <https://nptel.ac.in/courses/105102012/19>
9. Engineering properties of concrete <https://nptel.ac.in/courses/105102012/23>
10. Dimensional stability & durability <https://nptel.ac.in/courses/105102012/27>
11. Durability of concrete <https://nptel.ac.in/courses/105102012/31>
12. Special concretes <https://nptel.ac.in/courses/105102012/36>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV402.1							2					3		
21CIV402.2												3	2	
21CIV402.3												3	2	
21CIV402.4			3									2		
21CIV402.5									2					
21CIV402.6				3					2			2		

1: Low 2: Medium 3: High

Surveying Theory and Practice			
Course Code	21CIV403	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	04	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To understand principles of basic surveying to measure linear measurements 2. To understand principles of basic surveying to measure angular measurements 3. To understand effectively field procedures required for a professional surveyor 4. To apply techniques and skills necessary for Engineering practices 5. To use the conventional surveying instruments necessary for Engineering practices 6. To use Total Station in surveying to evaluate earthwork involved in the construction works 			
Module-1		8 Hours	
<p>Introduction: Definition of surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements, Surveying measurements and errors, types of errors, precision and accuracy.</p> <p>Measurement of Horizontal Distances: Measuring tape and types. Measurement using tapes, Taping on level ground and sloping ground. Errors and corrections in tape measurements, ranging of lines, direct and indirect methods of ranging, Electronic distance measurement, basic principle. Booking of tape survey work, Field book, entries, Conventional symbols, Obstacles in tape survey, Numerical problems.</p>			
Module-2		8 Hours	
<p>Measurement of Directions and Angles: Compass survey: Basic definitions; meridians, bearings, magnetic and True bearings. Prismatic and surveyor's compasses, temporary adjustments, declination. Quadrantal bearings, whole circle bearings, local attraction and related problems</p> <p>Traversing: Traverse Survey and Computations: Latitudes and departures, rectangular coordinates, Traverse adjustments, Bowditch rule and transit rule, Numerical Problems.</p>			
Module-3		8 Hours	
<p>Leveling: Basic terms and definitions, Methods of leveling, Dumpy level, auto level. Curvature and refraction corrections. Booking and reduction of levels. Differential leveling, profile leveling, fly leveling, check leveling, reciprocal leveling.</p>			
Module-4		8 Hours	
<p>Areas and Volumes: Measurement of area by dividing the area into geometrical figures, area from offsets, mid ordinate rule, trapezoidal and Simpson's one third rule, area from coordinates. Measurement of volumes- trapezoidal and prismatic formula.</p> <p>Contouring: Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.</p> <p>Curve Surveying: Curves – Necessity – Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (numerical problems).</p>			
Module-5		8 Hours	
<p>Remote sensing: Introduction, Principle of Remote sensing, EMR, types, resolutions, types of satellites, type of sensors, LIDAR, visual and digital image processing, and its applications.</p> <p>Global Positioning System: Definition, Principles of GPS, components of GIS, and applications.</p> <p>Advanced instrumentation in surveying: classification, measuring principles, Electronic</p>			

theodolite, EDM, Total Station, Drones surveying - Introduction, definitions, basics principles, methods, Importance of scale, height, applications.
List of Laboratory Experiments related to above modules – 2 hours each
<ol style="list-style-type: none"> 1. Measurement of horizontal distances in plane and sloping land 2. Setting out the perpendicular distance by various methods 3. Measurement of bearing using prismatic compass 4. Construction of Pentagon and Hexagon using Prismatic compass 5. Determination of difference in elevation between given points by height of instrument method 6. Determination of difference in elevation between given points by rise and fall method 7. Determination of true difference in elevation between given points by reciprocal levelling 8. Measurement of horizontal angle by repetition and reiteration method 9. Construction of contour map using total station

Course Outcomes:	
At the end of the course the student will be able to:	
21CIV403.1	Apply the principles of basic surveying to measure linear measurements
21 CIV403.2	Apply the principles of basic surveying to measure angular measurements
21 CIV403.3	Comprehend effectively field procedures required for a professional surveyor
21 CIV403.4	Use techniques and skills necessary for Engineering practices
21 CIV403.5	Demonstrate the conventional surveying instruments necessary for Engineering practices
21 CIV403.6	Demonstrate the use of Total Station in surveying to evaluate earthwork involved in the construction works

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Surveying	B.C. Punmia	Laxmi Publications pvt. Ltd., New Delhi	Vol.1, 2009
2	Surveying and Levelling	Kanetkar T P and S V Kulkarni	Pune Vidyarthi Griha Prakashan	Part I, 2006
Reference Books				
1	Surveying Vol.1	S.K. Duggal,	Tata McGraw Hill Publishing Co. Ltd. New Delhi. –	3 rd Edition, 2009
2	Surveying Vol. 1	K.R. Arora	Standard Book House, New Delhi. –	12 th Edition, 2010

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV403.1		2		2										
21CIV403.2		2		2										
21CIV403.3		2		2										
21CIV403.4		2		2										
21CIV403.5					2							2		
21CIV403.6					2							2		

1:Low 2: Medium 3: High

TRANSPORTATION ENGINEERING			
Course Code	21CIV404	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	03	Exam Hours	03
<p>Course Learning Objectives: This course will enable students:</p> <ol style="list-style-type: none"> 1. To gain knowledge of different modes of transportation systems, history, development of highways and the organizations associated with research and development of the same in INDIA. 2. To understand Highway planning and development considering the essential criteria's (engineering and financial aspects, regulations and policies, socio economic impact). 3. To get insight to different aspects of geometric elements and train them to design geometric elements of a highway network. 4. To understand pavement and its components, pavement construction activities and its requirements. 5. To understand the components of Railway design & Railway Planning and Harbour Engineering 6. To gain knowledge of various components of tunnelling like size & shape of the tunnel and Air transport characteristics 7. To gain the skills of evaluating the highway economics by B/C, NPV, IRR methods and also introduce the students to highway financing concepts. 			
Module -1		8 Hours	
<p>Principles of Transportation Engineering: Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport Jayakar committee recommendations, and implementation – Central Road Fund, Indian Roads Congress, Central Road Research Institute.</p> <p>Highway Development and Planning: Road types and classification, road patterns, planning surveys, master plan – saturation system of road planning, phasing road development in India, problems on best alignment among alternate proposals Salient Features of 3rd and 4th twenty year road development plans and Policies, Present scenario of road development in India and in Karnataka, Road development plan - vision 2021</p>			
Module-2		8 Hours	
<p>Highway Alignment and Surveys: Ideal Alignment, Factors affecting the alignment, Engineering surveys-Map study, Reconnaissance, Preliminary and Final location & detailed survey, Reports and drawings for new and re-aligned projects</p> <p>Highway Geometric Design: Cross-sectional elements–width, surface, camber, Sight distances – Stopping Sight distance, Overtaking Sight Distance, Intermediate Sight distance, Design of horizontal and vertical alignment–curves, super-elevation, widening, gradients, summit and valley curves.</p>			
Module-3		8 Hours	
<p>Pavement Materials: Subgrade soil - desirable properties- Highway research board (HRB) soil classification - determination of California Bearing Ratio and modulus of subgrade reaction with Problems Aggregates- Desirable properties and tests, Bituminous materials- Explanation on Tar, bitumen, cutback and emulsion-tests on bituminous material Pavement Design: Pavement types, component parts of flexible and rigid pavements and their functions, Equivalent Single Axle Load and its determination (Graphical method only)- Examples.</p> <p>Pavement Construction: Design of soil aggregate mixes by Rothfuch's method. Uses and properties of bituminous mixes and cement concrete in pavement construction. Earthwork; cutting and Filling, Preparation of subgrade, Specification, and construction of i) Granular Sub base, ii) Water bound macadam base, iii) Wet mix macadam base, iv) Bituminous</p>			

Macadam, v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and Pavement Quality Concrete viii) concrete roads. Tests on Highway Materials: Bitumen: Ductility, Penetration, and Softening
Module-4 8 Hours
Highway Drainage: Significance and requirements, Surface drainage system and design Examples, subsurface drainage system, design of filter materials, Types of cross drainage structures, their choice and location. Highway Economics: Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods-Examples, Highway financing-BOT-BOOT concepts
Module-5 8 Hours
Traffic Engineering – Traffic characteristics, Traffic Engineering Studies and Analysis, Traffic Regulation and Control, safety mitigation in Traffic management. Railway, Harbour, Tunnelling, Airport Planning: Significance of Road, Rail, Air, and Water transports – Coordination of all modes to achieve sustainability – Elements of the permanent way – Rails, Sleepers, Ballast, rail fixtures, and fastenings. Planning and Design of Harbours: Requirements, Classification, Location and Design Principles. Introduction, size, and shape of the tunnel. Air transport characteristics, airport classification, and airport planning: objectives, components

Course Outcomes: At the end of the course the student will be able to:	
21CIV404.1	Illustrate the knowledge of planning, design and the fundamental properties of highway materials & schemes
21CIV404.2	Identify the knowledge & use of geometric design and adopt appropriate suitable sight distance
21CIV404.3	Utilize and use the concept of different pavement materials in design, construction, inspection and maintenance of the pavement.
21CIV404.4	Understand pavement and its components, pavement construction activities
21CIV404.5	Identify the components of Railway design & Railway Planning and Harbor Engineering
21CIV404.6	Identify the components of tunnelling like size & shape of the tunnel and Air transport characteristics

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Highway Engineering	S K Khanna and C E G Justo	Nem Chand Bros, Roorkee	9 th Edition, 2011
2	Highway Engineering	L R Kadiyali	Khanna Publishers, New Delhi,	6 th Edition, 2013
3	Highway Engineering	R Srinivasa Kumar	University Press.,	1 st Edition, 2010
4	Transportation Engineering	K.P.subramaniam	SciTech Publications, Chennai.	6 th Edition, 2010

Reference Books	
1	Relevant IRC Codes
2	Specifications for Roads and Bridges-MoRT&H, IRC, New Delhi

Course Articulation Matrix:

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIV404.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
21CIV404.2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
21CIV404.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
21CIV404.4	2	-	-	-	-	-	-	-	-	2	-	-	-	-
21CIV404.5	-	2	-	-	-	-	-	-	-	2	-	-	-	-
21CIV404.6	-	2	-	-	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

BUILDING PLANNING & COMPUTER AIDED DRAFTING LAB			
Course Code	21CIL405	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03
<p>Course Learning Objectives:</p> <ol style="list-style-type: none"> 1. This course will enable students 2. Achieve skill sets to prepare computer-aided engineering drawings. 3. Understand the details of the construction of different building elements. 4. Achieve skill sets required to develop Building planning, sections, and elevations 5. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings. 			
Module-1			
<p>Drawing Basics: Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962.</p> <p>Simple engineering drawings with CAD drawing tools : Lines, Circle, Arc, Poly line, Multiline, Polygon, Rectangle, Spline, Ellipse, Modify tools: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet, Using Text: Single line text, Multiline text, Spelling, Edit text, Special Features: View tools, Layers concept, Dimension tools, Hatching, Customizing toolbars, Working with multiple drawings.</p>			
Module-2			
<p>Drawings Related to Different Building Elements:</p> <p>Following drawings are to be prepared for the data given using CAD Software</p> <ol style="list-style-type: none"> a) Cross section of Foundation for masonry wall and partition wall. b) Different types of bonds in brick masonry. c) Different types of staircases – Dog legged, Open well. d) Lintel and chajja e) Plan, Side view of Structural steel members (I,C,T and Angle sections) f) Septic Tank. g) Cross section of Flexible and Rigid pavement h) Cross sectional details of a road for a Residential area with provision for all services i) Layout plan of Rainwater recharging and harvesting system. J) Plan and section of Doors and Windows <p>Note: Students should sketch to dimension the above in a sketchbook before doing the computer drawing.</p>			
Module-3			
<p>Building Drawings: Principles of planning, planning regulations and building bye-laws, factors affecting site selection, Functional planning of residential and public buildings, and design aspects for different public buildings, design aspects for different public buildings, Basic concepts of planning and regulatory bodies.</p> <p>Drawing of Plan, elevation, and sectional elevation including electrical, plumbing and sanitary services using CAD software for:</p> <ol style="list-style-type: none"> 1. Single-storey residential building. 2. Double-storey residential building 3. Hostel building 4. School Building <p>Self-Study:</p> <p>Submission drawing (sanction drawing) of Hospital building/School building with access to terrace including all details and statements as per the local bye-laws.</p> <p>Note:</p> <p>Students should sketch to dimension the above in a sketchbook before doing the computer drawing, Single line diagrams to be given in the examination.</p>			

Course Outcomes: At the end of the course the student will be able to:	
21CIL405.1	Identify skill sets to prepare engineering drawings using different drawing and modifying tools.
21CIL405.2	Develop plan, cross sections of different elements of the buildings
21CIL405.3	Develop the cross sections of different roads, septic tank etc.,
21CIL405.4	Design plan, section and elevation for Residential and Public buildings as per requirements.
21CIL405.5	Create electrical and plumbing layout for Residential and Public Buildings
21CIL405.6	Apply the procedures of submission of drawings and Develop working and submission drawings for building.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Building drawing with an integrated approach to Built Environment Drawing	MG Shah, CM Kale, SY Patki	Tata McGraw Hill Publishing co. Ltd., New Delhi	5 th Edition, 2017
2	Building Construction	Gurucharan Singh Johnston and Jr. John T. De Wolf	Standard Publishers, & distributors, New Delhi.	17 th Edition, 2019
3	Civil Engineering Drawing	Malik R S and Meo G S	Asian Publishers/ Computech Publications Pvt Ltd.	Revised edition, 2021
Reference Books				
1	IS: 962-1989 (Code of practice for architectural and building drawing).		Bureau of Indian standards	-
2	National Building Code, BIS, New Delhi		Bureau of Indian standards	-

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
21CIL405.1					3							2		
21CIL405.2					3									
21CIL405.3					3									
21CIL405.4					3							2		
21CIL405.5					3							2		
21CIL405.6					3			1						

1: Low 2: Medium 3: High

COMPUTATIONAL TOOLS FOR ENGINEERS			
Course Code:	21CTE408	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03
<p>Course Learning Objectives:</p> <ol style="list-style-type: none"> 1. Apply modeling and simulation tools for a wide range of engineering problems. 2. Understand the analysis of data in Excel with statistics. 3. Use MATLAB and Simulink to perform engineering system analysis. <p>The engineering design process heavily relies on modeling and simulation. Modern simulation techniques enable the development of multi-physical, holistic system models that account for all system interactions. These digital models speed up the design and testing processes, saving time and money.</p>			
Module 1		6 Hours	
<p>Engineering Design Analysis Need for engineering design analysis. Product and system design. Introduction to analysis parameters – stress, deformation, acceleration, internal force and stability. Static structural analysis of engineering design using finite element method (case studies). Heat transfer and fluid dynamics modeling and simulation using CFD software (case studies).</p>			
Module 2		4 Hours	
<p>Data Analysis with EXCEL Calculate Mean, Median, Mode, Minimum, Maximum, Quartiles, Variance and Standard Deviation from some numbers. Analyze a population using data samples. Group data, build XY charts, apply Logarithmic Scale and Trend Line on a chart, forecast from some data, and calculate running averages. Normal Distribution, Exponential Distribution, Uniform Probabilities, Binomial Distribution, and Poisson Distribution.</p>			
Module 3		6 Hours	
<p>MATLAB and Simulink for Engineers Applications of MATLAB and Simulink in electrical engineering, electrical machines and power system projects, simulation of rectifiers, inverters, choppers, and cycloconverters</p>			
<p>Course Project Solve complex engineering problems via modeling and simulation. The project work is teamwork of 3-5 students. The goals should be clearly defined, use any software tool, and rigorous validation of the mathematical model should be done (experimental or theoretical).</p>			

Course Outcomes:	
At the end of the course, the student will be able to:	
21CTE408.1	Apply the Finite Element Method to solve engineering problems
21CTE408.2	Solve statistical problems using Excel
21CTE408.3	Perform system-level analysis using MATLAB and Simulink
21CTE408.4	Build mathematical models for any given engineering problem.
21CTE408.5	Demonstrate teamwork and communication skills

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Reference Books				
1	MATLAB and Simulink for Engineers	Agam Kumar Tyagi	Oxford University Press,	2012
2	Practical Finite Element Analysis	Nitin S.Gokhale	Finite To Infinite	2020
3	Excel Crash Course for Engineers	Eklas Hossain	Springer	2021

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
21CTE408.1	1				1	1								
21CTE408.2		1			2				2					
21CTE408.3		1			2									
21CTE408.4					2	2								
21CTE408.5	1								2					

1: Low 2: Medium 3: High

Industry Oriented Training - Computing Skills			
Course Code	2IIOT409	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	-
Credits	-	Exam Hours	02
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Use logical conditions for problem-solving and also introduce the concepts of arrays 2. Know functions, function calls, and parameter passing 3. Introduce algorithms and appreciate their importance in problem-solving 4. Introduce the core concepts of OOPs 5. Differentiate between front-end & back-end development and recognize the use of database management. 			
Module-1 Introduction to computing constructs			
Logical conditions: For Loops, Nested For Loops, While Loops, Do-While Loops, Nesting and Boxes, and combine/negate several logical conditions using logic operations AND, OR, and NOT. Arrays & strings: Create arrays of characters (strings), use the null terminator, and manipulate strings 4 Hours			
Module-2 Functions & Pointers			
Introduction to Functions, Returning Data From a Function, Passing Data Into a Function, Getting Valid User Input, Changing Parameter Values, Pointer Basics, Changing the Pointed to Value, Walking an Array with Pointers, Dynamic Memory Allocation, Getting More Memory, Pointers to Structure. 4 Hours			
Module-3 Algorithm analysis			
Introduction to Algorithm Analysis, Big-O, Big-O Examples, Dynamic Array Operations, Bubble Sort, Selection Sort, Insertion Sort, Recursion, Recursive Binary Search, Merge Sort 4 Hours			
Module-4 Object-oriented programming			
Designing for Object-Oriented Programming, Core Concepts of OO Programming: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object-oriented programming paradigm. 4 Hours			
Module-5 Frontend and backend development			
UI, Database management: DBMS overview, Relational Data Model and the CREATE TABLE Statement, Basic Query Formulation with SQL 4 Hours			

Course Outcomes:	
At the end of the course the student will be able to:	
2IIOT409.1	Illustrate the use of logical conditions, declare and manipulate data into arrays
2IIOT409.2	Implement functions, function calls, and parameter passing
2IIOT409.3	Design, implement, and evaluate an algorithm to meet desired needs
2IIOT409.4	Describe the core concepts of OOP's
2IIOT409.5	Recognize the concepts of front-end development
2IIOT409.6	Use the concepts of database management

Sources

1. Computational Thinking with Beginning C Programming Specialization: <https://www.coursera.org/learn/simulation-algorithm-analysis-pointers?specialization=computational-thinking-c-programming#syllabus>
2. Simulation, Algorithm Analysis, and Pointers: <https://www.coursera.org/lecture/simulation-algorithm-analysis-pointers/big-o-examples-pdCan>
3. Programming Fundamentals: <https://www.coursera.org/learn/programming-fundamentals?specialization=c-programming#syllabus>
4. Object-Oriented Programming Concepts: <https://www.coursera.org/learn/concepts-of-object-oriented-programming#syllabus>
5. Introduction to Back-End Development: <https://www.coursera.org/learn/introduction-to-back-end-development>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
2IOT409.1	2	1	1											
2IOT409.2	2	1	1											
2IOT409.3	1	1	2											
2IOT409.4	2		1											
2IOT409.5	2	1	1											
2IOT409.6	2	1	1											

1: Low 2: Medium 3: High

ADDITIONAL MATHEMATICS - II (A Bridge course for Lateral Entry students BE Programmes) (Common to all Programmes)			
Course Code	21MAL401	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:1:0)	SEE Marks	50
Credits	00	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> To familiarize the techniques of differential equations, vector analysis and linear algebra to engineering students. To equip the students with standard concepts and tools that will help them in solving problems in their discipline of engineering. 			
Module-1		8 Hours	
Partial Differentiation: Partial derivatives, Problems on Euler's theorem. Total derivative Partial differential equations: Introduction, Formation of PDE, Solution of PDE by direct integration method.			
Module-2		8 Hours	
First order ordinary differential equations: Introduction, Variable Separable, Homogeneous, Linear Exact and reducible to exact, Bernoulli's equations, Orthogonal Trajectories in polar form.			
Module-3		8 Hours	
Linear Ordinary Differential Equations of Higher Order: Standard form of higher order linear differential equation with constant coefficients, Concept of different types of solutions. Solution of homogeneous equations. Non homogeneous equations- Concept of Inverse differential operator (P.I restricted to $R(x) = e^{ax}, \sin ax$ or $\cos ax$ for $f(D)y = R(x)$.)			
Module-4		8 Hours	
Vector differentiation: Vector functions of a single variable, derivative of a vector function, velocity and acceleration, unit tangent. Scalar and vector functions, gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector			
Module-5		8 Hours	
Numerical Methods: Finite differences. Interpolation using Newton's forward and backward difference formulae (Statements only)-problems. Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods (only formulae, Numerical integration: Simpson's one third rule and three eighth rule (without proof) Problems.			

Course Outcomes:	
At the end of the course the student will be able to:	
21MAL401.1	Apply Euler's theorem for partial differentiation
21MAL401.2	Compare different methods of forming partial differential equations
21MAL401.3	Classify the given first order differential equations
21MAL401.4	Solve higher order differential equations
21MAL401.5	Differentiate between solenoidal and irrotational vectors.
21MAL401.6	Find root of a transcendental equation

Question paper pattern:

Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	Dr B.S. Grewal	Khanna Publishers	44th Edition, 2017
2	Higher Engineering Mathematics	H.K Dass and R Verma	C. Chand and Company	First Edition 2011
Reference Books				
1	Advanced Engineering Mathematics – Volume I	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	10th Edition 2015
2	Advanced Engineering Mathematics – Volume II	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	First Edition, 2014
3	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill,	First Edition 2017

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21MAL401.1		3	1									
21MAL401.2		3	1									
21MAL401.3	3	1										
21MAL401.4	3		1									
21MAL401.5		3	1									
21MAL401.6		3	1									

1: Low 2: Medium 3: High
