NEW HORIZON
COLLEGE OF ENGINEERING

SCHEME & SYLLABUS OF SECOND YEAR BE

AS PER THE NATIONAL EDUCATION POLICY 2020

ACADEMIC YEAR 2022–23

	CONTENTS	

VISION

To contribute to society by imparting quality education encompassing Technical, Managerial and Entrepreneurial skills

MISSION

- ➢ To create an environment wherein Faculty and Students engage in cutting edge research.
- ➢ To undertake Collaborative projects in order to develop a partnership between Institute and Industry
- ➢ To motivate Entrepreneurship and to imbibe Professional Ethics
- ➢ To promote participation in activities which help in holistic development of students.

Program Education objectives (PEOs)

PEO1	Graduates will be able contribute to the development of sustainable infrastructure
PEO2	Graduates as part of an organization or as Entrepreneurs, will continue to learn to hone-up evolving technologies
PEO3	Graduates will be professional Civil Engineers with ethical and societal responsibility
PEO4	Graduates will be able to work as a team in intra and interdisciplinary endeavors for development of new ideas and products for the betterment of society

Program Specific objectives (PSOs)

PSO1	Enhancing the employability skills by making the students find innovative solutions for challenges and problems in various domains of Civil Engineering
PSO2	Inculcating in students tech suaveness to deal with practical aspects of Civil Engineering

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To create an environment wherein Faculty and Students engage in cutting edge research.	2	3	2	3
To undertake Collaborative projects in order to develop a partnership between Institute and Industry.	2	2	2	3
To motivate Entrepreneurship and to imbibe Professional Ethics.	2	3	3	3
To promote participation in activities which help in holistic development of students.	2	3	2	2

Correlation: 3- High, 2-Medium, 1-Low

Program Outcomes (PO) with Graduate Attributes

	Graduate	Program Outcomes (POs)
1	Engineering Knowledge	**PO1:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex civil engineering problems.
2	Problem analysis	**PO2:** Identity, formulate, research literature and analyze complex civil engineering problems reaching substantiated conclusion using first principles of mathematics and engineering sciences.
3	Design/ Development of Solutions	**PO3:** The ability to analyse complexities of various civil engineering elements and design similar such elements.
4	Investigation of Problem	**PO4:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information related to civil engineering problems to provide valid conclusions.
5	Modern Tool usage	**PO5:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex civil engineering activities with an understanding of the limitations.
6	The Engineer and society	**PO6:** Apply reasoning based on the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the civil engineering professional practice.
7	Environment and sustainability	**PO7:** Understand the impact of the civil engineering solutions in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.
8	Ethics	**PO8:** Apply ethical principles, commit to professional ethics, own up responsibilities and abide by the norms of the civil engineering practice.
9	Individual & team work	**PO9:** As a civil engineer function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	**PO10:** Communicate effectively on complex civil engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	**PO11:** Demonstrate knowledge and understanding of the civil engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments as a civil engineer.
12	Lifelong learning	**PO12:** Recognize the need for, willingness to prepare for and to exhibit pro-activeness to engage in independent and lifelong learning in the broadest context of technological change with respect to civil engineering field

Mapping of POs to PEOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	3	2	3	3	2	2	2	2	3
PEO2	3	3	3	3	3	3	2	3	2	2	3	3
PEO3	3	3	3	3	2	3	2	3	2	3	2	3
PEO4	3	3	3	3	2	3	2	3	3	3	3	3

Scheme of III Semester B.E Program

Sl. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21CIV31A	Applied Mathematics-III	AS	3	0	0	0	3	4	50	50	100
2	21HSS321A	Life Skills for Engineers	HSS	1	0	1	0	2	3	50	50	100
3	21HSS331A	Entrepreneurship Development -2	HSS	1	0	0	0	1	1	50	50	100
4	21HSS341A	Constitution of India & Professional Ethics	HSS	1	0	0	0	1	1	50	50	100
5	21CIV35A	Strength of Materials	CIV	3	0	0	0	3	4	50	50	100
6	21CVL35A	Strength of Materials Lab	CIV	0	0	1	0	1	2	50	50	100
7	21CIV36A	Surveying	CIV	3	0	0	0	3	4	50	50	100
8	21CVL36A	Surveying Lab	CIV	0	0	1	0	1	2	50	50	100
9	21CIV37A	Fluid Mechanics and Hydraulic Machinery	CIV	3	0	0	0	3	4	50	50	100
10	21CVL37A	Fluid Mechanics and Hydraulic Machinery Lab	CIV	0	0	1	0	1	2	50	50	100
11	21CIV38A	Mini Project (Computer Aided Planning and Drawing)	CIV	0	1	1	0	2	4	50	50	100
		Total						**21**	**31**	**550**	**550**	**1100**
		*** The following courses are exclusively for Lateral Entry Students*										
1	21DMAT31A	Basic Applied Mathematics -I	AS	0	0	0	0	0	2	50	50	100

Scheme of IV Semester B.E Program

Sl. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21CIV41A	Applied Mathematics-IV	AS	3	0	0	0	3	4	50	50	100
2	21CIV422A	GIS and Remote Sensing	CIV	1	0	1	0	2	3	50	50	100
3	21HSS432A/ 21HSS433A	Aadalitha Kannada / Vyavaharikha Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS442A	Environmental Science	HSS/ CIV	1	0	0	0	1	2	50	50	100
5	21CIV45A	Construction Materials and Concrete Technology	CIV	3	0	0	0	3	4	50	50	100
6	21CVL45A	Concrete Technology Lab	CIV	0	0	1	0	1	2	50	50	100
7	21CIV46A	Theory of Structures	CIV	3	0	0	0	3	4	50	50	100
8	21CVL46A	Theory of structures Lab	CIV	0	0	1	0	1	2	50	50	100
9	21CIV47A	Geotechnical Engineering	CIV	3	0	0	0	3	4	50	50	100
10	21CVL47A	Geotechnical Engineering Lab	CIV	0	0	1	0	1	2	50	50	100
11	21CIV48A	Summer Internship - I	CIV	0	0	0	2	2	0	100	0	100
	Total							21	27	600	500	1100
*** The following courses are exclusively for Lateral Entry Students*												
1	21DAEC40A	Communicative English	HSS	0	0	0	0	0	2	50	50	100
2	21DMAT41A	Basic Applied Mathematics - II	AS	0	0	0	0	0	2	50	50	100

III
SEMESTER

Applied Mathematics-III

Course Code   :   21CIV31A   **Credits : 03**

L: T: P: S   : 3: 0: 0: 0   **CIE Marks : 50**

Exam Hours   :   03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Use appropriate numerical methods to solve algebraic equations and transcendental equations
CO2	Differentiate the physical problems numerically, evaluate a definite integral numerically and use appropriate numerical methods to solve boundary value problems in partial differential equations.
CO3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data and obtain the extremal of a functional.
CO4	Express the periodic functions as Fourier series expansion analytically and numerically.
CO5	Solve the continuous model problems using Fourier transforms.
CO6	Applying Fast Fourier transforms method, solve the discrete model problems.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	-	3	-	-	-	3	3	-	-
CO2	3	3	3	3	3	-	3	-	-	-	3	3	-	-
CO3	3	3	3	3	3	1	3	-	-	1	3	3	-	-
CO4	3	3	3	3	3	-	-	-	-	-	3	3	-	-
CO5	3	3	3	3	3	-	-	-	-	-	3	3	-	-
CO6	3	3	3	3	3	-	-	-	-	-	3	3	-	-

Module No	Contents of Module	Hrs	Cos
1.	**Numerical Methods-1:** Numerical solution of algebraic and transcendental equations: Regula-falsi method and Newton-Raphson method-Problems. Interpolation: Newton's forward and backward formulae for equal intervals, Newton divided difference, Lagrange's formula and Lagrange's inverse interpolation formula for unequal intervals (without proofs)-Problems. Case studies on Numerical Analysis.	9	CO1
2.	**Numerical Methods-2**: Numerical Differentiation: Derivatives of first order and second order using Newton's forward differences and Newton's backward differences. Numerical integration: Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Weddle's rule (without proofs)-Problems. **Applications:** Application of numerical integration to velocity of a particle and volume of solids. Numerical solution of one-dimensional wave equation, heat equation and two-dimensional Laplace's equation.	9	CO2
3.	**Statistical Methods and Calculus of Variation:** Fitting of the curves of the form $y = a + bx$, $y = a + bx + cx^2$, $y = ae^{bx}$, $y = ax^b$, and $y = ab^x$ by the method of least square-Problems. Correlation and Regression lines - Problems. Variation of a function and functional, variational problems, Euler's equation and Isoperimetric problems. **Applications:** Minimal surface of revolution, Hanging cable and Brachistochrone problem.	9	CO3
4.	**Fourier series:** Periodic function, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period $2l$, half range series-Problems. **Applications:** Practical harmonic analysis-Problems. Case studies on Fourier Series.	9	CO4
5.	**Fourier Transforms:** Infinite Fourier transforms, Fourier Sine and Cosine transforms, Inverse Fourier sine and cosine transforms. **Discrete Fourier Transform and Fast Fourier Transform:** Definition of N-Point DFT, problems for 4-points and inverse DFT for four points only. FFT algorithm to compute the Fourier transforms 4-point only.	9	CO5, CO6

TEXT BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.

REFERENCE BOOKS

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 15 Marks	Quizzes 10 Marks
Remember (L1)	5	5	-
Understand (L2)	5	5	-
Apply (L3)	10	5	10
Analyze (L4)	2.5	-	-
Evaluate (L5)	2.5	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	5
Evaluate (L5)	5
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	25	20	45	45
Analyze (L4)	2.5	5	7.5	7.5
Evaluate (L5)	2.5	5	7.5	7.5
Create (L6)	-	-	-	-
Total	**50**	**50**	**100**	**100**

Life Skills for Engineers

Course Code : 21HSS321A   **Credits : 02**

L: T: P: S   : 1: 0: 1: 0   **CIE Marks : 50**

Exam Hours   : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Relate "SMART GOALS" to personal and professional life
CO2	Articulate and communicate ideas and thoughts with clarity and focus
CO3	Develop critical and creative thinking skills for problem solving and decision making for leadership.
CO4	Analyze the importance of the concepts of personality development and grooming in corporate life
CO5	Determine personal and professional responsibility by using ownership task bar

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	-	-	-	-	-	-	-	3	3	3	3	3	-	-
CO2	-	-	-	-	-	3	3	3	3	1	3	3	-	-
CO3	-	-	-	-	-	3	3	3	3	3	2	3	-	-
CO4	-	-	-	-	-	-	3	3	3	3	2	3	-	-
CO5	-	-	-	-	-	3	2	3	3	2	3	3	-	-

Module No	Contents of Module	Hrs	Cos
1	Goal Setting: Importance of Goals: Achiever's goal - Creating SMART for personal and professional life, Right action at right time, career planning, overcoming fear and face uncertainty, Mind Mapping. Communication – Intellectual preparation/Idea generation.	6	CO1, CO2
2	You are the creator - Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career. Social responsibility. Communication – Organising thought flow.	6	CO2, CO5
3	Self-Awareness and Self-Management: Emotional Intelligence, know yourself- understanding personality, perception, techniques to understand self – Johari window and SWOT, reason for fall and opportunities to grow. Individual behaviour, attitude towards change and work in industry, being proactive and positive. Interpersonal skills - Knowing others, working well with others. Communication – Structured articulation	9	CO2, CO5
4	Leadership, meaning, self- motivation, coming out of comfort zone, mental preparation - accepting failure and resilience, decision making, thinking skills – critical and creative, six thinking hats, watchfulness - proactive risk management, problem solving mind set. Communication – Tips for Jam session, GD and Presentation	9	CO2, CO3
5	Personality Development and Grooming: - Expectations from the industry, building personal presence, corporate grooming, corporate etiquettes, Personal branding and image management. Communication – Mock GD sessions	6	CO2, CO4

REFERENCE BOOKS

1. The 7 – Habits of Highly Effective People, Stephen R Covey, Neha Publishers.

2. Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998.

3. Emotional Intelligence, Daniel Coleman, Bantam Book, 2006.

4. How to win friends and influence people   Dale Carnegie

5. BHAGAVDGITA for college students Sandeepa Guntreddy

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 10 Marks	Assignments 15 Marks	Self Study 15 Marks	Peer Evaluation 10 Marks
Remember (L1)	-	-	-	-
Understand (L2)	-	-	-	-
Apply (L3)	5	5	-	5
Analyze (L4)	-	-	5	-
Evaluate (L5)	-	-	-	
Create (L6)	5	10	10	5

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	5
Understand (L2)	10
Apply (L3)	10
Analyze (L4)	10
Evaluate (L5)	5
Create (L6)	10

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	-	5	5	**5**
Understand (L2)	-	10	10	**10**
Apply (L3)	15	10	25	**25**
Analyze (L4)	5	10	15	**15**
Evaluate (L5)	-	5	5	**5**
Create (L6)	30	10	40	**40**
Total	**50**	**50**	**100**	**100**

Entrepreneurship Development -II

Course Code   :   21HSS331A   **Credits : 01**

L: T: P: S   : 1: 0: 0: 0   **CIE Marks : 50**

Exam Hours   :   02 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Identify the problem and understand the concept of blue ocean strategy
CO2	Create Minimum viable product
CO3	Analyze customer segment, Niche and early adopters
CO4	Interpret the cost revenue Structure and feasibility of the venture
CO5	Analyze and develop financial model for venture.
CO6	Create sustainable venture through step wise process (problem solution fit, MVP and financial model).

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	0	3	0	0	0	3	1	2	0	0	0	1	0	0
CO2	0	3	0	0	0	3	1	2	0	0	0	0	0	0
CO3	0	3	0	0	0	3	1	2	0	0	0	0	0	0
CO4	0	3	0	3	0	3	1	2	0	0	0	3	0	0
CO5	0	3	0	3	0	3	1	2	0	0	0	3	0	0
CO6	0	3	0	3	0	3	1	2	0	0	0	3	0	0

Module No	Contents of Module	Hrs	Cos
1	**Refining Problem and solution** Identify and refining the problem, Brainstorming Solutions, Problem-Solution Fit	3	CO1
2	**Blue ocean strategy**– Meaning, Concept, Implementation	3	CO2
3	**Minimum Viable Product-**Meaning of MVP, ways to Build an MVP, Present Your MVP	3	CO3
4	**Business Model** – Cost Revenues and Pricing- concept, Business model-Lean Canvas – components, implementation	3	CO4
5	**Financing and Financial Model** - Bootstrapping meaning and concept and Initial Financing, Financial Model- concept and implementation	3	CO5, CO6

TEXT BOOKS

1. Kent ro water purifier business idea case study | Business

   [kent ro water purifier business idea case study | Business Idea from Children - YouTube](#)

2. Red Bus Start up story [Phanindra Sama: The Red Bus journey - YouTube](#)

REFERENCE BOOKS

1. Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant – Illustrated, 10 February 2015,by Kim (Author)

2. Financial Modeling, fourth edition (The MIT Press) , Illustrated, 18 April 2014,by Simon Benninga

3. Positioning: The Battle for Your Mind, by Al Ries,Jack Trout

CIE- Continuous Internal Evaluation (50 Marks)

Assessment format	Weightage to be awarded	Comments
Quiz	20 Marks	To be administered as a part of CI
Venture Milestone	30 Marks	Student should create VM 1, VM2, VM3

- VM1- Presentation- Forming team, Identifying problem, identifying solution (Module 1& 2)

- VM2- Presentation- Validate solution Identify customer segment, and early adopter, Create value proposition canvas, (Module-3 & 4)

- VM3- Presentation -Create business plan using lean canvas (Module-5**)**

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	10
Analyze (L4)	5
Evaluate (L5)	5
Create (L6)	10

Constitution of India & Professional Ethics

Course Code : 21HSS341A   **Credits : 01**

L: T: P: S   : 1: 0: 0: 0   **CIE Marks : 50**

Exam Hours   : 02 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Gain knowledge of Indian Constitution and be able to solve the legal and societal issues.
CO2	Understand the powers and functions of the Union, State and Local Governments in detail.
CO3	Understand Electoral Process, Emergency provisions and Amendment procedure.
CO4	Acquire the knowledge of their Ethical Duties, Responsibilities and the decision making Ability.
CO5	Understand the cybercrimes and cyber laws for cyber safety measures.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	-	-	-	-	-	1	-	3	1	-	-	3	-	-
CO2	-	-	-	-	-	1	-	3	1	-	-	3	-	-
CO3	-	-	-	-	-	1	-	3	1	-	-	3	-	-
CO4	-	-	-	-	-	1	-	3	1	-	-	3	-	-
CO5	-	-	-	-	-	1	-	3	1	-	-	3	-	-

Module No	Contents of Module	Hrs	Cos
1	**INTRODUCTION TO CONSTITUTION OF INDIA** Introduction to Constitution of India. The making and salient features of the constitution. The necessity of the constitution. The Role of the Constituent Assembly-Preamble to Indian constitution. Fundamental rights and its restrictions and Limitations. Decided case studies .Directive principles of state policy. Fundamental Duties and its Scope and significance in Nation building.	3	CO1
2	**UNION EXECUTIVE and STATE EXECUTIVE** Union Executive - President, prime minister, parliament and supreme court of India. Judicial activism and judicial review. Important parliamentary terminology. Center- state relations. Attorney General of India, Comptroller and Auditor General of India. State Executive- Governor, Chief Minister, State Legislature. High Court and Subordinate Court. Advocate General of the State .Controller and Auditor General of State. Special Provisions (Articles 370.371,371J) for some States.	3	CO2
3	**AMENDMENTS AND PROCEDURE, ELECTIONS AND EMERGENCY PROVISIONS:** Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments – Types and Important Constitutional Amendments.Amendments-42,44,61,86,73,74,91,95,100,101,118. Emergency Provisions, types of Emergencies and its effects. **Special provisions :** Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.	3	CO3
4	**ENGINEERING ETHICS:** Scope & aim of engineering ethics. Responsibility of engineers, Impediments to responsibility. Clash of ethics. Risk, safety and liability of Engineers. Trust and reliability in Engineering. IPR (Intellectual Property Right).Corporate Ethics.	3	CO4
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 and causes for Cyber Crimes, Cyber Crimes land mark judgements in India and the information Technology Act 2000, Cybercrimes and enforcement agencies.	3	CO5

TEXT BOOKS

1. Durga Das Basu: "Introduction to the constitution"19th/20th Edn., or 2008,Lexis Nexis; Twentieth edition (2011)

2. Shubham Singles, Charles E.Haries : Constitution of India and Professional Ethics. Latest Edition-2018, Cengage Learning India Private Limited (2019)

3. Cyber Security and Cyber Laws Alfred Basta and et al Cengage Learning India 2018 Reference Books

REFERENCE BOOKS

1. M.Govindarajan, Natarajan, V.S.Senthilkumar, Engineering Ethics", Prentice Hall India Learning Private Limited (2013)

2. M.V.Pylee,"An Introduction to Constitution of India", Vikas Publishing 2002.

3. Cyber Security and Cyber Laws Alfred Basta and et al Cengage Learning India 2018 Reference Books

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 25 Marks
Remember (L1)	10	10
Understand (L2)	10	10
Apply (L3)	5	5
Analyze (L4)	-	-
Evaluate (L5)	-	-
Create (L6)	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	20
Understand (L2)	20
Apply (L3)	10
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	20	20	40	40
Understand (L2)	20	20	40	40
Apply (L3)	10	10	20	20
Analyze (L4)	-	-	-	-
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

STRENGTH OF MATERIALS

Course Code   :   21CIV35A   **Credits : 03**

L: T: P: S   :   3:0:0:0   **CIE Marks : 50**

Exam Hours   :   3 Hours   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Develop the shear force and bending moment diagrams for the structural elements.
CO2	Analyze the structural elements for induced shear and bending stresses.
CO3	Evaluate the behavior of torsional members.
CO4	Evaluate the behavior of columns and struts.
CO5	Examine the principal stress and strain failure mechanisms in materials.
CO6	Apply strain energy concepts to beams frames and truss problems

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	2	-	2	-	-	-	-	-	-	3	3	3
CO3	3	3	2	-	2	-	-	-	-	1	-	3	3	3
CO4	3	3	2	2	2	-	-	-	-	1	-	3	3	3
CO5	3	3	2	2	2	-	-	-	-	1	-	3	3	3
CO6	3	3	2	2	2	-	-	-	-	1	-	3	3	3

Module No	Contents of Module	Hrs	Cos
1	**STRESS AND STRAIN**: Introduction, Properties of Materials, Stress, Strain, Hook's law, Poisson's Ratio, Stress – Strain Diagram for mild steel and non-ferrous materials, ELASTIC, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants, Problems. General two dimensional stress system, Principal stresses and principal planes **THEORIES OF FAILURE**: Introduction, maximum principal stress theory (Rankine's theory), Maximum principle strain theory (St.Venant's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh), Distrotion strain energy theory (Von Miske's theory).	08	CO1
2	**BENDING MOMENT AND SHEAR FORCE**: Introduction, Types of beams, loadings and supports, Shearing force in beam, Bending moment, Sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for simply supported beams, cantilever beams, and overhanging beam considering with point loads, UDL, UVL, Couple and their combinations Problems.	08	CO2
3	**BENDING AND SHEAR STRESSES IN BEAMS**: Bending stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of pure bending equation, modulus of rupture, section modulus and flexural rigidity. Shear Stresses in Beams, Expression for transverse shear stress in rectangular beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections Problems.	08	CO3
4	**TORSIONOFCIRCULARSHAFTS**: Introduction–Pure torsion-torsion equation of circular shafts, Strength and stiffness, Torsional rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections. **COLUMNS AND STRUTS:** Introduction–Short and long columns, Euler's theory on columns, Effective length slenderness ration, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory.	08	CO4, CO5
5	**ENERGY CONCEPT AND THEOREMS** Strain energy and complimentary strain energy, Strain energy due to axial load, bending moment and shear force, Principle of virtual work. Deflection of determinate beams and trusses using total strain energy, Castigliano's theorems and their applications in the analysis of beams and Application of Unit load methods to trusses.	08	CO6

TEXT BOOKS

1) Bansal, R.K., "Strength of Materials", Laxmi Publications, (ISBN: 9788131808146), 6th Edition, 2015.

2) Ramamrutham. S., "Strength of Materials", New Delhi Dhanpat Rai and Sons, (ISBN: 978-93-84378-26-4), 2015

REFERENCE BOOKS

1) Timoshenko and Young, "Elements of Strength of Materials", Affiliated East-West Press, 5th Edition, 2010

2) Chakarborty, "Strength of Materials", SK Kataria and Sons, (ISBN: 978-93-5014-375-9), 2nd Edition, 2001.

3) Sadhu Singh, "Strengths of Materials", Khanna Publishers, New Delhi, (ISBN: 978-81-7409-048-7),11th Edition, 2014.

4) Rajput R.K., "Strengths of Materials" ,S.Chand Publishers, (ISBN: 9789385401367), 6th Edition, 2015.

5) Punmia .B.C, Ashok Jain, Arun Jain, "Mechanics of Materials", Lakshmi Publications, New Delhi (ISBN:9788131806463) 3rd Edition: Revised, 2016.

6) B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd.,(ISBN978-1439854198)3rd Edition (2010).

7) Ferdinand P.Beer, E.Russell Johnston and Jr.John T. De Wolf "Mechanics of Materials", Tata Mc Graw-Hill, Third Edition, SI Units

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 15 Marks	Quizzes 10 Marks
Remember (L1)	-	0	0
Understand (L2)	5	3	2
Apply (L3)	10	6	4
Analyze (L4)	10	6	4
Evaluate (L5)	-	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	5
Understand (L2)	5
Apply (L3)	20
Analyze (L4)	20
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	-	5	5	**5**
Understand (L2)	10	5	15	**15**
Apply (L3)	20	20	40	**40**
Analyze (L4)	20	20	40	**40**
Evaluate (L5)	-	-	-	**-**
Create (L6)	-	-	-	**-**
Total	**50**	**50**	**100**	**100**

STRENGTH OF MATERIALS LAB

Course Code   :   21CVL35A   **Credits : 1**

L: T: P: S   :   0:0:1:0   **CIE Marks : 50**

Exam Hours   :   3 Hours   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Evaluate tensile, compressive, impact, shear and torsional strength of structural steel.
CO2	Analyze the compressive and bending strength of timber.
CO3	Interpret the hardness of ferrous and non ferrous metals.
CO4	Evaluate the strength of brick/block/tiles and specific gravity of fine and coarse aggregate

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO2	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO3	3	-	-	-	2	-	-	-	3	2	-	2	3	3
CO4	3	-	-	-	2	-	-	-	3	2	-	2	3	3

Experiment no.	Experiment Name	Hrs	CO's
1	Tension Test on Mild steel	2	CO1
2	Tension Test on HYSD Bars	2	CO1
3	Compression test of Mild steel/ Cast iron	2	CO1
4	Compression test of Wood (parallel and perpendicular to grains)	2	CO2
5	Impact Test on Mild Steel (Charpy & Izod)	2	CO1
6	Shear test on Mild Steel/HYSD Bars	2	CO1
7	Hardness tests on ferrous and non-ferrous metals- Brinell's and Rockwell's	2	CO3
8	Bending test on Wood under single point loading	2	CO2
9	Test on Bricks/Blocks and Tiles, Sieve analysis and specific gravity for fine and coarse aggregate	2	CO4
10	Torsion Test on Mild steel Circular sections	2	CO1

TEXT BOOKS

1. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd.,(ISBN978-1439854198)3rd Edition(2010)

2. Punmia .B.C, Ashok Jain, Arun Jain, "Mechanics of Materials", Lakshmi Publications, NewDelhi,(ISBN:9788131806463) Edition: Revised, 2016

3. Bansal, R.K., "Strength of Materials", Laxmi Publications, (ISBN: 9788131808146), 6th Edition,2015.

REFERENCE BOOKS

1. Timoshenko andYoung," Elements of Strength ofMaterials",AffiliatedEast-WestPress, 5th Edition,2010

2. Chakarborty, "Strength of Materials", S K Kataria and Sons, (ISBN:978-93-5014-375-9), 2nd Edition, 2001.

3. BhavikattiS .S.," Strength of Materials",Vikas Publishing House Pvt. Ltd., New Delhi, (ISBN:9789325971578) , 4th Edition, 2013.

4. Ramamrutham. S., "Strength of Materials", New Delhi Dhanpat Rai and Sons, (ISBN: 978-93-84378-26-4), 2015

5. Sadhu Singh,"Strengths of Materials",Khanna Publishers, New Delhi, (ISBN:978-81-7409048-7) , 11thEdition,2014

6. Rajput R.K., "Strengths of Materials", S. Chand Publishers,(ISBN: 9789385401367), 6 th Edition, 2015.

7. Relevent IS Codes

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Practical
Remember (L1)	0
Understand (L2)	4
Apply (L3)	16
Analyze (L4)	16
Evaluate (L5)	14
Create (L6)	0

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	0
Understand (L2)	4
Apply (L3)	16
Analyze (L4)	16
Evaluate (L5)	14
Create (L6)	0

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	0	0	0	**0**
Understand (L2)	4	4	8	**8**
Apply (L3)	16	16	32	**32**
Analyze (L4)	16	16	32	**32**
Evaluate (L5)	14	14	28	**28**
Create (L6)	0	0	28	**28**
Total	**50**	**50**	**100**	**100**

SURVEYING

Course Code : 21CIV36A

Credits : 03

L: T: P: S   : 3:0:0:0

CIE Marks : 50

Exam Hours : 03 Hours

SEE Marks : 50

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Explain principles of surveying, Classification and linear and angular measurements of survey lines
CO2	Compute the reduction of levels and prepare of contour maps.
CO3	Use theodolite for various applications in construction field and trigonometrically surveying.
CO4	Calculate earthwork volume and reservoir capacity
CO5	Understand the concepts of setting out the curves by linear and angular methods. Explain working principle and use modern surveying instruments
CO6	Recognize the basics of Photogrammetric and GIS.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	-	1	-	-	-	-	-	-	-	2	-	3
CO3	3	3	-	1	-	-	-	-	-	-	-	2	2	3
CO4	3	3	1	2	2	-	-	-	-	-	-	3	2	3
CO5	3	3	-	-	3	-	-	-	-	-	-	3	2	3
CO6	3	3	2	2	2	1	1	1	3	3	-	3	2	3

Module No	Contents of Module	Hrs	Cos
1	**INTRODUCTION:** 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. Classification of maps, map scale, conventional symbols, topographic maps, map layout, Survey of India Map numbering systems. Types of Chain,. Measuring tape and types. Measurement using tapes, taping on level ground and sloping ground. Errors and corrections in tape measurements. **MEASUREMENT OF DIRECTIONS AND ANGLES:** Compass survey: Basic definitions; meridians, bearings. Prismatic and surveyor's compasses, temporary adjustments, dip and declination. Bearing systems	08	CO1
2	**LEVELLING:** Basic terms and definitions, Methods of levelling, Dumpy level, auto level, digital and laser levels. Curvature and refraction corrections. Booking and reduction of levels. Differential levelling, profile levelling, fly levelling, check levelling, reciprocal levelling, Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours	08	CO2
3	**THEODOLITE SURVEYING:** Temporary adjustments of transit theodolite, measurement of horizontal and vertical angles. Trigonometric levelling (heights and distances-single plane and double plane method when the base is accessible and inaccessible. **MEASUREMENT OF VOLUMES-**Trapezoidal and Prismoidal formula. Contouring Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.	08	CO3 &CO4
4	**CURVES** – Necessity – Types, Simple curves, Elements, Setting out curves by Rankines deflection angle method. **Compound curves** Elements Design of compound curves Setting out of compound curve. **ADVANCED SURVEYING INSTRUMENT:** Introduction to Total station, advantages and disadvantages, features, setting-up of total station GPS: Concepts, definitions, segments of GPS, equipments, methods, differential GPS, errors, applications. introduction to LIDAR	08	CO5
5	**AERIAL PHOTOGRAMMETRY AND REMOTE SENSING**: Uses, Aerial photographs, Definitions, Scale of vertical and tilted photograph (simple problems), Ground Co- ordinates (simple problems), Relief Displacements (Derivation), Ground control. Procedure of aerial survey overlaps and mosaics, Stereoscope Parallax (Derivation). Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS).	08	CO6

TEXT BOOKS

1. 'Surveying' Vol1, Vol 2 and Vol 3 - B.C. Punmia, Er. Ashok Kr. Jain, Dr. Arun Kumar Jain, Laxmi Publications, New Delhi. Edition: 16th (2016), ISBN: 8170088836.

2. 'Higher Surveying' A.M. Chandra New age international (P) Ltd, 3rd Edition (2015), ISBN 978-81-224-3812-3

3. Elements of Photogrammetry – Paul R Wolf, McGraw International, 4th Edition, 2014

REFERENCE BOOKS

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.

2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India, 2nd Edition, ISBN978-81-203-4198.

3. Surveying, Arther Bannister et al., Pearson Education, India, 7th Edition (2006), ISBN 9788131700662

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (10)	Quizzes (05)	Co-curricular activities (10)
Remember (L1)	5	-	-	-
Understand (L2)	5	-	-	-
Apply (L3)	10	5	2.5	5
Analyze (L4)	5	5	2.5	5
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	10
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	5	10	15	15
Understand (L2)	5	10	15	15
Apply (L3)	22.5	20	42.5	42.5
Analyze (L4)	17.5	10	27.5	27.5
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

SURVEYING LAB

Course Code : 21CVL36A   **Credits : 01**

L: T: P: S   : 0: 0: 1: 0   **CIE Marks : 50**

Exam Hours : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Determine the distance using chain/tape & directions using compass. Also compute area by plane table method.
CO2	Compute the difference in elevation between the points
CO3	Determine horizontal and vertical angles using theodolite
CO4	Setting out the curves by angular method and Knowledge of Total station and GPS

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	-	1	-	-	-	-	-	-	-	2	-	3
CO3	3	3	-	1	-	-	-	-	-	-	-	2	2	3
CO4	3	3	1	2	2	-	-	-	-	-	-	3	2	3

Course Syllabus

Experiment no.	Experiment Name	Hrs	CO's
1	To measure distance between two points using direct ranging and set out perpendiculars at various points on given line using cross staff, optical square and tape.	2	CO1
2	To determine the distance between two inaccessible points using chain/tape & compass.	2	CO1
3	To calculate the area of a plot by plane table using radiation and intersection method.	2	CO1
4	To determine difference in elevation between two points using both HI and Rise & Fall methods.	2	CO2
5	To conduct leveling operations for road work and determine the depth of cut and depth of filling for a given formation level.	2	CO2
6	To measurement of horizontal angles by repetition and reiteration method using theodolite.	2	CO2
7	To determine the elevation of an object using single plane method when base is accessible and inaccessible.	2	CO2
8	To determine the distance and difference in elevation between two inaccessible points using double plane method.	2	CO3
9	Setting out compound curve with angular methods with using theodolite only.	2	CO4
10	Introduction to Total Stations and how to operate, Compute the area by using Total Station, Demonstration of GPS.	2	CO4

TEXT BOOKS

2. Surveying' Vo11, Vol 2 and Vol 3 - B.C. Punmia, Er. Ashok Kr. Jain, Dr. Arun Kumar Jain, Laxmi Publications, New Delhi. Edition: 16th (2016), ISBN: 8170088836.

2. 'Higher Surveying' A.M. Chandra New age international (P) Ltd, 3rd Edition (2015), ISBN 978-81-224-3812-3

3. Elements of Photogrammetry – Paul R Wolf, McGraw International, 4th Edition, 2014

REFERENCE BOOKS

4. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.

5. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India, 2nd Edition, ISBN978-81-203-4198.

6. Surveying, Arther Bannister et al., Pearson Education, India, 7th Edition (2006), ISBN 9788131700662

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Marks Distribution
Remember (L1)	10
Understand (L2)	10
Apply (L3)	25
Analyze (L4)	05
Evaluate (L5)	-
Create (L6)	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	25
Analyze (L4)	05
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	25	25	50	50
Analyze (L4)	5	5	10	10
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Code   :   21CIV37A   **Credits : 03**

L: T: P: S   :   3:0:0:0   **CIE Marks : 50**

Exam Hours   :   3 Hours   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand the properties of fluids and fluid statics
CO2	Apply the concepts of fluid dynamics for measurement of flows and solve engineering problems
CO3	Understand the concepts of pipe flow
CO4	Understand the concepts of open channel flow
CO5	Apply knowledge of the basics of impulse momentum equation
CO6	Understand the working principle and Design of turbines, pumps and fluid systems

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	3	3
CO2	3	3	3	2	1	-	-	-	-	-	-	3	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	3	3	3
CO4	3	3	-	-	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	-	-	-	-	-	-	-	-	3	3	3

Module No	Contents of Module	Hrs	Cos
1	**Introduction**-Definition of fluid. Fluid properties, Mass, Density, Specific volume, Specific weight, Specific gravity, Definition, Viscosity, Newtons law of viscosity, Surface tension, Capillary rise. Hydrostatics and Total pressure and centre of pressure.	08	CO1
2	**Dynamics of Fluid Flow-**Concept of Inertia force and other forces causing Motion, Derivation of Euler's & Bernoulli's Equation (Both for Ideal Fluids). **Measurement of velocity and discharge**- Pitot tubes, venturimeter and orifice meters, venturiflume, orifices, notches (Rectangular and V-notches) and weirs (Sharp crested Weirs).	08	CO2
3	**Flow in pipes**- Darcy-Weisbach equation for flow through circular pipe - Friction factor -.Minor losses - pipes in series and parallel – **Flow in open channels:** Definition of channel, difference between pipe and open channel flow, classification, types of flows, geometric properties of open channels, Uniform flow in open channels, Chezy's& Manning's formula.	08	CO3, CO4
4	**Impact of jet on flat vanes:** Introduction to Impulse – momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a Jet on a moving target, Derivations. **Impact of jet on curved vanes:** Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency, Problems on force exerted by a Jet on a series of curved vanes.	08	CO5
5	**Turbines:** Definition, classification, Pelton turbine, theory, equation for work done & efficiency, problems, Kaplan turbine, Introduction, Components, Working. **Pumps:** Definition, classification general principle, Centrifugal pumps- priming, work done, problem.	08	CO6

TEXT BOOKS

1) P.N.Modi &S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374),15th edition.

2. R.K.Bansal, "A text book of Fluid Mechanics& Hydraulic Machines", Laxmi Publications, New Delhi,(ISBN-13: 978-8131808153), 9 th edition.

3. K.L.Kumar, S, "Fluid Mechanics". Chand & Company Ltd, New Delhi,ISBN: 8121901006, 9788121901000),8th edition.

REFERENCE BOOKS

1. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill publications.

2. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies.

3. Fundamentals of Fluid Mechanics- Bruce R Munson & Donald F Young, John Wiley & Sons, Inc.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 15 Marks	Quizzes 10 Marks
Remember (L1)	5	5	-
Understand (L2)	5	-	5
Apply (L3)	10	5	5
Analyze (L4)	5	5	-
Evaluate (L5)	-	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	5
Understand (L2)	5
Apply (L3)	25
Analyze (L4)	15
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	5	15	15
Understand (L2)	10	5	15	15
Apply (L3)	20	25	45	45
Analyze (L4)	10	15	25	25
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Code : 21CVL37A   Credits : 1

L: T: P: S   : 0:0:1:0   **CIE Marks : 50**

Exam Hours : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Compute the flow of water passing through a pipe, channel and a tank.
CO2	Analyze the major and minor losses in pipe line
CO3	Understand the concepts of impulse momentum and the working of fluid systems
CO4	Analyze the working of turbines and pumps

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	3	-	-	3	3
CO2	3	3	3	3	-	-	-	-	-	3	-	-	3	3
CO3	3	3	3	3	-	-	-	-	-	3	-	-	3	3
CO4	3	3	3	3	-	-	-	-	-	3	-	-	3	3

Module No	Contents of Module	Hrs	Cos
1	To find the coefficient of discharge of venturimeter	2	CO1
2	Verification of Bernoullis equation	2	CO1
3	To determine the coefficient of friction of pipes of different diameters	2	CO2
4	To determine the minor losses in a pipe line	2	CO2
5	To determine the hydraulic coefficients of orifices	2	CO1
6	To find the coefficient of discharge of rectangular and trapezoidal notch	2	CO1
7	To determine the coefficient of impact of jet on flat vanes and inclined vanes	2	CO3
8	To study the efficiency of pelton turbines.	2	CO4
9	To study the efficiency of Kaplan turbines.	2	CO4
10	To study the efficiency of Centrifugal pump	2	CO4

TEXT BOOKS

1) P.N.Modi&S.M.Seth , "Hydraulics & Fluid Mechanics", Standard Book House, New Delhi, (ISBN: 8190089374),15th edition.

2) R.K.Bansal, "A text book of Fluid Mechanics", Laxmi Publications, New Delhi,(ISBN-13: 978- 8131808153), 9th edition.

REFERENCE BOOKS

1. Fluid Mechanics- Victor L Streeter & E. Benjamin Wylie, Mc-Graw Hill Publications.

2. Fluid Mechanics- Frank M White, Sixth Edition, the Mc-Graw Hill Companies.

3. Fundamentals of Fluid Mechanics- Bruce R Munson & Donald F Young, John Wiley & sons, Inc.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests
Remember (L1)	10
Understand (L2)	20
Apply (L3)	20
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	20
Apply (L3)	20
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	**20**
Understand (L2)	20	20	40	**40**
Apply (L3)	20	20	40	**40**
Analyze (L4)	-	-	-	**-**
Evaluate (L5)	-	-	-	**-**
Create (L6)	-	-	-	**-**
Total	**50**	**50**	**100**	**100**

MINI PROJECT (Computer Aided Planning & Drawing)

Course Code : 21CIV38A   **Credits : 02**

L: T: P: S : 0:1:1:0   **CIE Marks : 50**

Exam Hours : 3 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Use basic tools of AUTOCAD and functional requirements of building planning
CO2	Understand the basic requirements and bye laws for building planning and to prepare interconnectivity diagram.
CO3	Design and Prepare functional drawings of buildings as per specifications
CO4	Prepare service layouts and to develop drafting skills for buildings

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	3	-	3	3	-
CO2	3	-	-	-	-	3	2	2	-	3	-	3	-	3
CO3	3	3	2	3	3	3	2	2	-	3	-	3	3	3
CO4	3	3	2	3	3	3	2	2	-	3	-	3	3	3

Experiment No.	Content of Exercise	Hrs	Cos
PART-A			
1	**Basics Of AutoCAD:** Drafting and Modification Tools	**8**	**CO1**
2	F**unctional Requirements Building Planning:** Principles of planning, Planning regulations and building bye-laws, factors affecting site selection, Functional planning of residential and public buildings, design aspects for different public buildings.	**4**	**CO2**
3	Recommendations of NBC. Guidelines for buildingdrawings, Scales, definition of terms used in building, Specification for residential and public building, calculation of carpet area, plinth area and floor area ratio.	**4**	**CO2, CO3**
4	Generating inter connectivity diagrams (bubble diagram), development of line diagram for public buildings (Primary health centre, school building, College canteen, Office building	**8**	**CO2**
5	Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings.	**8**	**CO4**
6	Preparation of water supply, sanitary and electrical layouts in residential buildings.	**8**	**CO4**
PART- B MINI PROJECT			

Student should develop mini project on the topics mentioned below or similar applications usingabove concepts.

Preparing a set of construction drawings considering byelaws and regulations, centre line drawing, schedule of openings, electrical drawing, water supply and sanitary detailing, Services like staircases, lifts, HVAC, acoustics, fire fighting etc. with respect to:

> a. Residential Building.
> b. Commercial Building.
> c. Public Building.

Conduct of Practical Examination:

All laboratory experiments are to be included for practical examination.

Experiment distribution: Students are allowed to pick one experiment from the lot and are given equal opportunity.

Change of experiment is allowed only once and marks allotted for procedure part to be made zero.

Mini Project report to be submitted at the time of examination which consists of all the drawings related to the assigned problem.

 Marks Allocations:

For Part-A :(Lab Performance & Report) + (Execution + Viva-Voce):25+25=50 Marks.

For Part-B: Report + Execution + Viva: 20+20+10 =50 Marks.

TEXT BOOKS

1. **"Building Drawing"**, Shah M.H and Kale C.M, Tata Mc Graw Hill Publishing co. Ltd.,New Delhi.4th Edition, 2007, ISBN 0074638769

2. **"Building Planning Designing and scheduling",** Gurucharan Singh,Standard Publishers & distributors, New Delhi.2006, ISBN 8180140059, 978818014005

3. **"Building Planning and Drawing"** Dr. H.J Shah**,** Charotar Publishing house PVT Ltd**,(2007),** ISBN 9788185594743, 8185594740

REFERENCE BOOKS

1. **National Building Code,** BIS, New Delhi.

2. Civil Engineering Drawing and House Planning, B.P Verma

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests
Remember	5
Understand	10
Apply	10
Analyze	10
Evaluate	5
Create	10

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	10
Analyze	10
Evaluate	5
Create	10

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember	5	5	10	10
Understand	10	10	20	20
Apply	10	10	20	20
Analyze	10	10	20	20
Evaluate	5	5	10	10
Create	10	10	20	20
Total	50	50	100	100

BASIC APPLIED MATHEMATICS-I

Course Code : **21DMAT31A**   **Credits : 00**

L: T: P: S   : **0: 0: 0: 0**   **CIE Marks : 50**

Exam Hours : **02 Hrs**   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Know the principles of engineering mathematics through calculus
CO2	Determine the power series expansion of a function
CO3	Find the definite integrals with standard limits and also develop the ability to solve different types of differential equations
CO4	Apply ideas from linear algebra in solving systems of linear equations and determine the Eigen values and Eigen vectors of a matrix

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	-	-

Module No	Contents of Module	Hrs	Cos
1	**Differential Calculus:** Polar Curves-Problems on angle between the radius vector and tangent, Angle between two curves-Problems, Pedal equation for polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.	5	**CO1, CO2**
2	**Partial differentiation:** Definition and Simple problems, Euler's theorem for Homogeneous function (NO Derivation and NO extended theorem)-Problems, Jacobians of order two - definition and problems.	5	**CO1**
3	**Integral Calculus and Differential Equations:** Problems on evaluation of $\sin^n x$ and $\cos^n x$ integrals with standard limits (0 to $\pi/2$). Solution of first order and first-degree differential equations-Variable separable, Linear and Exact differential equations.	5	**CO3**
4	**Linear Algebra-1:** Problems on rank of a matrix by elementary transformations, Solution of system of linear equations by Gauss elimination method-Problems.	5	**CO4**
5	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen Vectors of a square matrix-Problems.	5	**CO4**

TEXT BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491

REFERENCE BOOKS

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Quiz (10)
Remember (L1)	5	5	-
Understand (L2)	5	5	-
Apply (L3)	10	5	10
Analyze (L4)	2.5	-	-
Evaluate (L5)	2.5	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	5
Evaluate (L5)	5
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	25	20	45	45
Analyze (L4)	2.5	5	7.5	7.5
Evaluate (L5)	2.5	5	7.5	7.5
Create (L6)	-	-	-	-
Total	50	50	100	100

IV
SEMESTER

Applied Mathematics-IV

Course Code : 21CIV41A   **Credits : 03**

L: T: P: S   : 3: 0: 0: 0   **CIE Marks : 50**

Exam Hours : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Solve initial value problems using appropriate numerical methods
CO2	Learn the concepts of Complex variables and transformation for solving Engineering Problems
CO3	Know the concepts of complex integration and its applications in the stability analysis of engineering problems
CO4	Gain ability to use probability distributions to analyze and solve real time problems
CO5	Apply the concept of sampling distribution to solve engineering problems
CO6	Use the concepts to analyze the data to make decision about the hypothesis

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	3	3	3	3	3	-	1	-	-	-	3	3	-	-
CO2	-	3	-	-	3	-	-	-	-	-	3	3	-	-
CO3	-	3	-	-	3	-	-	-	-	-	3	3	-	-
CO4	3	3	3	3	3	2	-	-	3	3	3	3	-	-
CO5	3	3	3	3	3	-	-	-	-	3	3	3	-	-
CO6	3	3	3	3	3	-	-	-	-	3	3	3	-	-

Module No	Contents of Module	Hrs	Cos
1	**Numerical Methods:** Numerical solution of ordinary differential equations of first order and of first degree: Taylor's series method, Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor and corrector methods-Problems. Numerical Solutions of second order ordinary differential equations by Runge-Kutta method of fourth-order-Problems. Case studies on Numerical Analysis.	9	CO1
2	**Complex Variables**: Functions of complex variables, Analytical functions, Cauchy-Riemann Equations in Cartesian and Polar forms, Harmonic functions and Construction of analytic functions-Problems using Milne-Thompson's method. **Applications:** Flow Problems-Velocity potential, Stream functions and complex potential functions.	9	CO2
3	**Conformal Transformations and Complex Integrations:** $w = z^2$, and $w = e^Z$. Cauchy's Theorem (with proof), Generalized Cauchy's integral formula, Singularities, Poles and Residues, Residue theorem (without proof)-Problems.	9	CO3
4	**Probability distributions:** Random variables (discrete and continuous), probability density functions, moment generating function. Discrete Probability distributions: Binomial and Poisson Distributions-Problems. Continuous Probability distributions: Exponential and Normal Distributions-Problems. Case Studies on Distributions.	9	CO4
5	**Sampling Theory:** Sampling, Sampling distributions, standard error, test of hypothesis of large samples for means and proportions, Inferences for variance and proportion. Central limit theorem (without proof), confidence limits for means, Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples. Case Studies on sampling theory and significant measures of scores.	9	CO5, CO6

TEXT BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.

REFERENCE BOOKS

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 15 Marks	Quizzes 10 Marks
Remember (L1)	5	5	-
Understand (L2)	5	5	-
Apply (L3)	10	5	10
Analyze (L4)	2.5	-	-
Evaluate (L5)	2.5	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	5
Evaluate (L5)	5
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	25	20	45	45
Analyze (L4)	2.5	5	7.5	7.5
Evaluate (L5)	2.5	5	7.5	7.5
Create (L6)	-	-	-	-
Total	**50**	**50**	**100**	**100**

GIS AND REMOTE SENSING

Course Code : 21CIV422A   **Credits : 02**

L: T: P: S : 1:0:1:0   **CIE Marks : 50**

Exam Hours : 3 Hours   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand the concept of Remote Sensing, data acquisition platforms sensors and Visual interpretation of satellite images, Geo referencing and Coordinate systems
CO2	Understand the components of GIS, familiarization of QGIS software. And GIS sample data creation
CO3	Apply the knowledge of GIS data tools and operations in QGIS software, and generate Map outputs
CO4	Analyze and manipulate spatial and non-spatial data.
CO5	Evaluate the application of GIS in the field of Civil Engineering using QGIS software
CO6	Plan Projects in GIS

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	3	-	-	3	3	-	-	-	-	-	-	-	3	3
CO2	3	-	-	-	3	-	-	-	3	-	-	3	3	3
CO3	3	3	3	3	3	-	-	-	3	-	3	3	3	3
CO4	3	3	3	3	2	-	-	-	3	-	3	3	3	3
CO5	3	3	3	3	3	2	2	2	3	-	3	3	3	3
CO6	3	3	3	3	3	2	2	2	3	-	3	3	3	3

Module No	Contents of Module	Hrs	Cos
1	**INTRODUCTION TO REMOTE SENSING** **A.** Remote sensing fundamentals, Data acquisition, Geometric correction, Image interpretation B. **E**xercise 1. Downloading of different types of satellite images and its interpretation Exercise 2 Georeferenceing, spatial reference and Coordinate systems (UTM and WGS 1984)	08	CO1
2	**GEOGRAPHICAL INFORMATION SYSTEMS** **A.** **Fundamentals of GIS**–Concept, Evolution and Development Components and objectives of GIS, **Introduction to GIS software's:** Arc GIS and QGIS, Exercise 3. Explore QGIS: Install QGIS, using plugins, Creating new shape files/geo database. **B**.**GIS Data:** Creation, Processing, Quality checking. Data cleaning, Adding attribute data (Non spatial data) Linking spatial & non-spatial data. Exercise: 4 Digitization of thematic layers: Soil, LULC, Transport, Polygon Building, water bodies Land marks. etc., from : Vector data (sample Topo sheet) Raster data (sample Satellite images):, Adding attribute data	08	CO2
3	**GEO SPATIAL ANALYSIS** **A.** Data query, spatial measurement(density, distance, neighborhood), overlay operations, Network Analysis Exercise 5. Hot spot analysis using Point data Exercise 6. Network analysis using Line data Exercise 7: overlay analysis using Polygon data Exercise 8: Raster analysis(clip & slope, analysis, contour extraction) **B.** Geovizualization in QGIS: Classification, Chart generation, Report generation. Map layout: creation of map in QGIS Map layout (Title, Scale, Direction, Legend), Print Layout Exercise: 9 Creating Map layouts for different thematic maps	08	CO3 & CO4
4	**GEO SPATIAL DATA MODELLING &APPLICATIONS** **A.** Real world modeling: Identify a problem, decide on the spatial operations, carry out the spatial analysis, generate a output Applications of GIS in different domains Exercise:10 project problem	08	CO5

	PROJECT PLANNING IN GIS		
5	**A.** Project planning concepts: Identify the requirement, Defining scope, Design database, Choose data model, Cost Analysis, implementation of the project.	**08**	**CO6**

TEXT BOOKS

1. P.A Burrough, R. A. McDonnell and C. D. Lloyd (2015).Principles of Geographical Information System(Third Edition), Oxford University Press.ISBN: 9780198742845.

2. Heywood, D. I., Cornelius, S. C., & Carver, S. J. (2011). *An Introduction to Geographical Information Systems* (Fourth edition), Pearson Prentice Hall.ISBN: 9780273722595.

3. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (2015). Remote Sensing and Image Interpretation (Seventh Edition), John Wiley and Sons, New Delhi. ISBN: 9781118343289.

REFERENCE BOOKS

1. George Joseph (2004). Fundamentals of Remote Sensing, Universities Press Pvt. Ltd., Hyderabad. ISBN: 8173714576.

2. Kang – Tsung – Chang (2019). Introduction to Geographical Information System (Ninth Edition),Tata McGraw HillPublishing Company *Limited*, New Delhi. ISBN: 1259929647.

3. C.P. Lo and Albert K. W. Yeung (2002). Concepts and Techniques of Geographic Information System, Prentice - Hall, India. ISBN: 0130804274.

Web resources:

1. https://www.**gis**lounge.com/**open**-**source**-**gis**-applications/

2. https://bhuvan.nrsc.gov.in/home/index.php

3. www.q**gis**.org/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Theory Test (25)	Practical Test (25)
Remember (L1)	-	-
Understand (L2)	10	-
Apply (L3)	10	10
Analyze (L4)	5	10
Evaluate (L5)	-	5
Create (L6)	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Practical Exam
Remember (L1)	-
Understand (L2)	-
Apply (L3)	20
Analyze (L4)	20
Evaluate (L5)	10
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	-	-	**-**	**-**
Understand (L2)	10	-	**10**	**10**
Apply (L3)	20	20	**40**	**40**
Analyze (L4)	15	20	**35**	**35**
Evaluate (L5)	5	10	**15**	**15**
Create (L6)	-	-	**-**	**-**
Total	**50**	**50**	**100**	**100**

ಆಡಳಿತ ಕನ್ನಡ / Aadalitha Kannada (Kannada for Administration)

Course Code : 21HSS432A   **Credits : 01**

L: T: P: S   : 1: 0: 0: 0   **CIE Marks : 50**

Exam Hours   : 02 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ
CO2	ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು
CO3	ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು
CO4	ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವಹಿಸಿಕೊಳ್ಳುವರು

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-	-	-

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ −1	ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ
ಅಧ್ಯಾಯ −2	ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ
ಅಧ್ಯಾಯ −3	ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ
ಅಧ್ಯಾಯ −4	ಪತ್ರ ವ್ಯವಹಾರ
ಅಧ್ಯಾಯ −5	ಆಡಳಿತ ಪತ್ರಗಳು
ಅಧ್ಯಾಯ −6	ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು
ಅಧ್ಯಾಯ −7	ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸೈಸ್ ರೈಟಿಂಗ್),ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ
ಅಧ್ಯಾಯ −8	ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ
ಅಧ್ಯಾಯ −9	ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ
ಅಧ್ಯಾಯ −10	ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ /ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದ ಲೇಖಕರು

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಪ್ರೋ. ವಿ . ಕೇಶವಮೂರ್ತಿ,ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ, ವಿ.ತಾ.ವಿ.ಬೆಳಗಾವಿ

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 25 Marks
Remember (L1)	12.5	12.5
Understand (L2)	12.5	12.5
Apply (L3)	-	-
Analyze (L4)	-	-
Evaluate (L5)	-	-
Create (L6)	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	25
Understand (L2)	25
Apply (L3)	-
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	25	25	50	**50**
Understand (L2)	25	25	50	**50**
Apply (L3)	-	-	-	-
Analyze (L4)	-	-	-	-
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

Vyavaharikha Kannada

Course Code : **21HSS433A**   **Credits : 01**

L: T: P: S : **1: 0: 0: 0**   **CIE Marks : 50**

Exam Hours : **02 Hrs**   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand Kannada Language.
CO2	Communicate in Kannada Language
CO3	Read simple Kannada words
CO4	Pronounce Kannada words correctly

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-	-	-

Syllabus

Chapter – 1	Vyavaharika Kannada – Parichaya (Introducton to Vyavaharika Kannada)
Chapter – 2	Kannada Aksharamale haagu uchharane (Kannada Alphabets and Pronunciation)
Chapter – 3	Sambhashanegaagi Kananda Padagalu (Kannada Vocabulary for Communication)
Chapter – 4	Kannada in Conversations (Sambhashaneyalli Kannada)
Chapter – 5	Activities in Kannada. (Kannada Sambhashanegaagi Chatuvatikegalu)

Text Book:

Vyavaharika Kannada by Dr. L. Thimmesh, Prof. V. Keshavamurthy, published by: VTU, Belagavi

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests 25 Marks	Assignments 25 Marks
Remember (L1)	12.5	12.5
Understand (L2)	12.5	12.5
Apply (L3)	-	-
Analyze (L4)	-	-
Evaluate (L5)	-	-
Create (L6)	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	25
Understand (L2)	25
Apply (L3)	-
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	25	25	50	50
Understand (L2)	25	25	50	50
Apply (L3)	-	-	-	-
Analyze (L4)	-	-	-	-
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

ENVIRONMENTAL SCIENCE

Course Code   :   21HSS442A   **Credits : 01**

L: T: P: S   :   1: 0: 0: 0   **CIE Marks : 50**

Exam Hours   :   02 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand the concepts of Environment, ecosystem and biodiversity.
CO2	Explain the strategies for management of natural resources to achieve sustainability.
CO3	Analyze the control measures of Environmental pollution and global Environmental issues.
CO4	Apply the knowledge of Environment Impact Assessment, Technology, Environmental acts and laws in protecting Environment and human health.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	3	-	-
CO3	-	-	-	-	-	3	3	3	-	3	-	3	1	-
CO4	-	-	-	-	1	3	3	3	-	3	-	3	1	1

Correlation levels: 1-Slight (Low)   2-Moderate (Medium)   3-Substantial (High)

Module No	Contents of Module	Hrs	Cos
1	**Introduction to Environment, Ecosystem and Biodiversity**: Environment: Definition, Components of Environment; Ecosystem: Types & Structure of Ecosystem, Energy flow in the ecosystem; Biodiversity: Types, Hot-spots, Threats and Conservation of biodiversity.	03	**CO1**
2	**Natural Resources:** Advanced Energy resources (Hydrogen, Solar, OTEC, Tidal and Wind), merits and demerits, Water resources – cloud seeding, Mineral resources, Forest resources. Strategies of management, concept of sustainability.	03	**CO2**
3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air Pollution, Water Pollution, soil Pollution and Noise pollution. Solid wastes and its management. Role of society, NGO and Govt. agencies in prevention of pollution.	03	**CO3**
4	**Global Environmental issues, Environment acts and amendments:** Fluoride problem in drinking water, Acid Rain**,** Ozone layer depletion, Global warming and climate change. National forest policy, Environmental laws and acts. International agreements and protocols.	03	**CO3 & CO4**
5	**Human Population and Environment Impact Assessment:** Population growth & explosion, Population pyramids. Negative impact of agriculture and urbanization, Role of Technology in protecting environment and human health. Environment Impact Assessment.	03	**CO4**

TEXT BOOKS

1. Environmental studies by Benny Joseph, Tata McGraw Hill Education Private Limited, 2009, ISBN: 9870070648135.

2. "Environmental Studies: Basic Concepts" by Ahluwalia, V. K. The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016. ISBN: 817993571X, 9788179935712.

3. "Textbook of Environmental Studies for Undergraduate Courses of all branches of Higher Education" by Bharucha, Erach for UGC, New Delhi, 2004. ISBN: 8173715408, 9788173715402.

REFERENCE BOOKS

1. Handbook of Environmental Engineering by Rao Surampalli, Tian C. Zhang, Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma; McGraw Hill Professional, 2018. ISBN: 125986023X, 9781259860232

2. Environmental Science and Engineering by P. Venugopala, Prentice Hall of India Pvt. Ltd, New Delhi, 2012 Edition. ISBN: 978-81-203-2893-8.

3. Environmental Science- Working with the earth by G Taylor Miller Jr, Brooks Cole Thompson Publications, 10thEdition. ISBN: 10: 0534424082.

4. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of India Pvt. Ltd, 2005 Edition. ISBN: 8120327748, 9788120327740.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Seminar (10)
Remember (L1)	5	-	-
Understand (L2)	15	-	-
Apply (L3)	5	8	5
Analyze (L4)	-	7	5
Evaluate (L5)	-	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	30
Apply (L3)	10
Analyze (L4)	-
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	5	10	**15**	**15**
Understand (L2)	15	30	**45**	**45**
Apply (L3)	18	10	**28**	**28**
Analyze (L4)	12	-	**12**	**12**
Evaluate (L5)	-	-	**-**	**-**
Create (L6)	-	-	**-**	**-**
Total	**50**	**50**	**100**	**100**

CONSTRUCTION MATERIALS AND CONCRETE TECHNOLOGY

Course Code : 21CIV45A   **Credits : 03**

L: T: P: S   : 3: 0: 0: 0   **CIE Marks : 50**

Exam Hours   : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Describe the basic Engineering Properties of the construction materials.
CO2	Demonstrate different types of bonds considered in masonry work
CO3	Understand the various structural components in the building systems
CO4	Describe the ingredients of concrete and its properties
CO5	Demonstrate the fresh properties of concrete along with mix design.
CO6	Evaluate hardened and durability properties of concrete.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	1	-	2	2	2	-	-	-	1	3	3
CO2	3	-	-	1	-	2	2	2	-	-	-	1	3	3
CO3	3	3	2	3	-	2	2	2	--	2	-	1	3	3
CO4	3	-	-	1	-	2	2	-	-	1	-	3	3	3
CO5	2	3	3	2	2	2	2	2	-	1	-	3	3	3
CO6	3	-	-	-	2	2	2	2	-	-	-	3	3	3

Module No	Contents of Module	Hrs	Cos
1	**Construction Materials:** Engineering Stones, Bricks, Timber, Lime. Cement Composition of Ordinary Portland Cement (OPC), Types of cement, sand and their uses. Pozzolanic materials such as fly ash, meta kaolin, silica fume, rice husk ash and blast furnace slag. Lime and Cement mortar. Desirable properties of Reinforcing steel, structural steel and aluminium. Masonry - Stone and brick. Construction of brick masonry using English and Flemish bond.	08	CO1 & CO2
2	**Structural Components:** Foundations- Classifications & different types, Bearing capacity of soil. Flooring requirements for floor finish and its types. Doors paneled and flush doors. Different types of Windows, Ventilators. Stairs - requirements of stairs. Dog-legged and open well staircase. Lintel, Chajja, Balcony. Plastering and Pointing, Paints- Purpose, types, ingredients and applications of paints to new and old plastered surfaces.	08	CO3
3	**Concrete Ingredients and Microstructure:** Cement- hydration of cement. Bogue's compound and transition zone in cement paste. Tests on cement-field test and laboratory tests (detailed procedures covered in laboratory). Quality of mixing water. Aggregates – Physical properties of Coarse and Fine aggregate. Sieve analysis, Fineness, grading of aggregates (detailed procedures to be covered in laboratory). Manufactured sand its significance and differences. Blended cement and its importance	08	CO4
4	**Fresh Concrete & Mix Design:** Workability - definition, factors affecting workability, measurement of workability by slump, compaction factor, vee-bee and flow tests. Segregation and bleeding. Process of manufacture of concrete-batching, mixing, transporting, placing, compaction and curing of concrete. Chemical admixtures - classification and uses. Concept of mix design, variables in proportioning, exposure conditions, procedure of mix design as per IS10262-2019 and numerical examples of mix design.	08	CO5
5	**Hardened Concrete:** Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, effect of aggregate properties, accelerated curing, Aggregate-cement bond strength. Shrinkage– plastic shrinkage and drying shrinkage, factors affecting shrinkage. Creep–measurement of creep, factors affecting creep. Tests on hardened concrete-compressive strength, split tensile strength, flexural strength. (Detailed test procedures to be covered in laboratory). Durability–definition and significance. Permeability, sulphate attack, chloride attack and carbonation.	08	CO6

TEXT BOOKS

1. Sushil Kumar, "Building Construction", Standard Publishers Distributors, New Delhi.

2. S. C. Rangwala, "Building Construction" & "Engineering materials" Book Stall, Anand.

3. M S Shetty, "Concrete Technology", Chand S and Co.

4. Gambhir B L, "Concrete Technology", Tata McGraw Hill, New Delhi.

REFERENCE BOOKS

1. Neville, A M, "Properties of Concrete", ELBS Publications.

2. IS: 10262-2019, "Recommended guidelines for Concrete Mix design", – BIS Publications

3. Mehta PK, Properties of Concrete, ICI, Chennai.

4. Mohan Raj and Jai Singh, "Advanced Building Materials and Construction", CBRI Publications, Roorkee.

5. B.C. PUNMIA, "Building Construction", Lakshmi Publications, New Delhi.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Quizzes (10)
Remember (L1)	10	-	-
Understand (L2)	10	-	5
Apply (L3)	-	-	5
Analyze (L4)	-	5	-
Evaluate (L5)	5	5	-
Create (L6)	-	5	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	15
Apply (L3)	5
Analyze (L4)	5
Evaluate (L5)	10
Create (L6)	5

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	15	15	30	30
Apply (L3)	05	5	10	10
Analyze (L4)	05	5	10	10
Evaluate (L5)	10	10	20	20
Create (L6)	05	5	10	10
Total	50	50	100	100

CONCRETE TECHNOLOGY LAB

Course Code : 21CVL45A   **Credits : 01**

L: T: P: S   : 0: 0: 1: 0   **CIE Marks : 50**

Exam Hours   : 03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Characterize the materials properties by conducting various tests
CO2	Design appropriate concrete mixes based on properties of material and evaluate the workability of fresh concrete.
CO3	Describe mechanical behavior of hardened concrete through Destructive Testing
CO4	Evaluate the quality of concrete through Non Destructive Testing

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	3	-	3	3	-	-	3	3	3
CO2	3	3	-	-	-	3	2	3	3	-	-	3	3	3
CO3	3	3	-	-	2	3	-	3	3	-	-	3	3	3
CO4	3	3	-	-	2	3	2	3	3	-	-	3	3	3

Course Syllabus

Experiment no.	Experiment Name	Hrs	CO's
1	**Tests on Cement** To determine the Normal consistency & specific gravity of cement	2	CO1
2	To determine the Setting time & Compression strength test	2	CO1
3	Air permeability test for fineness, Soundness by Autoclave method	2	CO1
4	**Tests on Fine aggregates** To determine the Moisture content & Specific gravity of fine aggregates To determine the Bulk density of fine aggregates	2	CO1
5	**Tests on Coarse aggregate** To determine the Absorption & specific gravity of coarse aggregates. To determine the Bulk density of CA	2	CO1
6	Shape tests (Flakiness Index, Elongation Index, Angularity number)	2	CO1
7	**Tests on Fresh properties:** To determine the Workability – Slump and Compaction factor test Vee Bee Consistometer test	2	CO2
8	**Tests on Hardened concrete** Compression strength and Split Tensile Test	2	CO3
9	**Tests on Hardened concrete** Flexural strength of beams	2	CO3
10	**Non-destructive Tests:** Ultrasonic pulse velocity test, Rebound hammer test.	2	CO4

TEXT BOOKS

1. M S Shetty, "Concrete Technology", Chand S and Co.
2. Gambhir M L, "Concrete Technology Manual", Dhanpat Rai & Sons, New Delhi
3. Neville, A M, "Properties of Concrete", ELBS Publications.

REFERENCE BOOKS

1. IS: 10262-2019, "Recommended guidelines for Concrete Mix design", – BIS Publications
2. N Krishna Raju, "Design of concrete mixes", CBS Publisher.
3. S K Khanna, CEG Justo, A Veeraragavan, " Highway Materials & Pavement Testing", Nem Chand & Brothers publishers.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Marks Distribution
Remember (L1)	-
Understand (L2)	10
Apply (L3)	10
Analyze (L4)	10
Evaluate (L5)	20
Create (L6)	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	-
Understand (L2)	10
Apply (L3)	10
Analyze (L4)	10
Evaluate (L5)	20
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	-	-	-	-
Understand (L2)	10	10	20	20
Apply (L3)	10	10	20	20
Analyze (L4)	10	10	20	20
Evaluate (L5)	20	20	40	40
Create (L6)	-	-	-	-
Total	50	50	100	100

THEORY OF STRUCTURES

Course Code   :   21CIV46A   **Credits : 03**

L: T: P: S   :   3: 0: 0: 0   **CIE Marks : 50**

Exam Hours   :   03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Explain and classify different forms of structure
CO2	Analyze the determinate trusses by different methods.
CO3	Compute deflection of determinate beams.
CO4	Evaluate the indeterminate beams and frames by Slope Deflection Method.
CO5	Evaluate the indeterminate beams and frames by Moment Distribution Method
CO6	Evaluate the indeterminate beams and frames by Kani's Method

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	1	-	-	-	-	-	-	2	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	2	-	-	-	-	-	-	-	-	-	3
CO4	3	3	3	2	-	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	-	1	-	-	-	-	-	-	2	3
CO6	3	3	3	3	-	-	-	-	-	-	-	-	2	3

Module No	Contents of Module	Hrs	Cos
1	**STRUCTURAL SYSTEMS AND ANALYSIS OF TRUSSES:** Classification of structures, Forms of structures, Linear and Non linear structures, one, two, three dimensional structural systems, Determinate and indeterminate structures, Static and Kinematic Indeterminacy. Types of trusses, Assumptions in analysis-Analysis of determinate trusses by method of joints and method of sections.	8	CO1 CO2
2	**DEFLECTION OF BEAMS.** Introduction, curvature of bending beam, Relation between slope, deflection and radius of curvature, Sign conventions, Slope and deflection of simply supported/cantilever beams subjected to point loads, UDL and Couple by using, Macaulay's Method, Moment Area method and Conjugate beam method.	8	CO3
3	**SLOPE DEFLECTION METHOD**: Introduction, Sign convention, Development of slope-deflection equations. Analysis of continuous beams without support yielding and with support yielding – analysis of portal frame.	8	CO4
4	**MOMENT DISTRIBUTION METHOD:** Introduction, Definition of terms- Distribution factor. Carry over factor. Analysis of continuous beams without support yielding and with support yielding – analysis of portal frame.	8	CO5
5	**KANI'S METHOD:** Introduction, Basic Concepts. Analysis of continuous beams without support yielding and with support yielding – analysis of portal frame.	8	CO6

TEXT BOOKS

1. Bhavikatti, S S" Structural Analysis" Vol. I &II, Vikas Publishing House Pvt. (ISBN:9788125942696), 4th Edition, 2010

2. Vaidyanathan. R & Perumal.P, "Structural Analysis" Vol. I & II", Laxmi Publications, (ISBN:978-81-318-0781-1), 3rd Edition, 2007.

3. Pandit G.S and GutaS.P.,"Theory of Structures", Vol.–I, Tata Mc Graw Hill, New Delhi,(ISBN:9780074634936), 10th Edition, 2014

REFERENCE BOOKS

1. Reddy C.S.,"Basic Structural Analysis",Tata Mc Graw Hill, New Delhi, (ISBN:9780070702769), 4th Edition, 2011.

2. D S Rajendra Prasad, "Structural Analysis 1", Sapna Book House, Bengaluru, ISSN:9788128020148, 2012

3. Thandava moorthy, "Structural Analysis", Oxford University Press Higher Education,(ISBN:9780198069188),3rdEdition, 2012.

4. Devdas Menon,"Structural Analysis", Narosa Publishing House, (ISBN:978-81-7319-750-5), 2014

5. VazraniV.N., Ratwani M.M.,"Structural Analysis" Vol. I & II, Khanna Publishers, (ISBN:978-81-7409-140-8), 13th Edition, 2013.

6. Negi L.S and Jangid R.S, "Structural Analysis", Tata Mc Graw Hill, New Delhi, 6thEdition, 2003.

7. Gambir.M.L., "Fundamentals of Structural Mechanics and Analysis" ,PHI Learning Pvt.Ltd, New Delhi, (ISBN:9788120342361), 2011.

8. Russell C. Hibbeler. "Structural Analysis", Pearson Publication, ISBN-13:9786073210621, 8th Edition,

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Quizzes (10)
Remember (L1)	-	-	0
Understand (L2)	-	-	5
Apply (L3)	5	5	5
Analyze (L4)	10	5	-
Evaluate (L5)	10	5	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	-
Understand (L2)	05
Apply (L3)	10
Analyze (L4)	20
Evaluate (L5)	15
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	-	-	0	0
Understand (L2)	05	05	10	10
Apply (L3)	15	10	25	25
Analyze (L4)	15	20	35	35
Evaluate (L5)	15	15	30	30
Create (L6)	-	-	0	0
Total	50	50	100	100

THEORY OF STRUCTURES LAB

Course Code : 21CVL46A

L: T: P: S : 0: 0: 1: 0

Exam Hours : 03 Hrs

Credits : 01

CIE Marks : 50

SEE Marks : 50

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Use software in a professional set up to meet industrial standards
CO2	Model and Analyze continuous beams using software
CO3	Model and Analyze plane frames and 3D multi-storied frames
CO4	Model and Analyze plane trusses using software.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	3	3	-	-	-	-	3	-	3	3	3
CO2	3	3	-	3	3	-	-	-	-	3	-	3	3	3
CO3	3	3	-	3	3	-	-	-	-	3	-	3	3	3
CO4	3	3	-	3	3	-	-	-	-	3	-	3	3	3

Course Syllabus

Experiment no.	Experiment Name	Hrs	CO's
1	Introduction to commercial structural analysis software package, various tools and its applications in modelling, analysis of various civil engineering structures.	2	CO1
2	Modelling and Analysis of Three span continuous beam with fixed end conditions, considering different types of loading conditions	2	CO2
3	Modelling and Analysis of Three span continuous beam with pinned end conditions, considering different types of loading conditions	2	CO2
4	Modelling and Analysis of continuous beam with over hanging, considering different types of loading conditions	2	CO2
5	Modelling and Analysis of continuous beam with differential settlements and rotation of supports, considering different types of loading conditions.	2	CO2
6	Modelling and Analysis of plane frame with fixed end conditions, considering different types of loading conditions	2	CO3
7	Modelling and Analysis of plane frame with pinned end conditions, considering different types of loading conditions	2	CO3
8	Modelling and Analysis of plane frame with over hanging, considering different types of loading conditions	2	CO3
9	a) Modelling and Analysis of multi storied plane frame (up to 2-bay, 2-storey), considering different types of loading conditions b) Modelling and Analysis multi storied 3-D frames, considering different types of loading conditions (Minimum 3-bay, 3-storey)	2	CO3
10	Modelling and Analysis of steel truss	2	CO4

REFERENCE BOOKS

1. Training and user manuals of STAAD PRO

2. Bhavikatti SS, Structural Analysis II, Vikas Publishers, 4th Edition, 2011, New Delhi.

3. Thandavamoorthy TS, Structural Analysis, Oxford University Press, 3rd Edition, 2012, Bengaluru

4. Ramamrutham S, Theory of structures, Dhanpat Rai Publications, 9th Edition, 2014, New Delhi

5. S.P. Gupta, G.S. Pandit and R. Gupta, Theory of Structures Vol. 2, n Tata McGraw Hill Publication Company Ltd., 1st Edition, 1999, New Delhi

6. Manish S, Finite Element Method and Computational Structural Dynamics, PHI learning Pvt. Ltd, 1st Edition, 2012, New Delhi

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Marks Distribution
Remember (L1)	5
Understand (L2)	5
Apply (L3)	20
Analyze (L4)	20
Evaluate (L5)	-
Create (L6)	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	5
Understand (L2)	5
Apply (L3)	20
Analyze (L4)	20
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	5	5	10	10
Understand (L2)	5	5	10	10
Apply (L3)	20	20	40	40
Analyze (L4)	20	20	40	40
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

GEOTECHNICAL ENGINEERING

Course Code	:	21CIV47A	Credits : 03

Course Code   :   21CIV47A   **Credits : 03**

L: T: P: S   :   3: 0: 0: 0   **CIE Marks : 50**

Exam Hours   :   03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand the functional relationship and index properties of soil and to classify the soil.
CO2	Evaluate the permeability of soil and to understand the effective stress principle.
CO3	Estimate the compaction characteristics of soil.
CO4	Evaluate the compressibility characteristics of soil and to estimate the settlement of soils.
CO5	Estimate stresses in soils due to applied loading.
CO6	Analyze the shear strength characteristics of soil.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	-	-	-	-	-	-	-	3	3	-
CO2	3	3	-	-	-	1	1	-	-	-	-	3	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	-	2	-	-	-	-	-	-	-	3	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO6	3	3	-	-	-	-	-	-	-	-	-	3	3	-

Module No	Contents of Module	Hrs	CO's
1	**Introduction to Soil Mechanics, Index Properties, Inter-relationships and Soil Characterization** Types of soil and soil formation, Geological cycle, Phase diagrams, Basic terms, Functional relationships based on index properties, Physical characterization of soil-Dry sieve analysis, Atterberg's Indices. IS Soil Classification.	08	CO1
2	**Permeability and Seepage** Darcy's law and its validity, Factors affecting permeability, Laboratory permeability tests, Permeability of stratified soil masses, Effective Stress concept, Quick sand condition, Flow nets - characteristics and applications. Flow nets for sheet piles and below the dam section.	08	CO2
3	**Compaction & Consolidation of soil** Definitions, Differentiate between compaction and consolidation, Compaction mechanism and proctor tests, field compactions methods, factors affecting compaction, Consolidation mechanism through spring analogy, fundamental definitions, Terzaghi's one dimensional consolidation theory (only formula), Time factor, pre-consolidation pressure, consolidation settlement.	08	CO3 & CO4
4	**Stresses in soils due to applied loading** Introduction, Boussinesq's and Westergaard's theories for different types of loadings such as point load and circular load (no derivations), pressure distribution diagram. Comparison of Boussinesq's and Westergaard's analysis.	08	CO5
5	**Shear Strength of soil** Concept of shear strength, Mohr-Coulomb failure criterion, Modified Mohr-Coulomb failure criterion. Factors affecting shear strength of soil. Sensitivity and Thixotropic of Clay. Measurement of shear strength parameters- Direct shear test, unconfined compression, triaxial compression and vane shear test, under three drainage conditions.	08	CO6

TEXT BOOKS

1. Dr. Arora K. R, "Soil Mechanics and Foundation Engineering",Standard Publishers and Distributors, 3rd Edition, 2009.

2. Punmia B.C., "Soil Mechanics and Foundation Engineering", Laxmi Publications Co., 16th Edition, New Delhi, 2005.

3. Gopal Ranjan & A.S.R Rao, "Basic and Applied Soil Mechanics", New Age International Pvt Ltd, 3rd Edition, 2016.

REFERENCE BOOKS

1. Braja, M. Das, "Principles of Geotechnical Engineering", Thomson Asia Pte Ltd., 8th Edition, 2013.

2. Murthy V.N.S., "Textbook of Soil Mechanics and Foundation Engineering", CBS Publishers & Distributors, 2018.

3. Robert D. Holtz, William D. Kovacs, Thomas C. Sheahan, "An Introduction to Geotechnical Engineering", Pearson publishers, 2nd Edition, 2011.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Quizzes (10)
Remember (L1)	4	2	-
Understand (L2)	5	3	2
Apply (L3)	10	4	6
Analyze (L4)	6	6	2
Evaluate (L5)	-	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	5
Understand (L2)	15
Apply (L3)	20
Analyze (L4)	10
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	6	5	**11**	**11**
Understand (L2)	10	15	**25**	**25**
Apply (L3)	20	20	**40**	**40**
Analyze (L4)	14	10	**24**	**24**
Evaluate (L5)	-	-	**-**	**-**
Create (L6)	-	-	**-**	**-**
Total	**50**	**50**	**100**	**100**

GEOTECHNICAL ENGINEERING LAB

Course Code   :   21CVL47A   **Credits : 01**

L: T: P: S   :   0: 0: 1: 0   **CIE Marks : 50**

Exam Hours   :   03 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Compute the index properties of fine grained and coarse-grained soil
CO2	Analyze the soil strength parameters for the given sample of soil.
CO3	Estimate the engineering properties of soil by various tests
CO4	Understand the concept and procedure for soil testing and its recommendations

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	3	-	3	3	3	3
CO4	3	-	-	-	-	-	-	-	3	-	-	-	3	3

Course Syllabus

Experiment no.	Experiment Name	Hrs	CO's
1	Visual soil classification, water content determination by oven drying method, Specific gravity test (for coarse and fine grained soils) (Pycnometer and Density bottle).	2	CO1
2	Determine Particle size distribution of given soil sample using sieve analysis	2	CO1 & CO2
3	Determine the In situ density by core cutter and sand replacement methods.	2	CO1
4	Determine the Consistency Limits – Liquid Limit (Casagrande Method), plastic limit and shrinkage limit	2	CO1
5	Standard Proctor Compaction Test	2	CO1 & CO3
6	Modified Proctor Compaction Test	2	CO1 & CO3
7	Constant head permeability test and Falling head permeability test	2	CO3
8	a) Unconfined Compression Test b) Consolidation test	2	CO1 & CO3
9	a) Tri axial shear test b) Direct Shear Test c) Laboratory vane shear test	2	CO1 & CO3
10	SPT and DCPT test(Demo only)	2	CO2, CO3 & CO4

TEXT BOOKS

1. Dr. Arora K. R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, 3rd Edition,2009.

2. Punmia B.C., "Soil Mechanics and Foundation Engineering", Laxmi Publications Co., 16th Edition, New Delhi,2005.

3. Gopal Ranjan & A.S.R Rao, "Basic and Applied Soil Mechanics", New Age International Pvt Ltd, 3rd Edition,2016.

REFERENCE BOOKS

1. Braja, M. Das, "Principles of Geotechnical Engineering", Thomson Asia Pte Ltd., 8th Edition, 2013.

2. Murthy V.N.S., "Textbook of Soil Mechanics and Foundation Engineering", CBS Publishers & Distributors, 2018.

3. Robert D. Holtz, William D. Kovacs, Thomas C. Sheahan, "An Introduction to Geotechnical Engineering", Pearson publishers, 2nd Edition, 2011.

4. **Soil Testing & Recommendation, Kalyani publishers, ISBN 978-8176635943**

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Marks Distribution
Remember	-
Understand	10
Apply	20
Analyze	20
Evaluate	-
Create	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember	-
Understand	10
Apply	20
Analyze	20
Evaluate	-
Create	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember	-	-	-	-
Understand	10	10	20	20
Apply	20	20	40	40
Analyze	20	20	40	40
Evaluate	-	-	-	-
Create	-	-	-	-
Total	**50**	**50**	**100**	**100**

SUMMER INTERNSHIP - I

Course Code : **21CIV48A**   **Credits : 02**

L: T: P: S   : **0: 0: 0: 2**   **CIE Marks : 100**

Exam Hours : **0**   **SEE Marks : 0**

Module Name: Information Technology Applications

NOTE: *The contents to be taught during **Summer Internship-1**. Total duration is **1 week**. At the end of this module, the students are expected to use the computer applications for their assessment(s) works.*

Word Processor

Managing and reviewing documents
Working with reference tools
Using time saving tools
Working with advanced graphics and objects
Tables in word
Creating equations and charts
Translate Languages on the Go
Mail Merge

Spreadsheet Applications

Managing Worksheets

Formatting Cells

Excel Functions (Basic and advanced)

Charts

Sorting Data

Pivot table

PowerPoint Applications

Work with the basic features of PowerPoint

Create a presentation

Insert text into a slide and apply basic formatting

Work with the various slide layouts

Create and work with smart art graphics and multimedia effects

COMMUNICATIVE ENGLISH

Course Code : 21DAEC40A   **Credits : 00**

L: T: P: S   : 0: 0: 0: 0   **CIE Marks : 50**

Exam Hours   : 02 Hrs   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Recognise the grammatical structures in English and identify errors in sentences
CO2	Demonstrate conversational skills using situational vocabulary
CO3	Examine the importance of sub skills of listening for effective communication
CO4	Analyse the importance of receptive and productive skills of communication

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	3	-	-

Module No	Contents of Module	Hrs	Cos
1	Self-introduction – Talking about self, ambition, hobbies, likes, dislikes, talents and achievements. Asking for and Giving Information (Pair work) **(SEE Task 1)** Asking question. (WH, Aux Verbs), Helping Verbs usage chart, question tags. Nouns, Pronouns	5	CO1
2	Talking about Routine, Repeated activities (Frequency adverbs) Verb: Main / Assistant, Forms of Verbs, Use of Do, Does in negative and question forms **Verbal Ability** Error Detection: Subject Verb Agreement	5	CO1, CO2
3	Describing people, things, actions, process **(SEE Task 2)** Describing on going actions Situational conversations, role plays Adjectives, Adverbs **Verbal Ability:** Sentence correction, Sentence completion.	5	CO1, CO2, CO4
4	**Listening Skills:** Importance of listening for effective communication Traits of a good listener Listening sub skills Listening to audio files of short stories, news, TV clips, Documentaries Gap filling exercise and Paraphrasing **Verbal Ability:** Common Errors in English 1 (articles, prepositions) Cloze Exercises	4	CO2, CO4
5	**Presentation Skills:** **Nonverbal Communication (Body Language):** Kinesics, Oculesics, Paralanguage. Overcoming stage fear, Organising a speech - Preparation, Practise, Delivery **Articulation of Ideas:** How to generate ideas and express them. Fluency development activities like comparing, expressing opinions, agreeing & disagreeing **(SEE Task 3)** Group Discussion	5	CO1

TEXT BOOKS

1. Grammar Practice Activities- Penny Ur, Cambridge University Press

2. Intermediate English Grammar   Raymond Murphy Cambridge University Press

REFERENCE BOOKS

1. Grammar & Composition. New Delhi: S. Chand. ISBN 81-219- 2197-X.

2. Wren, P.C.; Martin, H., A Final Course of Grammar & Composition, S Chand.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	10
Evaluate (L5)	-
Create (L6)	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	10
Evaluate (L5)	-
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	20	20	40	40
Analyze (L4)	10	10	20	20
Evaluate (L5)	-	-	-	-
Create (L6)	-	-	-	-
Total	50	50	100	100

BASIC APPLIED MATHEMATICS-II

Course Code : **21DMAT41A**   **Credits : 00**

L: T: P: S   : **0: 0: 0: 0**   **CIE Marks : 50**

Exam Hours : **02 Hrs**   **SEE Marks : 50**

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Gain knowledge of basic operations of vectors
CO2	Use curl and divergence of a vector function in three dimensions
CO3	Develop the ability to solve higher order Linear differential equations
CO4	Know the basic concepts of Laplace transform to solve the Periodic functions and also solve initial and boundary value problems using Laplace transform method

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	3	3	-	-
CO2	3	3	3	3	-	1	-	-	-	-	3	3	-	-
CO3	3	3	3	3	3	-	3	-	-	3	3	3	-	-
CO4	3	3	3	3	3	-	3	-	-	3	3	3	-	-

Module No	Contents of Module	Hrs	Cos
1	**Vectors:** Definition of scalar and vector, Vector addition, Subtraction and Multiplication-Dot product, Cross product, Scalar triple product. Orthogonal, Co-planar and Angle between vectors-Problems.	5	CO1
2	**Vector Differentiation:** Vector differential operator-Gradient of a scalar function, Divergence of a vector function, Curl of a vector function - Problems. Solenoidal and irrotational vector fields-Problems.	5	CO2
3	**Linear differential equations with constant coefficients:** Solution of initial and boundary value problems, Inverse differential operator techniques for the functions-e^{ax}, Sin $(ax + b)$ and Cos $(ax + b)$.	5	CO3
4	**Laplace Transform:** Definition and Laplace transforms of elementary functions-Problems. Properties of Laplace transforms (Shifting property-without proof), Periodic functions (without proof)-problems	5	CO4
5	**Inverse Laplace Transform:** Inverse Laplace Transform by partial fractions - Problems. Solution of linear differential equations using Laplace Transforms-Problems.	5	CO4

TEXT BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.

2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491

REFERENCE BOOKS

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.

2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.

3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.

4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category Marks (out of 50)	Tests (25)	Assignments (15)	Quiz (10)
Remember (L1)	5	5	-
Understand (L2)	5	5	-
Apply (L3)	10	5	10
Analyze (L4)	2.5	-	-
Evaluate (L5)	2.5	-	-
Create (L6)	-	-	-

SEE - Semester End Examination (50 Marks)

Bloom's Category	Tests
Remember (L1)	10
Understand (L2)	10
Apply (L3)	20
Analyze (L4)	5
Evaluate (L5)	5
Create (L6)	-

Percentage Evaluation of Various Blooms Levels

Blooms Category	CIE	SEE	Total	%
Remember (L1)	10	10	20	20
Understand (L2)	10	10	20	20
Apply (L3)	25	20	45	45
Analyze (L4)	2.5	5	7.5	7.5
Evaluate (L5)	2.5	5	7.5	7.5
Create (L6)	-	-	-	-
Total	50	50	100	100

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accredition:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes

COURSE OUTCOME

↓

PROGGRAM OUTCOME

↓

PROGRAM EDUCATIONAL OBJECTIVES

↓

DEPARTMENTAL MISSION

↓

DEPARTMENTAL VISION
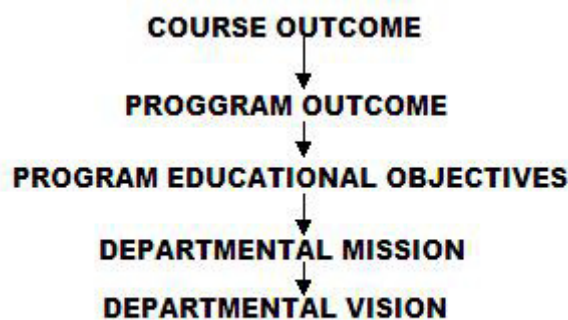
APPENDIX B

The Graduate Attributes of NBA

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

Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

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

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

Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.