DEPARTMENT OF COMPUTER ENGINEERING

SCHEME AND SYLLABUS

BATCH: 2021-25

CREDITS: 160
(2020 Scheme NEP)

Academic Year 2022-23

Third and Fourth Semester Scheme and Syllabus

CONTENTS

INSTITUTION

Vision

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

Mission

To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

To encourage long-term interaction between the academia and industry through their involvement in the design of curriculum and its hands-on implementation.

To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

To develop value based socially responsible professionals for the betterment of the society

Quality Policy

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

Values

- ❖ Academic Freedom
- ❖ Innovation
- ❖ Integrity
- ❖ Professionalism
- ❖ Inclusiveness
- ❖ Social Responsibility

DEPARTMENT OF COMPUTER ENGINEERING

Vision

To produce engineers, researchers and technologists with managerial skills of highest competence who would be able to solve the challenges of society.

Mission

To impart high quality professional training, practical experience and value education in the Computer Engineering.

To pursue creative research in Computer Engineering in order to serve the engineering and society.

To prepare and encourage a student for Lifelong learning to meet career and ethical challenges through active participation in co-curricular and extracurricular activities.

Program Educational Objectives (PEOs)

PEO1:	To prepare globally competent graduates having strong fundamentals of Computer Engineering domain knowledge, updated with modern technology to provide effective solutions for engineering problems.
PEO2:	To acuminate graduates with ability to adapt and develop projects towards the latest technological era of the Computing and IT sector with a high degree of innovativeideas.
PEO3:	To produce committed and motivated graduates with research attitude, investigative approach, and multidisciplinary thinking for implementation of strategic tasks.
PEO4:	To shape the graduates with strong managerial and communication skills to work andlearn continuously and effectively as individuals as well as in teams.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To impart high quality professional training, practical experience and value education in the Computer Engineering.	3	2	2	2
To pursue creative research in Computer Engineering in order to serve the engineering community and society.	3	2	2	2
To prepare and encourage a student for Lifelong learning to meet career and ethical challenges through active participation in co- curricular and extracurricular activities.	2	2	3	3

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

Program Outcomes (POs) with Graduate Attributes

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems in Computer Engineering.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems in Computer Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
PO3	**Design / Development of Solutions:** Design solutions for complex Engineering problems and design system components or processes of Computer Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments in Computer Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities in Computer Engineering with an understanding of the limitations.
PO6	**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 in Computer Engineering.
PO7	**Environment and Sustainability:** Understand the impact of the professional Engineering solutions of Computer Engineering in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication Skills:** 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.
PO11	**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.
PO12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

A graduate of the Computer Engineering Program will demonstrate

PSO1: The ability to apply the knowledge of core science, engineering mathematics and engineering fundamentals to design and develop the computing systems.

PSO2: The ability to provide effective and efficient real time solutions to problems in computer engineering using acquired knowledge in various domains.

Mapping of POs with PEOs

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

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

DEPARTMENT OF COMPUTER ENGINEERING
III Semester Scheme – NEP 160 Credits

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21CEE31A	Mathematical Foundation for Computing Sciences	AS	3	0	0	0	3	4	50	50	100
2	21CEE322A*	Programming in C	CEE	1	0	1	0	2	3	50	50	100
3	21HSS332A/ 21HSS333A	Aadalitha Kannada / Vyavaharikha Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS341A	Environmental Science	HSS	1	0	0	0	1	1	50	50	100
5	21CEE35A	Digital Logic Circuits	CEE	3	0	0	0	3	4	50	50	100
6	21CEL35A	Digital Logic Circuits Lab	CEE	0	0	1	0	1	2	50	50	100
7	21CEE36A	Data Structures	CEE	3	0	0	0	3	4	50	50	100
8	21CEL36A	Data Structures Lab	CEE	0	0	1	0	1	2	50	50	100
9	21CEE37A	Data Base Management Systems	CEE	3	0	0	0	3	4	50	50	100
10	21CEL37A	Data Base Management Systems Lab	CEE	0	0	1	0	1	2	50	50	100
11	21CEE38A	Mini Project-I	CEE	0	0	2	0	2	0	50	50	100
Total								**21**	**27**	**550**	**550**	**1100**
Exclusively for Lateral Entry Students												
12	21DMAT31A	Basic Applied Mathematics -I	AS	0	0	0	0	0	2	50	50	100
Total								**0**	**2**	**50**	**50**	**100**
* - Ability Enhancement course												

DEPARTMENT OF COMPUTER ENGINEERING
IV Semester Scheme – NEP 160 Credits

S. No	Course Code	Course	BOS	L	T	P	S	Overall Credits	Contact Hours	CIE	SEE	TOTAL
1	21CEE41A	Discrete Mathematics and Graph Theory	AS	3	0	0	0	3	4	50	50	100
2	21HSS421A*	Life Skills for Engineers	HSS	1	0	1	0	2	2	50	50	100
3	21HSS431A	Entrepreneurship Development -II	HSS	1	0	0	0	1	1	50	50	100
4	21HSS441A	Constitution of India & Professional Ethics	HSS	1	0	0	0	1	1	50	50	100
5	21CEE45A	Object Oriented Programming using Java	CEE	3	0	0	0	3	4	50	50	100
6	21CEL45A	Object Oriented Programming using Java Lab	CEE	0	0	1	0	1	2	50	50	100
7	21CEE46A	Microprocessor and Microcontroller	CEE	3	0	0	0	3	4	50	50	100
8	21CEL46A	Microprocessor and Microcontroller Lab	CEE	0	0	1	0	1	2	50	50	100
9	21CEE47A	Design and Analysis of Algorithm Using C	CEE	3	0	0	0	3	4	50	50	100
10	21CEL47A	Design and Analysis of Algorithm using C Lab	CEE	0	0	1	0	1	2	50	50	100
11	21CEE48A	Summer Internship-I	CEE	0	0	0	2	2	0	50	50	100
Total								**21**	**26**	**550**	**550**	**1100**
Exclusively for Lateral Entry Students												
12	21DAEC40A	Communicative English	HSS	0	0	0	0	0	2	50	50	100
13	21DMAT41A	Basic Applied Mathematics-II	AS	0	0	0	0	0	2	50	50	100
Total								**0**	**4**	**100**	**100**	**200**
* - Ability Enhancement course												

SEMESTER III

(SYLLABUS)

NEP – 160 Credits

MATHEMATICAL FOUNDATION FOR COMPUTING SCIENCES

Course Code : 21CEE31A		**Credits:**	03
L: T: P: S : 3: 0: 0: 0		**CIE Marks:**	50
Exam Hours: : 03		**SEE Marks:**	50

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21CEE31A.1	Use appropriate numerical methods to solve algebraic equations and transcendental equations.
21CEE31A.2	Solve initial value problems using appropriate numerical methods and also Evaluate definite integrals numerically.
21CEE31A.3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data.
21CEE31A.4	Gain ability to use probability distributions to analyze and solve real time problems
21CEE31A.5	Justify the concept of sampling distribution to solve the engineering problems.
21CEE31A.6	Use the large/small samples 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**
21CEE31A.1	3	3	3	3	3	-	3	-	-	-	3	3
21CEE31A.2	3	3	3	3	3	-	3	-	-	-	3	3
21CEE31A.3	3	3	3	3	3	2	3	-	-	3	3	3
21CEE31A.4	3	3	3	3	3	2	-	-	-	3	3	3
21CEE31A.5	3	3	3	3	3	-	-	-	-	3	3	3
21CEE31A.6	3	3	3	3	3	-	-	-	-	3	3	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**Co's**
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 for unequal intervals (without proofs)-Problems. Case studies on Numerical Analysis.	**9**	**CO1**
2.	**Numerical Methods 2:** 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 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 particle and volume of solids.	**9**	**CO2**

3.	**Statistical Methods:** Fitting of the curves of the form $y = a + b\,x$, $y = a + b\,x + c\,x^2$, $y = ae^{bx}$, $y = a\,x^b$, and $y = ab^x$ by the method of least square, Correlation and Regression, Regression coefficients, line of regression-Problems and applications. Case studies on Correlation and Regressions.	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 distribution: Normal Distributions-Problems. **Joint Probability distributions:** Concept of joint probability-Joint probability distribution, Discrete and Independent random variables. Expectation, Covariance, Correlation coefficient. Case Studies on Distributions.	9	CO4
5.	**Sampling Theory:** Sampling, Sampling distributions, test of hypothesis of large samples for means and proportions, Inferences forvariance 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, 4th Edition, 2016, ISBN: 978-0-07-063419-0.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.
4. P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications(P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

1. CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 marks)	Assignment 1 (7.5 Marks)	Assignment 2 (7.5Marks)	Quiz1 (05Marks)	Quiz2 (05 Marks)
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. SEE- Semester End Examination (50Marks).

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

PROGRAMMING IN C
(Domain Based AEC)

Course Code	**: 21CEE322A**	**Credits:**	**02**
L: T: P: S	**: 1: 0: 1: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 03**	**SEE Marks:**	**50**

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21CEE322A.1	Describe the basic concepts of C Programming Language.
21CEE322A.2	Apply the fundamentals of problem-solving skills to solve problems.
21CEE322A.3	Apply the basic concepts of branching, looping statements of C Language in problem solving.
21CEE322A.4	Design and evaluate C programs based on different data types, decision structures, loops, arrays, strings and functions.
21CEE322A.5	Analyze the concepts of structures, Unions with their applications.
21CEE322A.6	Categorize various operations performed on pointers to implement C Program.

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
21CEE322A.1	3	-	-	-	-	-	-	-	-	1	-	1
21CEE322A.2	3	-	-	-	3	-	-	-	3	-	-	-
21CEE322A.3	3	3	3	-	3	-	-	-	3	-	-	-
21CEE322A.4	3	3	3	-	3	-	-	-	3	-	-	-
21CEE322A.5	3	3	3	1	3	-	-	-	3	1	-	-
21CEE322A.6	3	3	-	-	-	-	-	-	-	1	-	1
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No	Module Contents	Hours	Cos
1	Introduction to C Language: Algorithm, Flowchart, Basic concepts of a C program, Types of operators and expressions, Program to display 'This is my first C Program' Program like find sum of two numbers, Multiply two numbers. Program to calculate area and circumference of a circle.	6	**CO1, CO2**
2	Branching and Looping: if, if- else, nested if- else, switch statement, For, do- while, while. Program for even or odd number, Largest of three numbers. Eligible to vote or not. Program to print positive integers from 1 to 10 (For/Do/While). Program to find whether a character is consonant or vowel using switch statement.	6	**CO2, CO3**
3	Functions: User defined functions- function and Recursion definition, function declaration and call. Program to calculate factorial of a number using recursion. Program for addition subtraction multiplication and division using the function.	6	**CO2 CO3 CO4**

4	Basics of structures- data types, accessing structures, Structure operations, Nested structures, structures containing arrays, write a C program to create, declare and initialize structure. Program to store information of 5 students in structure and display it.	6	CO3, CO4
5	Basics of Union-data types, Array, Pointers concepts, Program to declare, initialize a union. Program to insert 5 elements into an array and print the elements of the array. Program to find biggest among three numbers using pointer.	6	CO4, CO6

Text Books:
1. "The C Programming Language", BrianW. Kernighan and Dennis M. Ritchie, 2 Edition, PHI, 2012.
2. Problem Solving with C ", Jacqueline Jones &Keith Harrow, 1 Edition, Pearson2011.IM PANDEY, Financial Management, Vikas Pub. House, 2018 Edition

Reference Books:
1. Computer Concepts and C Programming", Vikas Gupta, Dreamtech Press2013.Prasanna Chandra, Financial Management, TMH,2007
2. " Programming with C ", R. S. Bichkar, University Press,2012.Chopra P. N, Principle of Economics, Kalyani Publishers,
3. "Computer Programing in C", V. Rajaraman, PHI, 2013.
4. Computer Concepts and C Programming", Vikas Gupta, Dreamtech Press2013.Prasanna Chandra, Financial Management, TMH,2007

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	-	-	5
Understand	10	-	5
Apply	10	7.5	-
Analyze	5	7.5	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

ಆಡಳಿತ ಕನ್ನಡ

(Kannada for administration)

Course Code : 21HSS332A/432A	Credits : 01
L: T: P: S : 1:0:0: 0	CIE Marks : 50
Exam Hours : 2	SEE Marks : 50

ಆಡಳಿತ ಕನ್ನಡ ಅಧ್ಯಯನದ ಕಲಿಕಾಂಶಗಳು

C01 ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ

C02 ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು

C03 ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು

C04 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವಹಿಸಿಕೊಳ್ಳುವರು

CO – PO Mapping:

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

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಯ –1 ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ

ಅಧ್ಯಯ –2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ

ಅಧ್ಯಯ –3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

ಅಧ್ಯಯ –4 ಪತ್ರ ವ್ಯವಹಾರ

ಅಧ್ಯಯ –5 ಆಡಳಿತ ಪತ್ರಗಳು

ಅಧ್ಯಯ –6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು

ಅಧ್ಯಯ –7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸ್ಯೆಸ್ ರೈಟಿಂಗ್),ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ

ಅಧ್ಯಯ –8 ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ

ಅಧ್ಯಯ –9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

ಅಧ್ಯಯ –10 ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ /ಕಂಪ್ಯೂಟರ್
ಪಾರಿಭಾಷಿಕ ಪದಗಳು

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದ ಲೇಖಕರು

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

ಪರೀಕ್ಷೆಯ ವಿಧಾನ:

ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ (Continuous Internal Evaluation) : 50 ಅಂಕಗಳು

ಸೆಮಿಸ್ಟರ್ ಪರೀಕ್ಷೆ(Semester End Examination)   : 50 ಅಂಕಗಳು

Blooms Category	CIE (50)	SEE (50)
Remember	25	25
Understand	25	25

Vyavaharika Kannada

Course Code	: 21HSS333A/433A	Credits: 01
L: T: P: S	: 1: 0: 0: 0	CIE Marks:50
Exam Hours:	: 02	SEE Marks:50

Course Outcomes:	On completion of the course, student would be able to
CO#	COURSE OUTCOME
21HSS333A.1	Understand Kannada Language.
21HSS333A.2	Communicate in Kannada Language
21HSS333A.3	Read simple Kannada words
21HSS333A.4	Pronounce Kannada words correctly

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21HSS333A.1	-	-	-	-	-	-	-	-	-	3	-	-
21HSS333A.2	-	-	-	-	-	-	-	-	-	3	-	-
21HSS333A.3	-	-	-	-	-	-	-	-	-	3	-	-
21HSS333A.4	-	-	-	-	-	-	-	-	-	3	-	-
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

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 Books:

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

Continuous Internal Evaluation & Semester End Examination : (50 marks Each)

Bloom's Category	CIE(50)	SEE(50)
Remember	25	25
Understand	25	25

ENVIRONMENTAL SCIENCE

Course Code : **21HSS342A**		**Credits:**	**01**
L: T: P: S : 1: 0: 0: 0		**CIE Marks:**	**50**
Exam Hours: : 02		**SEE Marks:**	**50**

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21HSS342A.1	Understand the concepts of Environment, eco system and biodiversity.
21HSS342A.2	Explain the strategies for management of natural resources to achieve sustainability.
21HSS342A.3	Analyze the control measures of Environmental pollution and global Environmental issues.
21HSS342A.4	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
21HSS342A.1	-	-	-	-	-	3	3	-	-	-	-	-	-	-
21HSS342A.2	-	-	-	-	-	3	3	-	-	-	-	3	1	-
21HSS342A.3	-	-	-	-	-	3	3	3	-	3	-	3	1	-
21HSS342A.4	-	-	-	-	1	3	3	3	-	3	-	3	1	1

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

Module No.	Content 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 wastesand its management.Role of society, NGO and Govt. agenciesin 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, 10th Edition. 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	Tests	Assignments	Seminar
Marks (Out of 50)	25	15	10
Remember	5	-	-
Understand	15	-	-
Apply	5	8	5
Analyze	-	7	5
Evaluate	-	-	-
Create	-	-	-

SEE – Semester End Examination (50 Marks):

Bloom's Category	Tests
Remember	10
Understand	30
Apply	10
Analyze	-
Evaluate	-
Create	-

Percentage Evaluation of Various Blooms' levels:

Bloom's Category	CIE	SEE	Total	%
Remember	5	10	15	15
Understand	15	30	45	45
Apply	18	10	28	28
Analyze	12	-	12	12
Evaluate	-	-	-	-
Create	-	-	-	-

DIGITAL LOGIC CIRCUITS

Course Code : **21CEE35A**		**Credits:**	**03**
L: T: P: S : **3: 0: 0: 0**		**CIE Marks:**	**50**
Exam Hours: : **03**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE35A.1	Define, discuss and describe the basic principles of the digital circuits and their significance.
21CEE35A.2	Apply the Knowledge of minimization techniques to digital circuits
21CEE35A.3	Analyze different types of combinational and sequential circuits based on the given application with the given specifications
21CEE35A.4	Design efficient combinational and sequential logic circuit implementations from functional description of digital systems
21CEE35A.5	Use HDL tools to simulate and verify Digital circuits
21CEE35A.6	Examine the concepts of state transition for the analysis of combinational and sequential circuits.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEE35A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEE35A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEE35A.3	-	3	-	-	-	-	-	-	-	-	-	-	3	2
21CEE35A.4	-	-	3	-	-	-	-	-	-	-	-	-	3	2
21CEE35A.5	-	-	-	-	3	-	-	-	3	3	-	3	3	2
21CEE35A.6	-	-	-	2	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

Module No	Module Contents	Hours	Cos
1	**Simplification of Boolean Functions:** Review of Boolean algebra, logic gates, canonical forms, Three Variable K – Maps, Four Variable K – Maps, Quine-McCluskey minimization technique, reduced prime implicants Tables, Map Entered Variables.	9	**CO1, CO2**
2	**Combinational Logic Circuits:** Introduction, Adders, Subtractors, Carry Look Ahead Adder, Parallel Adder, Magnitude Comparator, Priority Encoders, Decoders, Multiplexers, Read Only memories (ROM), Programmable Logic Arrays (PLAs)	9	**CO1, CO2, CO3, CO4, CO6**

3	**Sequential Logic Circuits:** The Basic Flip-flop circuit, Clocked Flip-flops, Triggering of Flip-flops, types of Flip- flop, Master Slave Flip-Flops, Conversion of Flip-flops, types of Shift Registers, applications of shift register.	**9**	**CO1, CO2, CO3, CO4, CO6**
4	**Analysis of Sequential Circuit:** Binary ripple counters, synchronous binary counters, Design of a synchronous mod- n counter using clocked T, JK, D and SR flip-flops, Verilog implementation of counters, Mealy and Moore Models, State Reduction and Assignment, Design Procedure, Design with State Equations.	**9**	**CO1, CO2, CO3, CO4, CO6**
5	**Introduction to HDL:** Basic Concepts, data types, Compiler directives. Modules and Ports, Module definition, port declaration, connecting ports, Different types of modelling style, Verilog implementation of combinational circuits, Verilog implementation of sequential circuits, Verilog implementation Moore and Mealy.	**9**	**CO1, CO5**

Text Books:

1. Albert Paul Malvino, Donald P Leach and Goutam Saha, Digital Principles and Applications, McGraw Hill, 8thEdition, Special Indian Edition, 2017, ISBN: 978-9339203405

2. James Bignell and Robert Donovan, Digital Electronics, Cengage learning, 5th Edition, 2013, ISBN: 9788131520710

3. M. Morris Mano and Michael D. Ciletti, Digital Design with an Introduction to the VerilogHDL, VHDL,and SystemVerilog, Pearson Education,6th Edition 2018,ISBN*:* 978-0-13-277420-8

4. David J. Comer, Digital Logic & State Machine Design, Oxford University Press, 3rdEdition, 2016, ISBN: 978-0198092094

5. M. Morris Mano, Digital Logic and Computer Design, Pearson Education India, 1st Edition, 2017, ISBN: 978-9332542525

Reference Books:

1. Thomas L Floyd, Digital Fundamentals, Pearson Education India, 11th edition, 2018, ISBN: 9789332584600

2. R. D. Sudhakar Samuel, An Illustrative Approach to Logic Design, Pearson Education India, 2010, ISBN: 978-8131732304

3. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic Design with VHDL, Tata McGraw Hill, 2nd Edition, Special Indian edition, 2006, ISBN: 978-0070647756

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	5	-	5
Understand	10	-	5
Apply	10	7.5	-
Analyze	-	7.5	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	20
Apply	10
Analyze	10
Evaluate	-
Create	-

DIGITAL LOGIC CIRCUITS LAB

Course Code	: 21CEL35A	Credits:	01
L: T: P: S	: 0: 0: 1: 0	CIE Marks:	50
Exam Hours:	: 03	SEE Marks:	50

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	COURSE OUTCOME
21CEL35A.1	Apply the concepts of minimization techniques to realize the digital circuits
21CEL35A.2	Analyse and evaluate different methods to realize the logic circuits
21CEL35A.3	Design and simulate logic circuits using HDL tool
21CEL35A.4	Conduct experiments to demonstrate the specific application of digital electronics using suitable digital ICs/ Multisim/Xilinx/ FPGA board/- etc.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEL35A.1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEL35A.2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
21CEL35A.3	-	-	3	-	-	-	-	-	-	-	-	-	3	2
21CEL35A.4	-	-	-	-	3	-	-	-	-	-	-	-	3	2

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

Module No	Module Contents	Hours	Cos
1	Verify (a) Demorgan's Theorem for 2 variables. (b) The sum-of product and product-of-sum expressions using universal gates.	3	CO1, CO2, CO4
2	Design and implement (a) Full Adder using basic logic gates. (b) Full Subtractor using basic logic gates.	3	CO1, CO2, CO4
3	Realize the different shift registers using IC7474	3	CO2, CO4
4	Given a4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC. Simulate and verify its working using Verilog code	3	CO2, CO4
5	Perform n bit addition / subtraction using 4-bit full adder IC. Simulate and verify its working using Verilog code.	3	CO2, CO4

6	Design and implement BCD to seven-segment decoder. Simulate and verify given decoder using VERILOG code.	3	CO3, CO4
7	Design and implement Ring counter and Johnson counter using 4-bit shift register and demonstrate its working. Simulate and verify the working using VERILOG code.	3	CO3, CO4
8	Design and implement a mod-n (n<8) synchronous up or down counter using J-K Flip-Flop ICs and demonstrate its working. Simulate and verify mod 8 synchronous up or down counter using VERILOG code.	3	CO3, CO4
9	Design and implement an asynchronous counter using decade counter IC to count from 0 to n (n<=9) and demonstrate its working.	3	CO3, CO4
10	Design and implement a sequence generator (3bits) using Moore model and JK flip flop. Simulate and verify the working using VERILOG code.	3	CO3, CO4

CIE- Continuous Internal Evaluation: LAB (25 Marks)

Bloom's Taxonomy	Test	Conduction	Viva	Observation	Record
Marks	25	10	5	5	5
Remember	5	-	-	-	5
Understand	5	5	-	-	-
Apply	10	5	-	5	-
Analyze	5	-	5	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

SEE- Semester End Examination: LAB (25 Marks)

Bloom's Category	Tests	Write-up	Conduction	Viva
Remember	**25**	**10**	**10**	**5**
Understand	5	-	5	-
Apply	5	5	-	-
Analyze	10	5	5	-
Evaluate	5	-	-	5
Create	-	-	-	-

DATA STRUCTURES

Course Code : **21CEE36A**		**Credits:**	**03**
L: T: P: S : **3: 0: 0: 0**		**CIE Marks:**	**50**
Exam Hours: : **03**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE36A.1	Describe the fundamentals of data structure.
21CEE36A.2	Apply the concept of Dynamic Memory allocation.
21CEE36A.3	Analyze the concepts of linear and non-linear data structures for problem solving.
21CEE36A.4	Investigate various techniques in linear data structure and submit report in a team.
21CEE36A.5	Prepare an effective written documentation for non-linear data structures.
21CEE36A.6	Develop algorithms to solve problems using fundamental data structures.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEE36A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE36A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE36A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
21CEE36A.4	-	-	-	3	3	-	-	-	2	2	-	3	3	2
21CEE36A.5	-	-	-	-	3	-	-	-	-	2	-	3	3	2
21CEE36A.6	-	-	2	-	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

Module No	Module Contents	Hours	COs
1	**Introduction to Data Structures:** Arrays and Pointers revisited, Sparse matrix, transpose of a sparse matrix, dynamic memory management. Introduction to Data Structures, Classification of Data Structures, Abstract Data Types, Insertion sort, Quick sort, Shell sort, Radix sort.	9	**CO1, CO2**
2	**Stacks & Queues:** **Stacks:** Definition, tack representation, Primitive operations on stack, array representation of stacks. Applications of stacks: Recursion, Fibonacci series, Tower of Hanoi problem, Conversion of expressions, Evaluation of postfix expression, Iteration v/s recursion **Queues:** Definition, Queue representation, Primitive operations on queue, array representation of queues, Circular queue, Priority queue, Double ended queue, Applications of queues.	9	**CO1, CO2, CO3, CO4, CO6**

3	**Linked Lists:** Dynamic memory allocation revisited– malloc, calloc, realloc, free, Introduction to linked list, Representation of linked list in memory, primitive operations on linked list, searching a linked list, circular linked list, doubly linked list, header linked list. Applications of linked list: Josephus problem, addition of two long integers, addition of two polynomials, Linked representation of stack, Linked representation ofqueue.	9	**CO1, CO3, CO4**
4	**Trees-I: Introduction:** Binary tree – strictly binary tree, complete binary tree, representing binary tree in memory, traversing a binary tree, binary Search tree, insertion and deletion in binary search tree, threaded binary tree. Expression trees, construction of an expression tree from prefix and postfix, Heap tree, creation of heap tree, insertion in heap, Deletion from heap.	9	**CO1, CO2, CO3, CO5, CO6**
5	**Trees II & Graphs:** AVL Trees, Rotations in AVL tree, Insertion and deletion in an AVL tree, Huffman's algorithm. Introduction to Graph, Graph theory terminologies, sequential representation of a graph, adjacency matrix and path matrix, Warshall's algorithm, Linked representation of a graph, Operations on a graph, Traversing a graph, Topological sorting	9	**CO1, CO2, CO3, CO5, CO6**

Text Books:
1. SEYMOUR LIPSCHUTZ, Data Structures with C, McGraw Hill, 13th Edition, Special Indian Edition, 2017, ISBN: 978-0070701984
2. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J Augenstein, Data Structures Using C, Pearson Education, Thirteenth Impression, 1st Edition, 2019, ISBN: 978-8131702291

Reference Books:
1. Richard F Gilberg and Behrouz A Forouzan, Data Structures – A Pseudo code Approach with C, Cengage Learning, Second edition, Fifth Indian Reprint, 2015, ISBN: 9788131503140

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	-	-	5
Understand	10	-	5
Apply	10	7.5	-
Analyze	5	7.5	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

DATA STRUCTURES LAB

Course Code	:	**21CEL36A**	Credits:	**01**
L: T: P: S	:	**0: 0: 1: 0**	CIE Marks:	**50**
Exam Hours:	:	**03**	SEE Marks:	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEL36A.1	Apply Data structure techniques to solve the problem
21CEL36A.2	Analyse output for a given problem
21CEL36A.3	Conduct experiments as individual by using C programming language
21CEL36A.4	Make an effective report based on experiments

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEL36A.1	3	-	-	-	-	-	-	-	-	-	-	3	3	2
21CEL36A.2	-	3	-	-	-	-	-	-	-	-	-	3	3	2
21CEL36A.3	-	-	-	-	3	-	-	-	3	-	-	3	3	2
21CEL36A.4	-	-	-	-	-	-	-	-	-	3	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Module No	Module Contents	Hours	COs
1	Write a program to check whether the given matrix is sparse or not	**3**	**CO1, CO2, CO3, CO4**
2	Write A Program to Implement Insertion Sort Using Functions		
3	Write a program to sort the numbers using quick sort.	**3**	**CO1, CO2, CO3, CO4**
4	Write a C program to search an element using Binary search technique.		
5	Develop a program for STACK that performs following primitive operations: push, pop and display	**3**	**CO1, CO2, CO3, CO4**
6	Develop a program to convert INFIX notation to POSTFIX	**3**	**CO1, CO2, CO3, CO4**

7	Write a menu driven program to perform the following primitive operations on single linked list
	  A. Create a list with one node
	  B. Insertion at front, rear, after any given node
	  C. Deletion at front, rear, after any given node
	  D. Display
	  E. Reverse
		3	CO1, CO2, CO3, CO4

8	Develop a program for Queue that performs following primitive operations	3	CO1, CO2, CO3, CO4

9	Write a Menu driven program to perform the following primitive operations in double linked list
	  A. Insertion
	  B. Deletion
	  C. Display
		3	CO1, CO2, CO3, CO4

10	Develop a program to traverse a tree using in-order, pre-order and post-order.	3	CO1, CO2, CO3, CO4
11	Develop a program to perform insertion, deletion and traversal of a binary search tree	3	CO1, CO2, CO3, CO4
12	Develop a program to implement BFS and DFS traversal of graph	3	CO1, CO2, CO3, CO4

CIE- Continuous Internal Evaluation: LAB (50 Marks)

Bloom's Category	Tests (50 marks)
Remember	-
Understand	10
Apply	30
Analyze	10
Evaluate	-
Create	-

SEE- Semester End Examination: LAB (50 Marks)

Bloom's Category	Questions (50 marks)
Remember	-
Understand	10
Apply	30
Analyze	10
Evaluate	-
Create	-

DATA BASE MANAGEMENT SYSTEMS

Course Code : **21CEE37A**		**Credits:**	**03**
L: T: P: S : **3: 0: 0: 0**		**CIE Marks:**	**50**
Exam Hours: : **03**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE37A.1	Describe the concepts of data base management system.
21CEE37A.2	Apply the relational database concepts for the given scenario.
21CEE37A.3	Analyze various database concepts with ER model.
21CEE37A.4	Design database for the structured data by applying normalization techniques.
21CEE37A.5	Investigate, prepare and submit document for unstructured data as a team.
21CEE37A.6	Develop in-memory database for needed applications.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEE37A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE37A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE37A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
21CEE37A.4	-	-	3	-	3	-	-	-	-	-	-	3	3	2
21CEE37A.5	-	-	-	-	3	-	-	-	3	3	-	3	3	2
21CEE37A.6	3	-	-	-	3	-	-	-	-	-	-	2	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Module No	Module Contents	Hours	COs
1	**Introduction:** Introduction, An example, Characteristics of Database Approach. **Database Applications**: Need for data management, Advantages of using DBMS approach. **Data models & Database Architecture**: Data models, schemas and instances, Three-schema architecture and data independence, Centralized and client-server architectures. **ER Diagrams**: Entity Types, Entity Sets, Attributes and Keys, Relationship types, Roles and Structural Constraints, Weak Entity Types, ER Diagrams.	10	**CO1, CO2, CO3**
2	**Relational Model:** Concepts, Constraints and Relational Database Schemas, Update operations **Database Design** using ER to Relational Mapping **Relational Algebra**: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	9	**CO1, CO2, CO3**

3	**Introduction to SQL:** DDL and Data types, Data Constraints, Basic Queries in SQL, Insert, Delete and Update statements in SQL, More complex SQL Queries, Triggers, Introduction to Views: creation, implementation, update of views; Introduction to Assertion and Triggers, Introduction to Nested Queries; Correlated Nested Queries, Advanced SQL - Embedded & Dynamic SQL	9	**CO1, CO2, CO3**
4	**Index Structures:** Indexes on Sequential Files: dense, sparse index; multilevel indexing; Hash Based Indexing: Static Hashing and dynamic hashing. Database Refinement: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normalization for Relational Databases:1NF, 2NF, 3NF, BCNF; Transaction Management: The ACID Properties; Transactions and Schedules	9	**CO1, CO3, CO4**
5	**In-Memory Data Base:** Overview of in-memory DB, Architecture and applications of in-memory database, Hands-on SQLite data types and query. **NOSQL Databases:** What is NoSQL, Need of NOSQL, Features OF NOSQL, CAP Theorem, ACID v/s BASE, Advantages & Disadvantages of NOSQL, Types of NOSQL: Key-Value database- Document-based database- Column-based database- Graph based database	8	**CO1, CO5, CO6**

Text Books:

1. Abraham Silberschatz , Henry F. Korth , S. Sudarshan, Database System Concepts, McGraw Hill, 6th Edition, 2013, ISBN: 9789332901384
2. Ramez Elmasri and Shamkant B. Navathe: Fundamentals of Database Systems, Pearson Education India, 7th Edition, 2016, ISBN: 9780133971118
3. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, McGraw Hill, 3rd Edition, 2014, ISBN: 978-8131769591
4. https://www.tutorialspoint.com/sqlite/sqlite_tutorial.pdf

Reference Books:

1. C.J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006, ISBN: 9788177585568
2. https://www.comp.nus.edu.sg/~ooibc/TKDE-2015-inmemory.pdf
3. https://web.archive.org/web/20130719065616/http://www.low-latency.com/article/101-introduction-memory-database-systems
4. C.J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006, ISBN: 9788177585568

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	5	-	-
Understand	5	7.5	5
Apply	10	7.5	5
Analyze	5	-	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

DATABASE MANAGEMENT SYSTEMS LAB

Course Code : **21CEL37A**		**Credits:**	**1**
L: T: P: S : **0: 0: 1: 0**		**CIE Marks:**	**50**
Exam Hours: : **3**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	COURSE OUTCOME
21CEL37A.1	Design and develop database for the given scenario.
21CEL37A.2	Analyze output of database for a given problem.
21CEL37A.3	Conduct experiments as individual by using modern tools like MySQL/SQLite
21CEL37A.4	Make an effective report based on experiments.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEL37A.1	3	-	-	-	-	-	-	-	-	-	-	3	3	2
21CEL37A.2	-	3	-	-	-	-	-	-	-	-	-	3	3	2
21CEL37A.3	-	-	-	-	3	-	-	-	3	-	-	3	3	2
21CEL37A.4	-	-	-	-	-	-	-	-	-	3	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Exercise No	Module Contents	Hours	CO's
PART – A			
1	Draw ER diagram and Map to schema Diagram	4	**CO1, CO2, CO3, CO4**
2	Write a relational algebra for a given set of relations.		
3	Hands on practice on SQL queries on basic operations.	4	**CO1, CO2, CO3, CO4**
4	Queries with aggregate functions and Sub queries		
5	Nested Queries and correlated Queries	4	**CO1, CO2, CO3, CO4**
6	Practice on Different join operation in SQL		
7	Creating Views and Manipulations of views	2	**CO1, CO2, CO3, CO4**

Exercise No	Module Contents	Hours	CO's
PART – B			
1	Usage of Cursors and Triggers.	**4**	**CO1, CO2, CO3, CO4**
2	PL/SQL.		
3	Library Database perform related queries	**4**	**CO1, CO2, CO3, CO4**
4	Company Database perform related queries		
5	College Database perform related queries	**4**	**CO1, CO2, CO3, CO4**
6	Order Database perform related queries		
7	Case Study – performance analysis on SQLite	**4**	**CO1, CO2, CO3, CO4**

CIE- Continuous Internal Evaluation: LAB (50 Marks)

Bloom's Category	Tests (50 marks)
Remember	-
Understand	10
Apply	30
Analyze	10
Evaluate	-
Create	-

SEE- Semester End Examination: LAB (50 Marks)

Bloom's Category	Questions (50 marks)
Remember	-
Understand	10
Apply	30
Analyze	10
Evaluate	-
Create	-

MINI PROJECT-I

Course Code : **21CEE38A**		**Credits:**	**2**
L: T: P: S : **0: 0: 2: 0**		**CIE Marks:**	**50**
Exam Hours: : **3**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE38A.1	Understand the technological needs and/ or societal needs and sustainability of the environment.
21CEE38A.2	Design application high level programming language.
21CEE38A.3	Analyse and evaluate the outcome of the project.
21CEE38A.4	Test, validate and communicate the identified solutions in a structured way.

Mapping of Course Outcomes to Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEE38A.1	-	-	-	-	-	3	2	3	-	-	-	3	3	2
21CEE38A.2	-	-	3	-	3	-	-	-	-	-	-	3	3	2
21CEE38A.3	-	3	-	-	-	-	-	-	-	-	-	3	3	2
21CEE38A.4	-	-	-	3	-	-	-	-	3	3	3	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

The student shall be capable of identifying a problem related to the field of Computer Engineering and carry out a mini project on the problem defined. Each student is expected to do the mini project individually. The code developed towards the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an "F" GRADE and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

Sample Mini project includes:
1) Tic-Tac-Toe Game
2) Quiz Game
3) Library Management
4) Telecom Billing Management system
5) Numerical Method Applications.

CIE- Continuous Internal Evaluation: (50 Marks)

Bloom's Category	Mini Project (50 marks)
Remember	-
Understand	-
Apply	20
Analyze	20
Evaluate	10
Create	-

SEE- Semester End Examination: (50 Marks)

Bloom's Category	Mini Project (50 marks)
Remember	-
Understand	-
Apply	20
Analyze	20
Evaluate	10
Create	-

BASIC APPLIED MATHEMATICS-I

Course Code	: 21DMAT31A	Credits:	00
L: T: P: S	: 0: 0: 0: 0	CIE Marks:	50
Exam Hours:	: 02	SEE Marks:	50

Course Outcomes:	On completion of the course, student would be able to
CO#	COURSE OUTCOME
21DMAT31A.1	Know the principles of engineering mathematics through calculus
21DMAT31A.2	Determine the power series expansion of a function
21DMAT31A.3	Find the definite integrals with standard limits and also develop the ability to solve different types of differential equations
21DMAT31A.4	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
21DMAT31A.1	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.2	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.3	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.4	3	3	3	-	-	-	-	-	-	-	-	3

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

	Course Syllabus		
Module No.	**Contents of the Module**	**Hours**	**CO's**
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, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN:978-0-273-73409-3
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.

1. **CIE- Continuous Internal Evaluation (50 Marks).**

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. **SEE- Semester End Examination (50Marks).**

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

SEMESTER IV

(SYLLABUS)

NEP – 160 Credits

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Code : **21CEE41A**   **Credits:**   **3**
L: T: P: S : 3: 0: 0: 0   **CIE Marks:**   **50**
Exam Hours: : 03   **SEE Marks:**   **50**

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21CEE41A.1	Explain the counting techniques and combinatorics by using the context of discrete probability.
21CEE41A.2	Illustrate the fundamental concepts of trees, connectivity and planarity graphs.
21CEE41A.3	Apply Pigeon hole principle to solve real life problems.
21CEE41A.4	Solve the engineering problems involving relations and functions.
21CEE41A.5	Analyze the computer science problems by using graph theory techniques.
21CEE41A.6	Justify the arguments with propositional and predicate logic and from truth tables.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21CEE41A.1	3	3	3	3	-	-	-	-	-	3	-	3
21CEE41A.2	3	3	3	3	-	-	-	-	-	-	-	3
21CEE41A.3	3	3	3	3	-	-	-	-	-	3	-	3
21CEE41A.4	3	3	3	3	-	-	-	-	-	-	-	3
21CEE41A.5	3	3	3	3	-	-	-	-	2	3	-	3
21CEE41A.6	3	3	3	3	-	-	-	-	2	3	-	3

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

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**COs**
1.	**Mathematical Logic:** Basic Connectives and Truth Tables, Tautology and Contradiction, Logic Equivalence, The Laws of Logic, Converse, Inverse and Contra positive, Logical Implication, Rules of Inference. Case studies on roles of logic in specification of computation.	9	CO6
2.	**Properties of the Integers**: The Well Ordering Principle, Mathematical Induction, Fundamental Principles of Counting: The Rules of Sum and Product, Permutations, Combinations without repetition, The Binomial Theorem.	9	CO1
3.	**Relations and Functions**: Cartesian Products and Relations, One-to-One and onto functions. The Pigeon hole Principle, Function Composition and Inverse Functions. Properties of Relations, Equivalence Relations and Partitions.	9	CO3 CO4
4.	**Graph Theory:** Graphs-Definitions and examples, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, graph isomorphism, Euler graphs, Hamiltonian paths and cycles. Case studies on Network Analysis.	9	CO5
5.	**Trees, Connectivity and Planarity**: Trees, Properties of trees, Rooted and binary trees. Spanning trees, cut sets, Properties of cut set, all cut sets, Fundamental circuits Network flows, Planar graphs, Dual of planar graphs, Different representation of a planar graph. Case studies on Social Network Analysis.	9	CO2

Text Books:

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics-an applied introduction, Pearson Education, Fifth Edition, 2019, ISBN: 9789353433055.
2. Narsingh Deo, Graph Theory with Application to Engineering and Computer Science, Dover Publications Inc., First Edition, 2016, ISBN: 978-0486807935.

Reference Books:

1. Basavaraj S. Anami and Venakanna S. Madalli, Discrete Mathematics – A Concept based approach, Universities Press, 2016, ISBN: 9788173719998.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, McGraw Hill Education, Seventh Edition, 2017, ISBN: 9780070681880.
3. D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson, 2004. ISBN: 9780619212858.
4. Thomas Koshy, Discrete Mathematics with Applications, Elsevier, First Edition 2005, ISBN: 9788181478870

1. **CIE- Continuous Internal Evaluation (50 Marks).**

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. **SEE- Semester End Examination (50Marks).**

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

LIFE SKILLS FOR ENGINEERS

Course Code	: 21HSS421A	Credits:	02
L: T: P: S	: 1: 0: 1: 0	CIE Marks:	50
Exam Hours:	: 03	SEE Marks:	50

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21HSS421A.1	Relate "SMART GOALS" to personal and professional life
21HSS421A.2	Articulate and communicate ideas and thoughts with clarity and focus
21HSS421A.3	Develop critical and creative thinking skills for problem solving and decision making for leadership.
21HSS421A.4	Analyze the importance of the concepts of personality development and grooming in corporate life
21HSS421A.5	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
21HSS421A.1	-	-	-	-	-	-	-	3	3	3	3	3
21HSS421A.2	-	-	-	-	-	3	3	3	3	1	3	3
21HSS421A.3	-	-	-	-	-	3	3	3	3	3	2	3
21HSS421A.4	-	-	-	-	-	3	3	3	3	3	2	3
21HSS421A.5	-	-	-	-	-	3	2	3	3	2	3	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No.	Module Contents	Hours	CO'S
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 – Organizing 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 behavior, 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	Tests	Assignments	Self-Study	Peer Evaluation
Marks (out of 50)	10	15	15	10
Remember	-	-	-	-
Understand	-	-	-	-
Apply	5	5	-	5
Analyze	-	-	5	-
Evaluate	-	-	-	
Create	5	10	10	5

SEE- Semester End Examination (50 Marks)

NOTE: Being a Life skills course we felt it would be suitable to do the final assessment through a structured group discussion which will provide an opportunity to test students in all levels of Bloom's Taxonomy.

Bloom's Category	Group Discussion
Remember	**5**
Understand	**10**
Apply	**10**
Analyse	**10**
Evaluate	**5**
Create	**10**

ENTREPRENEURSHIP DEVELOPMENT-II

Course Code : **21HSS431A**		**Credits:**	**01**
L: T: P: S : **1: 0: 0: 0**		**CIE Marks:**	**50**
Exam Hours: : **02**		**SEE Marks:**	**50**

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
21HSS431A.1	Identify the problem and understand the concept of blue ocean strategy
21HSS431A.2	Create Minimum viable product
21HSS431A.3	Analyze customer segment, Niche and early adopters
21HSS431A.4	Interpret the cost revenue Structure and feasibility of the venture
21HSS431A.5	Analyze and develop financial model for venture.
21HSS431A.6	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
21HSS431A.1	0	3	0	0	0	3	1	2	0	0	0	1
21HSS431A.2	0	3	0	0	0	3	1	2	0	0	0	0
21HSS431A.3	0	3	0	0	0	3	1	2	0	0	0	0
21HSS431A.4	0	3	0	3	0	3	1	2	0	0	0	3
21HSS431A.5	0	3	0	3	0	3	1	2	0	0	0	3
21HSS431A.6	0	3	0	3	0	3	1	2	0	0	0	3

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

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 conceptand Initial Financing, Financial Model- concept and implementation	3	CO5, CO6

Suggested Case Studies:

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 RedBus 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. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India)Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.
3. Financial Modeling, fourth edition (The MIT Press) , Illustrated, 18 April 2014,by Simon Benninga.
4. Positioning: The Battle for Your Mind, by Al Ries, Jack Trout

INTERNAL ASSESSMENT PATTERN – 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	10
Understand	10
Apply	10
Analyze	5
Evaluate	5
Create	10

CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

Course Code	**: 21HSS441A**	**Credits:**	**01**
L: T: P: S	**: 1: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 02**	**SEE Marks:**	**50**

Course Outcomes:	On completion of the course, student would be able to
CO#	COURSE OUTCOME
21HSS441A.1	Gain knowledge of Indian Constitution and be able to solve the legal and societal issues.
21HSS441A.2	Understand Engineering Ethics and Responsibilities
21HSS441A.3	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
21HSS441A.1	-	-	-	-	-	1	-	3	1	-	-	3
21HSS441A.2	-	-	-	-	-	1	-	3	1	-	-	3
21HSS441A.3	-	-	-	-	-	1	-	3	1	-	-	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

*L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 –Creating

SYLLABUS			
Module No	CONTENTS OF THE MODULE	Hours	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. Centre- 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	CO1
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	CO1

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**	**C02**
5	**Iinternet 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**	**C03**

Text Books:

1. Durga Das Basu: "Introduction to the constitution"$19^{th}/20^{th}$ 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:

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.

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 25)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	21 to 25
Good (B)	The student's performance is good in most of the intended course learning outcomes.	16 to 20
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	10 to 15
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 09

OBJECT ORIENTED PROGRAMMING USING JAVA

Course Code	**: 21CEE45A**	**Credits:**	**03**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 03**	**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE45A.1	Define, describe and explain the object-oriented concepts.
21CEE45A.2	Apply OOP's concept to implement a given problem using Java.
21CEE45A.3	Analyze and ensure the flow of a program through appropriate exception handling techniques.
21CEE45A.4	Investigate and apply the concept of Multithreading in concurrent programming available in literature and submit report in a team
21CEE45A.5	Solve the real-world problems using Object Oriented concepts and collection framework in Java.
21CEE45A.6	Construct GUI applications using JAVA swing/applet package.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21CEE45A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE45A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
21CEE45A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
21CEE45A.4	-	-	3	-	3	-	-	-	3	3	-	3	3	2
21CEE45A.5	-	-	3	-	3	-	-	-	-	3	-	3	3	2
21CEE45A.6	-	-	-	2	3	-	-	-	-	-	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Module No	Module Contents	Hours	COs
1	**Introduction to Java:** Basics of Java programming - Dissecting the "Hello, World" Program, Compiling and Running a Java Program, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Math class, Arrays in java	9	**CO1, CO2, CO6**
2	**Objects and Classes:** Working with Objects, Implementing Classes, Object Construction, Static Variables and Methods, Constructors, Overloading, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, this reference, nested classes.	9	**CO1, CO2, CO6**
3	**Inheritance and Polymorphism:** Inheritance and types, Super and sub class, Overriding, Polymorphism, Dynamic binding, Casting objects, Instance of operator, Abstract class, Interface, Package, Object class	9	**CO1, CO2**

4	**Exception Handling**: Exception Types, Uncaught Exceptions, using try and catch, Multi catch clauses, Nested try statements, throw, throws, finally, Java's Built- in Exceptions. **Threads**: The java Thread Model, the main Thread, creating a Thread, creating multiple Threads, Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming and Stopping Threads, using Multithreading.	9	**CO1, CO2, CO3, CO4, CO6**
5	**I/O basics:** Reading input, writing output, Reading and Writing files **The Collections Framework:** Collections Overview, The Collection Interfaces- The List Interface, The Set Interface, The Queue Interface, The Collection Classes – Array List Class, Linked List Class, Tree set Class	9	**CO1, CO2, CO5**

Text Books:
1. Herbert Schildt, Java™: The Complete Reference, McGraw-Hill Education, 11th edition, 2018, ISBN: 978-1260440232
2. Cay S.Horstmann, Core Java SE9 for the Impatient, Addison Wesley, 2nd Edition, 2018, ISBN: 9780134694849

Reference Books:
1. Ken Kousen, Modern Java Recipes, O'Reilly Media Inc, 2017, ISBN: 9781491973172
2. Cay S. Horstmann, Core Java™ Volume I - Fundamentals, Pearson education India, 10th edition,2015, ISBN: 9780134177335
3. Rogers Cedenhead and Laura Lemay, SAMS teach yourself Java2 in 21 days, Pearson Education, Professional Reference Edition, 3rd Edition, 2004, ISBN-13: 9780672326288

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	5	-	-
Understand	5	-	-
Apply	10	7.5	5
Analyze	5	7.5	5
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

Course Code	: **21CEL45A**	**Credits:**	**1**
L: T: P: S	: 0: 0: 1: 0	**CIE Marks:**	**50**
Exam Hours:	: 3	**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEL45A.1	Apply OOP concepts with basic Java constructs to solve the given problem.
21CEL45A.2	Analyze the output for the programs in Java.
21CEL45A.3	Conduct experiments as individual by using modern tools like JDK
21CEL45A.4	Make an effective report based on experiments

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEL45A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEL45A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEL45A.3	-	3	-	-	-	-	-	-	3	-	-	3	3	2
21CEL45A.4	-	-	-	-	-	-	-	-	3	3	-	-	3	2

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

Module No	Module Contents	Hours	Cos
1	Write a Java Program to demonstrate math class and arrays	**4**	**CO1, CO2, CO3, CO4**
2	Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object, and use static members.		
3	Write a Java program to demonstrate String class, String Buffer class and its Methods	**4**	**CO1, CO2, CO3, CO4**
4	Write a Java program to demonstrate nested classes and array of objects		
5	Write a Java Program to implement inheritance and demonstrate use of method overriding	**4**	**CO1, CO2, CO3, CO4**
6	Write a Java Program to implement multilevelinheritance by applying various access controls to its data members and methods		
7	Write a program to demonstrate use of implementing interfaces	**4**	**CO1, CO2, CO3, CO4**
8	Write a program to demonstrate use of extending interfaces		

9	Write a Java program to implement the concept of importing classes from user defined package and creating packages Write a Java Program to demonstrate dynamic binding, generic programming	**4**	**CO1, CO2, CO3, CO4**
10	Write a program to implement the concept of threading by extending Thread Class		
11	Write a program to implement the concept of threading by implementing Runnable Interface	**4**	**CO1, CO2, CO3, CO4**
12	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number		
13	Write a program to implement the concept to of Exception Handling using pre-defined exception	**4**	**CO1, CO2, CO3, CO4**
14	Write a program to implement the concept of Exception Handling by creating user defined exceptions		
15	Write a program to demonstrate File I/O Operations	**2**	**CO1, CO2, CO3, CO4**
16	Write a program to demonstrate Array List Class, Linked List Class, Tree set Class		

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (50 marks)
Remember	-
Understand	-
Apply	20
Analyze	10
Evaluate	-
Create	20

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	-
Understand	-
Apply	20
Analyze	10
Evaluate	-
Create	20

MICROPROCESSOR AND MICROCONTROLLER

Course Code : **20CEE46A**		**Credits:**	**3**
L: T: P: S : **3: 0: 0: 0**		**CIE Marks:**	**50**
Exam Hours: : **3**		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	COURSE OUTCOME
20CEE46A.1	Describe the concepts and explain the functional features of 8086 Microprocessor and 8051 Microcontroller
20CEE46A.2	Apply the knowledge of addressing modes to write assembly language program in 8086 and 8051.
20CEE46A.3	Analyze and make use of assembler directives and interrupt methods in 8086 and 8051programming.
20CEE46A.4	Examine the timing diagrams using minimum and maximum mode configuration of 8086 and 8051.
20CEE46A.5	Demonstrate the programmable peripheral Input-output interfacing with 8086.
20CEE46A.6	Evaluate assembly language programs and download the machine code that will provide solutions to real-time problems.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CEE46A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	-
20CEE46A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
20CEE46A.3	-	3		-	3	-	-	-	-	-	-	3	3	-
20CEE46A.4	-	-	3	-	-	-	-	-	2	-	-	3	3	-
20CEE46A.5	-	-	-	-	3	-	-	-	-	2	-	3	3	-
20CEE46A.6	-	-	-	2	3	-	-	-	-	-	-	-	3	-
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

Module No	Module Contents	Hours	COs
1	**ARCHITECTURE OF 8086**–Review of Functional Block Diagram of 8086, flag register and function of Flags, Machine language instruction formats, Instruction set. Addressing modes of 8086, simple programs.	9	**CO1, CO2**
2	**ASSEMBLY LANGUAGE PROGRAMMING**: Assembler Directives, 8086 Simple Assembly Language Programming, procedures, and macros. Interrupts, Interrupt cycle of 8086 and Interrupt Service Routines. Introduction to DOS and BIOS interrupts.	9	**CO1, CO3, CO6**
3	**8086 BUS CONFIGURATION AND TIMINGS:** Pin Diagram of 8086, Memory Organization, Minimum Mode and Timing diagrams, Maximum Mode and Timing diagrams, Memory interfacing to 8086 (Static RAM & EPROM). Need for DMA. DMA data transfer Method.	9	**CO1, CO4**
4	**MICROCONTROLLER**: Architecture of 8051 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.	9	**CO1, CO5**

5	**INTERFACING MICROCONTROLLER:** Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display	9	**CO1, CO5**

Text Books:

1. Douglas V Hall and SSSP Rao, Microprocessor and Interfacing, McGraw Hill Education, 3rd edition, 2017, ISBN: 978-1259006159
2. A.K. Ray and K.M. Bhurchandi, Advanced Microprocessors and Peripherals, McGraw Hill Education, 3rd Edition, 2015, ISBN: 9781259006135
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, ―The 8051 Microcontroller and Embedded Systems: Using Assembly and C‖, Second Edition, Pearson education, 2011.

Reference Books:

1. Yu - Cheng Liu and Glenn A. Gibson, Microcomputer systems-The 8086 / 8088 Family, Education India, 2nd edition, 2015, ISBN: 9789332550087
2. Barry B. Brey, The Intel Microprocessor, Architecture, Programming and Interfacing, Pearson Education India, 8th Edition, 2009, ISBN: 978-0-13-502645-8
3. Kenneth J Ayala, The 8086 Microprocessor: Programming & Interfacing the PC, CENGAGE Learning, 1st Edition, 2007, ISBN: 9788131501801

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	5	-	-
Understand	5	7.5	-
Apply	10	7.5	5
Analyze	5	-	5
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Taxonomy	Questions (50 marks)
Remember	10
Understand	20
Apply	10
Analyze	10
Evaluate	-
Create	-

MICROPROCESSORS AND MICROCONTROLLER LAB

Course Code : **20CEL46A** | **Credits:** 1
L: T: P: S : 0: 0: 1: 0 | **CIE Marks:** 50
Exam Hours: : 3 | **SEE Marks:** 50

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	COURSE OUTCOME
20CEL46A.1	Write assembly level programs using 8086 and 8051 to perform arithmetic and logical operations.
20CEL46A.2	Apply the knowledge of computer number system to write code conversion programs in 8086.
20CEL46A.3	Analyze and develop assembly code for string operations, sorting of numbers and branch instructions of 8086.
20CEL46A.4	Develop assembly code for generating software interrupts

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CEL46A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL46A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL46A.3	-	3	-	-	3	-	-	-	3	-	-	3	3	2
20CEL46A.4	-	-	-	-	3	-	-	-	3	3	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

Sl.No.	LIST OF EXPERIMENTS	Cos
1	Data transfer instructions like: 1.1 Byte and word data transfer in different addressing modes. 1.2 Block move (with and without overlap) 1.3 Block interchange	**CO1**
2	Arithmetic & logical operations like: 2.1 Addition and Subtraction of multi precision nos. 2.2 Multiplication and Division of signed and unsigned Hexadecimal nos. 2.3 ASCII adjustment instructions 2.4 Code conversions 2.5 Arithmetic programs to find square cube, LCM, GCD, factorial	**CO1, CO2**
3	Bit manipulation instructions like checking: 3.1 Whether given data is positive or negative 3.2 Whether given data is odd or even 3.3 Logical 1"s and 0"s in a given data 3.4 2 out 5 code 3.5 Bit wise and nibble wise palindrome	**CO1**
4	Branch/Loop instructions like: 4.1 Arrays: addition/subtraction of N nos., Finding largest and smallest nos., Ascending and descending order 4.2 Near and Far Conditional and Unconditional jumps, Calls and Returns	**CO3**

5	Write an assembly level programs using 8086 for sorting operations like ascending, descending, largest and smallest in microprocessor	**CO3**
6	Programs on String manipulation like string transfer, string reversing, searching for a string, etc.	**CO3**
7	Write a assembly level program for basic arithmetic and logical operations in 8051 microcontroller.	**CO4**
8	Experiments on interfacing 8086/8051 with the following interfacing modules through DIO (Digital Input/Output-PCI bus compatible) card a. Matrix keyboard interfacing b. Seven segment display interface c. Logical controller interface d. Stepper motor interface	**CO4**

Assessment Pattern

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Test	Conduction	Viva	Observation	Record
Marks	**50**	**20**	**10**	**10**	**10**
Remember	10	-	-	-	10
Understand	10	10	-	-	-
Apply	20	10	-	10	-
Analyze	10	-	10	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests	Write-up	Conduction	Viva
Remember	10	-	10	-
Understand	10	10	-	-
Apply	20	10	10	-
Analyze	10	-	-	10
Evaluate	-	-	-	-
Create	-	-	-	-

DESIGN AND ANALYSIS OF ALGORITHM using C

Course Code	: **21CEE47A**		**Credits:**	**03**
L: T: P: S	: 3: 0: 0: 0		**CIE Marks:**	**50**
Exam Hours:	: 03		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEE47A.1	Recognize asymptotic notations for performance of different algorithms.
21CEE47A.2	Apply appropriate design techniques by analysing and evaluating algorithm to propose solution
21CEE47A.3	Analyze the efficiency of algorithms using time and space complexity theory
21CEE47A.4	Design algorithms for various computing problems.
21CEE47A.5	Investigate P, NP & NP-complete classes to analyse the limitations of an algorithm and submit a report as a team.
21CEE47A.6	Apply Backtracking and Branch & Bound technique to assess an algorithm and formulate solution.

Mapping of Course Outcomes to Program Outcomes													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21CEE47A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
21CEE47A.2	3	-	-	-	3	-	-	-	-	-	-	-	3	2
21CEE47A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
21CEE47A.4	-	-	3	-	3	-	-	-	-	-	-	3	3	2
21CEE47A.5	-	-	-	3	-	-	-	-	3	3	-	3	3	2
21CEE47A.6	3	-	-	-	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)													

Module No	Module Contents	Hours	Cos
1	**Introduction**: Fundamentals of Algorithms, Problem Solving- Important Problem Types, **Performance Analysis:** Space complexity, Time complexity– Asymptotic notations and Basic efficiency classes: Big-Oh notation (O), Omega notation (Ω), The annotation (Θ), Mathematical analysis for Recursive and Non-recursive algorithms. **Brute Force Approach**: General Method, Simple string matching	9	**CO1, CO2**
2	**Divide and Conquer**: General method - Recurrence equation for divide and conquer-Analysis of quick sort and merge sort algorithm- Advantages and disadvantages of divide and conquer approach. **Decrease and Conquer**: General Method, Topological sorting. **Transform and Conquer**: General Method, Heaps and Heap Sort	9	**CO1, CO2**

3	**Greedy Approach**: General method, Prim's Algorithm, Kruskal's Algorithm, Single source shortest paths: Dijkstra's Algorithm, 0/1 Knapsack problem. **Dynamic Programming**: General method, All pair shortest path problem, Longest common subsequence, Traveling salesperson problem	**9**	**CO1, CO3**
4	**Backtracking**: General method, N-Queens problem, Sum of subsets problem, Hamiltonian cycles. **Branch and Bound**: General method, Travelling Sales Person problem, Knapsack problem, LC Programme and Bound solution.	**9**	**CO1, CO4, CO6**
5	**NP Complete and NP-Hard problems**: Basic concepts-non- deterministic algorithms-P, NP, NP- Complete, and NP-Hard classes **String matching algorithm**: KMP String matching algorithm- Boyer Moore String matching algorithm **Parallel algorithms**: PRAM models, Prefix computation, Odd even merge sort, Sorting on a mesh.	**9**	**CO1, CO5**

Text Books:

1. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Pearson Education India, 3rd Edition, 2012, ISBN: 9780132316811

Reference Books:

1. Thomas H Cormen, Charles E Leiserson, Ronald R Rivest and Clifford Stein, Introduction to Algorithms, 3rd Edition, PHI Learning Pvt. Ltd, 2010, ISBN: 978-8120340077

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignments (15 marks)	Quizzes (10 marks)
Remember	5	-	-
Understand	10	-	5
Apply	10	7.5	5
Analyze	-	7.5	-
Evaluate	-	-	-
Create	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

DESIGN AND ANALYSIS OF ALGORITHM using C LAB

Course Code : **21CEL47A**   **Credits:** **01**
L: T: P: S : **0: 0: 1: 0**   **CIE Marks:** **50**
Exam Hours: : **03**   **SEE Marks:** **50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21CEL47A.1	Write the complexities of various applications in different domains
21CEL47A.2	Apply efficient algorithms to solve problems in various domains
21CEL47A.3	Analyze suitable design technique to develop efficient algorithms
21CEL47A.4	Compare, implement and understand when to apply various design techniques

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CEL47A.1	3	3	3	3	3	-	-	3	3	-	-	3	3	3
21CEL47A.2	3	3	3	3	3	-	-	3	3	-	-	3	3	3
21CEL47A.3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
21CEL47A.4	3	3	3	3	3	-	-	3	3	-	-	3	3	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Sl. No.	LIST OF EXPERIMENTS	HOURS	Cos
1	Write a program to find GCD of two numbers using differential algorithms	2	CO1
2	Write a program to Implement Sieve of Eratosthenes to generate Prime Numbers Between Given Range	2	CO1
3	Write a program to implement string matching using Brute Force	2	CO1
4	Write a program to implement Merge Sort	3	CO2, CO3
5	Write a program to implement Quick Sort	3	CO2, CO3
6	Write a program to obtain minimum cost spanning tree using Prim's Algorithm	3	CO2, CO3
7	Write a program to obtain minimum cost spanning tree using Kruskal's Algorithm	3	CO2, CO3
8	Write a program to obtain shortest path using Djikstra's algorithm	3	CO2, CO3
9	Write a program to compute Binomial Coefficient	3	CO2, CO3
11	Write a program to compute Transitive closure using Warshall's algorithm	3	CO2, CO3
12	Write a program to implement Breadth First search	3	CO2, CO3
13	Write a program to implement Depth First search	3	CO2, CO3

14	Write a program to implement Topological sorting	**3**	**CO2, CO3**
15	Write a program to implement Subset Sum problem using Backtracking	**3**	**CO4**
16	Write a program to implement N Queens problem using Backtracking	**3**	**CO4**

Assessment Pattern

CIE- Continuous Internal Evaluation (50 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**50**
L1: Remember	-
L2: Understand	-
L3: Apply	50
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

SEE- Semester End Examination (50 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	-
L2: Understand	-
L3: Apply	50
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

COMMUNICATIVE ENGLISH

Course Code	: **21DAEC40A**	Credits:	**00**
L: T: P: S	**: 0: 0: 0: 0**	CIE Marks:	**50**
Exam Hours:	**: 01**	SEE Marks:	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21DAEC40A.1	Recognize the grammatical structures in English and identify errors in sentences
21DAEC40A.2	Demonstrate conversational skills using situational vocabulary
21DAEC40A.3	Examine the importance of sub skills of listening for effective communication
21DAEC40A.4	Analyze 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
21DAEC40A.1	-	-	-	-	-	-	-	-	-	3	-	3
21DAEC40A.2	-	-	-	-	-	-	-	-	3	3	-	3
21DAEC40A.3	-	-	-	-	-	-	-	-		3	-	3
21DAEC40A.4	-	-	-	-	-	-	-	-	-	3	-	3

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

Module No	Module Contents	Hours	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 playsAdjectives, Adverbs **Verbal Ability:** Sentence correction, Sentence completion.	5	CO1 CO2 CO4

4	**Listening Skills:** Importance of listening for effective communicationTraits 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.

Assessment Pattern:
CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests
Marks(out of 25)	
Remember	10
Understand	10
Apply	20
Analyse	10
evaluate	-
create	-

SEE – Semester End Examination (50 Marks)

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

BASIC APPLIED MATHEMATICS-II

Course Code : 21DMAT41A		**Credits:**	**00**
L: T: P: S : 0: 0: 0: 0		**CIE Marks:**	**50**
Exam Hours : 02		**SEE Marks:**	**50**

Course Outcomes:	At the end of the Course, the Student will be able to
CO#	**COURSE OUTCOME**
21DMAT41A.1	Gain knowledge of basic operations of vectors
21DMAT41A.2	Use curl and divergence of a vector function in three dimensions
21DMAT41A.3	Develop the ability to solve higher order Linear differential equations
21DMAT41A.4	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
21DMAT41A.1	3	3	3	3	-	-	-	-	-	-	3	3
21DMAT41A.2	3	3	3	3	-	1	-	-	-	-	3	3
21DMAT41A.3	3	3	3	3	3	-	3	-	-	3	3	3
21DMAT41A.4	3	3	3	3	3	-	3	-	-	3	3	3

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

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**CO's**
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.

1.CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

2. SEE- Semester End Examination (50Marks).

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

APPENDIX A

OUTCOME BASED EDUCATION

Outcome-based education (OBE) is an educational theory that bases each part of and 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 Accreditation:

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 straight forward 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 modeling 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 multi-disciplinary environments.

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

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.

Bloom's Taxonomy

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state