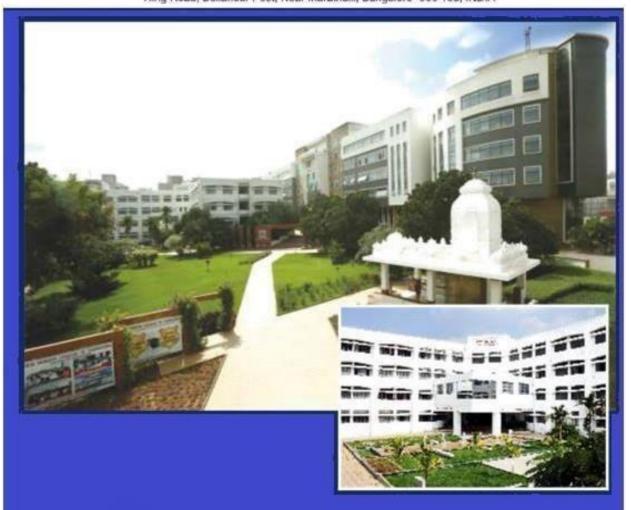# NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by **NAAC** with '**A**' Grade, Accredited by **NBA**

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA

Academic Year 2022-23
Department of Information Science & Engineering
Third and Fourth Semester Scheme and Syllabus
Batch: 2021-25 (160 Credits)

VISION

To emerge as a Department of eminence in Information Science and Engineering in serving the Information Technology industry and the nation by empowering students with a high degree of technical and practical competence.

MISSION

- To strengthen the theoretical, practical and ethical dimensions of the learning process by continuous learning and establishing a culture of research and innovation among faculty members and students, in the field of Information Science and Engineering.
- To build long-term interaction between the academia and Information Technology 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.

Program Education objectives (PEOs)

PEO1	To excel in their professional career with expertise in providing solutions toInformation Technology problems.
PEO2	To pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO3	To exhibit adaptive and agile skills in the core area of Information Science &Engineering to meet the technical and managerial challenges.
PEO4	To demonstrate interpersonal skills, professional ethics to work in a team to makea positive impact on society.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To prepare the students with academic and industry exposure by empowering and equipping them with necessary domain knowledge.	3	2	2	2
To prepare the students for global career in information technology with relevant technical and soft skills.	3	2	2	2
To encourage students to participate in co-curricular and extracurricular activities leading to the enhancement of their social and professional skills.	2	2	3	3

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

Program Specific Outcomes (PSO's)

PSO1: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking or efficient design of computer based systems of varying complexity.

PSO2: The ability to apply standard practices and strategies in software project development using innovative ideas and open ended programming environment with skills in teams and professional ethics to deliver a quality product for business success.

Program Outcomes (PO) with Graduate Attributes

	Graduate Attributes	Program Outcomes (POs)
1	Engineering Knowledge	**PO1:** The basic knowledge of Mathematics, Science and Engineering.
2	Problem analysis	**PO2:** An Ability to analyze, formulate and solve engineering problems.
3	Design and Development of Solutions	**PO3:** An Ability to design system, component or product and develop interfaces among subsystems of computing.
4	Investigation of Problem	**PO4:** An Ability to identify, formulate and analyze complex engineering problem and research literature through core subjects of Computer Science.
5	Modern Tool usage	**PO5:** An Ability to use modern engineering tools and equipments' for computing practice.
6	Engineer and society	**PO6:** An Ability to assess societal, health, cultural, safety and legal issues in context of professional practice in Computer Science & Engineering.
7	Environment and sustainability	**PO7:** The broad education to understand the impact of engineering solution in a global, economic, environmental and societal context.
8	Ethics	**PO8:** An understanding of professional and ethical responsibility.
9	Individual & team work	**PO9:** An Ability to work both as individual and team player in achieving a common goal.
10	Communication	**PO10:** To communicate effectively both in written and oral formats with wide range of audiences.
11	Lifelong learning	**PO11:** Knowledge of contemporary issues, Management and Finance.
12	Project management and finance	**PO12:** An Ability to recognize the need and thereby to engage in independent and life-long learning for continued professional and career advancement.

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

New Horizon College of Engineering
Department of Information Science and Engineering
NEP Scheme of Third Semester B.E Program– AY: 2022-23 (160 Credits)

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21ISE31A	Mathematical Foundation for Computing sciences	AS	3	0	0	0	3	4	50	50	100
2	21HSS321A*	Life Skills for Engineers	HSS	1	0	1	0	2	3	50	50	100
3	21HSS331A	Entrepreneurship Development - 2	HSS	1	0	0	0	1	1	50	50	100
4	21HSS341A	Constitution of India & Professional Ethics	HSS	1	0	0	0	1	1	50	50	100
5	21ISE35A	Logic Design and Computer Organization	ISE	3	0	0	0	3	4	50	50	100
6	21ISL35A	Logic Design and Computer Organization Laboratory	ISE	0	0	1	0	1	2	50	50	100
7	21ISE36A	Operating System	ISE	3	0	0	0	3	4	50	50	100
8	21ISL36A	Operating System Laboratory	ISE	0	0	1	0	1	2	50	50	100
9	21ISE37A	Data Base Management Systems	ISE	3	0	0	0	3	4	50	50	100
10	21ISL37A	Data Base Management Systems Laboratory	ISE	0	0	1	0	1	2	50	50	100
11	21ISE38A	Mini Project	ISE	0	0	2	0	2	0	50	50	100
Total								**21**	**27**	**550**	**550**	**1100**

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21DMAT31A	Basic Applied Mathematics -1	AS	0	0	0	0	0	2	50	50	100

New Horizon College of Engineering
Department of Information Science and Engineering
NEP Scheme of Fourth Semester B.E Program– AY: 2022-23 (160 Credits)

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21ISE41A	Discrete Mathematics and Graph Theory	AS	3	0	0	0	3	4	50	50	100
2	21ISE422A*	Problem Solving using C	ISE	1	0	1	0	2	3	50	50	100
3	21HSS432A/ 21HSS433A	Aadalitha Kannada / Vyavaharikha Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS442A	Environmental Science	CV	1	0	0	0	1	1	50	50	100
5	21ISE45A	Data Structures with C	ISE	3	0	0	0	3	4	50	50	100
6	21ISL45A	Data Structures with C Laboratory	ISE	0	0	1	0	1	2	50	50	100
7	21ISE46A	Object Oriented Programming using Java	ISE	3	0	0	0	3	4	50	50	100
8	21ISL46A	Object Oriented Programming using Java Laboratory	ISE	0	0	1	0	1	2	50	50	100
9	21ISE47A	Internet Of Things	ISE	3	0	0	0	3	4	50	50	100
10	21ISL47A	Internet Of Things Laboratory	ISE	0	0	1	0	1	2	50	50	100
11	21ISE48A	Summer Internship - I	ISE	0	0	0	2	2	0	50	50	100
Total								**21**	**27**	**550**	**550**	**1100**

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21DAEC40A	Communicative English	HSS	0	0	0	0	0	2	50	50	100
2	21DMAT41A	Basic Applied Mathematics - 2	AS	0	0	0	0	0	2	50	50	100

MATHEMATICAL FOUNDATION FOR COMPUTING SCIENCES

Course Code: 21AIM31A/21CEE31A/21CSE31A/21ISE31A   **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 do the following:

CO1	Use appropriate numerical methods to solve algebraic equations and transcendental equations.
CO2	Solve initial value problems using appropriate numerical methods and also Evaluate definite integrals numerically.
CO3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data.
CO4	Gain ability to use probability distributions to analyze and solve real time problems
CO5	Justify the concept of sampling distribution to solve the engineering problems.
CO6	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
CO1	3	3	3	3	3	-	3	-	-	-	3	3
CO2	3	3	3	3	3	-	3	-	-	-	3	3
CO3	3	3	3	3	3	2	3	-	-	3	3	3
CO4	3	3	3	3	3	2	-	-	-	3	3	3
CO5	3	3	3	3	3	-	-	-	-	3	3	3
CO6	3	3	3	3	3	-	-	-	-	3	3	3

Course Syllabus			
Module No.	**Contents of the Module**	**Hour**	**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 fir order and of first degree: Taylor's series method, Modifi Euler's method and Runge-Kutta method of fourth-orde Problems. Milne's predictor and corrector method Problems.	9	CO2

	Numerical integration: Simpson's $1/3^{rd}$ rule, Simpson's $3/8$ rule, Weddle's rule (without proofs)-Problems. **Applications:** Application of numerical integration velocity of a particle and volume of solids.		
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 leastsquare, 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 for variance and proportion. Central limit theorem (without proof), confidence limits for means, Student's t-distribution, F-distribution and Chi-square distribution for test of goodness of fit for small samples. Case Studies on sampling theory and significant measures of scores.	9	CO5, CO6

Text Books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.

Reference Books:
1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P)Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Assessment Pattern:

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	-	-	-	-	-

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 : 21HSS321A   Credits : 02
L: T: P: S : 1:0:1:0   CIE Marks : 50
Exam Hours : 3   SEE Marks : 50

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

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

Mapping of Course Outcomes to Program Outcomes:

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

Module No.	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 behaviour, attitude towards change and work in industry, being proactive and positive. Interpersonal skills - Knowing others, working well with others. Communication – Structured articulation	9	CO2,CO5
4	Leadership, meaning, self- motivation, coming out of comfort zone, mental preparation - accepting failure and resilience, decision making, thinking skills – critical and creative, six thinking hats, watchfulness - proactive risk management, problem solving mind set .Communication – Tips for Jam session, GD and Presentation	9	CO2,CO3
5	Personality Development and Grooming: - Expectations from the industry, building personal presence, corporate grooming, corporate etiquettes, Personal branding and image management. Communication – Mock GD sessions	6	CO2,CO4

REFERENCE BOOKS:

1. The 7 – Habits of Highly Effective People, Stephen R Covey, Neha Publishers.
2. Seven Habits of Highly Effective Teens, Convey Sean, New York, Fireside Publishers, 1998.
3. Emotional Intelligence, Daniel Coleman, Bantam Book, 2006.
4. How to win friends and influence people ,Dale Carnegie.
5. BHAGAVDGITA for college students   Sandeepa Guntreddy

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	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- 2

Course Code : 21HSS331A/431A   **Credits   : 01**

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

Exam Hours : 2   **SEE Marks   : 50**

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

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

Mapping of Course Outcomes to Program Outcomes:

	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	3	0	0	0	3	1	2	0	0	0	1

CO2	0	3	0	0	0	3	1	2	0	0	0	0
CO3	0	3	0	0	0	3	1	2	0	0	0	0
CO4	0	3	0	3	0	3	1	2	0	0	0	3
CO5	0	3	0	3	0	3	1	2	0	0	0	3
CO6	0	3	0	3	0	3	1	2	0	0	0	3

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

Suggested Case Studies:

1. kent ro water purifier business idea case study | Business
2. kent ro water purifier business idea case study | Business Idea from Children – YouTube
3. Red Bus Start up story Phanindra Sama: The RedBus journey - YouTube

Books for reference

1. Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant – Illustrated, 10 February 2015,by Kim (Author)
2. Financial Modeling, fourth edition (The MIT Press) , Illustrated, 18 April 2014,by Simon Benninga
3. Positioning: The Battle for Your Mind, by Al Ries, Jack Trout.

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 valueproposition 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	05
Evaluate	05
Create	10

Constitution of India and Professional Ethics

Course Code : 21HSS341A/431A		**Credits**	: 01
L: T: P:S : 1:0:0:0		**CIE Marks**	: 50
Exam Hours : 2		**SEE Marks**	: 50

Course Outcomes: At the end of the Course, the Student will be able to do the following:

CO1	Gain knowledge of Indian Constitution and be able to solve the legal and societal issues.
CO2	Understand Engineering Ethics and Responsibilities
CO3	Understand the cybercrimes and cyber laws for cyber safety measures.

Mapping CO v/s PO:

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

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. Center- state	**3**	**CO1**

	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	**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**	**CO2**
5	**Internet Laws, Cyber Crimes and Cyber Laws:** Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types and causes for Cyber Crimes, Cyber Crimes land mark judgements in India and the information Technology Act 2000, Cybercrimes and enforcement agencies.	**3**	**CO3**

Text Books:

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

    Twentieth edition (2011).

2. Shubham Singles, Charles E.Haries :Constitution of India and Professional Ethics.Latest Edition-2018, CengageLearning 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.
3. Cyber Security and Cyber Laws Alfred Basta and et al Cengage Learning India 2018.

Logic Design and Computer Organization

Course Code: 21ISE35A		**Credits**	**: 03**
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:

CO1	Understand the working of logic Gates and simplify Boolean function using Karnaugh maps.
CO2	Implementation of combinational logic circuits
CO3	Analyze and design of circuits using latch and flipflop's.
CO4	Design and analyze application of registers and counters.
CO5	Analyze different methods for computer I/O and functions of Memory System
CO6	Develop simple HDL programs.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	CO's
1	**Digital Logic and Combinational Logic Circuits**: Overview of Basic Gates and Universal Logic Gates, Introduction to HDL Boolean Laws and Theorems, Sum-of-products Method, Truth Table to Karnaugh Map, Karnaugh Simplifications, Don't Care Conditions, Product-of-sums Method, Product-of-sums Simplification, Simplification by Quine-McClusky Method, Verilog implementation on Combinational Logic Circuits.	9	CO1,CO6
2	**Combinational Circuits:** Number System , Base Conversion, Binary Addition, Binary Subtraction, Binary Multiplication and Division, Unsigned Binary Numbers, Sign-Magnitude Numbers, 2's Complement Representation, 2's Complement Arithmetic, Arithmetic Building Blocks, The Adder-Subtractor, Arithmetic Logic Unit, 2/3-bit Magnitude Comparator, Code Converter (Binary to Graycode and Binary to excess-3), parity Generator and Checker, Arithmetic Circuits using HDL	9	CO2,CO6

3	**Latches and Flip-Flops:** Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop ,SR Flip Flop, J K Flip Flop, T Flip Flop, Flip Flop with additional inputs, **Registers and Counters:** Shift registers, Design of Binary Counters, counters for other sequences using SR and J K Flip Verilog implementation of Flip-flops. Verilog implementation of Registers and counters,	9	CO3,CO6
4	**Basic Computer Organization and Design:** Instruction Codes, Computer Instruction, Timing and Control, Execution and Instruction, Input-Output and Interrupt, Design of Computer.	9	CO4,CO6
5	**Central Processor Organization** Processor Bus Organization, Arithmetic Logic Unit(ALU), Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Microprocessor Organization. **Input-Output Organization:** Peripheral Devices, Asynchronous Data Transfer, Direct Memory Access(DMA), Priority Interrupt, Input-Output Processor(IOP)	9	CO5

TEXT BOOKS:

1. Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning,2019.
2. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015.

REFERENCE BOOKS:
1. Donald P Leach, Albert Paul Malvino& Goutam Saha, Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015.
2. Computer Organization – Carl Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hil,2005.

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

Logic Design and Computer Organization Laboratory

Course Code : 21ISL35A   **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:

CO1	Analyze and design modular combinatorial logic circuits.
CO2	Realize the Flip flops and verify the truth table
CO3	Design of sequential circuits
CO4	Implement counters using flipflops.
CO5	Implement the logical circuits using HDL
CO6	Implement application of Counters, Flipflops using HDL

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Experiment No.	Experiment
PART-A	
1	Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.
2	Perform n bit addition / subtraction using 4 bit full adder IC AND To design the circuit of half adder and half subtractor.
3	Realize JK, D and T Flip-Flops and verify its truth table
4	Design and implement Ring counter and Johnson counter using 4-bit shift register and demonstrate its working.
5	Design and implement a mod-n (n<8) synchronous up or down counter using J-K Flip-Flop ICs and demonstrate its working.
PART-B	
6	Simulate and verify the working of 8:1 multiplexer using Verilog code.
7	Simulate and verify the working of n bit adder/subtractor using Verilog code.

8	Simulate and verify the working of the JK,D and T Flip flop using Verilog code.
9	Simulate and verify the working of Ring and Johnson Counter using Verilog code.
10	Simulate and verify mod 8 synchronous up or down counter using Verilog code.

Note: For SEE Examination:
One experiment from part A & One experiment from part B to be given

Examination will be conducted for 50 marks

Marks Distribution: Procedure write-up – 20%

Conduction   – 60%

Viva – Voce   – 20%

Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'.

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

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

Operating System

Course Code : 21ISE36A   Credits   03
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:

CO1	Apply the fundamentals of problem-solving skills to solve problems and the basic concepts of branching, looping statements and functions ,arrays and strings of C Language in problem solving.
CO2	Understand the concept of services provided by and the structure of an operating system.
CO3	Compare, implement and know when to apply various CPU scheduling algorithms.
CO4	Ability to Learn and implement various operations on deadlock, Analyze various CPUscheduling algorithms.
CO5	Analyze the efficiency aspect of using system resources and memory management schemes.Handle operations for disk scheduling and file operations.
CO6	Develop various Linux commands that are used to manipulate system operations

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	1	2	2	1	2	1	2
CO2	3	3	3	3	3	1	2	2	1	2	1	2
CO3	3	3	3	3	3	1	2	2	1	2	1	2
CO4	3	3	3	3	3	1	2	2	1	2	1	2
CO5	3	3	3	3	3	1	2	2	1	2	1	2
CO6	3	3	3	3	3	1	2	2	1	2	1	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3
CO6	3	3

Module No.	Module Contents	Hours	CO's
1	**Introduction to C Language:** Algorithm, Flowchart, Pseudo-code solution to problem, Basic concepts of a C program. **Branching and Looping:** if, if- else, nested if- else, cascaded if-else, switch statement, Go to, Loops in C, control statements. **Functions:** User defined functions, Passing parameters to functions. **Arrays and Strings:** Classification of arrays, Multidimensional arrays-addition and multiplication of matrices, **String:** String input and output functions, String handling functions.	9	CO1
2	**Operating System:** Concept, Components, Operations, Protection and Security. User view, System View, **System Calls:** Concept, Types of System Calls. Types of Operating Systems. **Process Management:** Process Concept, Operation on Processes, Cooperating Processes,	9	CO2,CO6

	Inter-Process Communication, critical section problem, semaphores, Threads.		
3	**CPU Scheduling:** Basic Concepts, Preemptive strategies, Non preemptive strategies, Scheduling Criteria, Scheduling algorithms, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling.	9	CO3,CO6
4	**Deadlock:** System Models, Deadlock Characterization, Resource Allocation Graph, Deadlock Prevention, Avoidance, Detection and Recovery, Banker's algorithm.	9	CO4,CO6
5	**Memory Management:** Contiguous Memory Allocation, Fragmentation, Paging, And Segmentation. Virtual Memory: Demand Paging, Page Replacement, Page replacement algorithm, Allocation of frames, Thrashing. **File-System Interface:** Concepts, Access Methods, Directory and Disk Structure. File-System Structure	9	CO5,CO6

TEXT BOOKS:

1. The C Programming Language", BrianW. Kernighan and Dennis M. Ritchie, 4 Edition, PHI, 2019.
2. "Problem Solving with C ", Jacqueline Jones &Keith Harrow, 3rdEdition, Pearson2018.
3. Silber schatz, Galvin, Greg, "Operating System Concepts", Wiley and Sons, 10th Edition, 2018.
4. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition,
Prentice Hall, 2018.
5. Andrew S Tanenbaum, Albert S Woodhull, "Operating systems design and implementation", 3rd edition.
6. UNIX-Concepts Applications, SUMITABHADAS,McGraw Hill, TATA McGraw Hill
Edition, 4th edition, 26th reprint 2019.

REFERENCE BOOKS:
1. "Computer Concepts and C Programming", Vikas Gupta, Dreamtech Press2013. 2. " Programming with C ",
R. S. Bichkar,University Press,2012.
2. Andrew S. Tanenbaum, "Modern Operating Systems",4th Edition, Addison Wesley,2015.
3. **Charles** Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education",2012.
4. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", 3rd Edition,
Tata McGraw Hill Education,2017

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

Operating System Laboratory

Course Code	: 21ISL36A		**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:

CO1	Familiarize with C programming, constructs and develop programs in C using arrays, strings, pointers, functions.
CO2	Demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.
CO3	Compare, implement and know when to apply various process scheduling algorithms
CO4	Ability to Learn and implement various operations on deadlock

Mapping of Course Outcomes to Program Outcomes

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

Experiment No.	Experiment
	PART-A
1	I/O statements, operators, expressions
2	Decision-making constructs: if-else, goto, switch-case, break-continue
3	Loops: for, while, do-while
4	Arrays: 1D and 2D, Multi-dimensional arrays, traversal.
5	Strings: operations
6	Functions: call, return, passing parameters by (value, reference), passing arrays to function.
	PART-B
7	Introduction- Linux Architecture- Shell, Kernel, System calls.

	Linux installation- Steps for installing Linux Operating System Internal & External commands in Linux. • Internal commands- echo, type, etc. • External commands- ls, cp, mv, rm, cat, etc • Other commands – tput clear, who, cal, date, bc, man, passwd, uname (with different options). • Expressions & search patterns .(dot operator), *, A, +, ?, grep, egrep, fgrep
8	Working with files & directories. • Know the categories of files. • Directory related Commands – pwd, mkdir, rmdir, cd, ls • Manipulating Absolute paths and Relative paths using cd command. • File related Commands – cat, cp, mv, rm, comm, cmp, diff, tar, umask, wc Basic File attributes. • Listing seven attributes of a file : ls and its options • File Permissions: Absolute and Relative permissions • Manipulating File permissions using chmod command • Manipulating File Ownership using chown command • Manipulating Hardlink and Softlink using ln command
9	Process Management commands. • Process creation, status, Identifying process, ps -f &its options, • Running process in background, Job control, and Process termination. Changing process priority, scheduling process (Usage of sleep and wait commands)
10	Design, Develop and Implementation of CPU scheduling by using a) Round Robin b) FCFS c) Shortest job first d) Priority
11	Design, Develop and Implement an Algorithm for Dead Lock Detection.
12	Design, Develop and Implement a Program by using page replacement algorithms for virtual memory management

For SEE Examination:
• One experiment from part A & One experiment from part B to be given
• Examination will be conducted for 50 marks.
• Marks Distribution : Procedure write-up – 20%
          Conduction   – 60%
          Viva – Voce   – 20%
• Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

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

Database Management Systems

Course Code : 21ISE37A		Credits	03
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:

CO1	Provides fundamental knowledge of, and practical experience with, database concepts.
CO2	Build entity relationship diagrams and map into relational database schema
CO3	Apply and Analyze the concept of functional dependencies and normalization techniques to refine databases.
CO4	Apply the concepts of relational database theory to manage relational database management system.
CO5	Knowledge about basic SQL fundamentals and table operations. Practical experience gained designing and constructing data models and using SQL
CO6	Design and implement a database for any specified domain according to well-known design principles that balance data retrieval performance with data consistency guarantees

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	CO's
1	Introduction: Introduction to Database. Hierarchical, Network and Relational Models. Three-schema architecture and data independence. Data Definition Language (DDL), Data Manipulation Language (DML).Database Administrator, Users. Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ER Issues, weak entity sets. ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key.	9	CO1,CO2
2	Relational data Model and Language: Relational data model concepts, Logical view of data, keys, integrity rules. integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints. Functional dependencies, features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).	9	CO3
3	Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities	9	CO4
4	SQL - Introduction, data definition in SQL, table, and key and foreign key revisit, update behaviors. Querying in SQL - basic select-from-where block and its semantics, nested queries - correlated and uncorrelated, notion of aggregation, aggregation functions group by and having clauses, embedded SQL.	9	CO5
5	Transaction management and Concurrency control: Transaction processing and Error recovery - concepts of transaction processing, ACID properties, and serializability concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, and database recovery management.	9	CO6

TEXT BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database S y s t e m s" , Sixth Edition, Pearson / Addison - Wesley, 7th Edition 2017.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

1. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, Database System, Pearson, 2nd Edition.
2. .C.J. Date, An Introduction to Database Systems, 8th Edition.
3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2013.

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CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

Database Management Systems Laboratory

Course Code: 21ISL37A   **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:

CO1	Create a database as per the given requirements
CO2	Use SQL to retrieve and process the data in the given database.
CO3	Apply the concepts of views and triggers in DBMS using SQL.
CO4	Apply the concepts of complex queries to retrieve the data from the database

Mapping of Course Outcomes with Program Outcomes

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2

Common set of operations to be carried out for all the experiments:

1. Creation of tables, insertion of values with Data Definition Commands (use constraints while creating tables) and exercises on Data Manipulation Commands.
2. Developing Queries using clauses SELECT, FROM, WHERE, GROUP BY, HAVING.
3. Developing Queries using clauses Aggregate functions COUNT, SUM, AVG, MAX and MIN.
4. Developing Queries (along with NESTED Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT Constraints. Creation and Manipulation of Views.
5. Creation of simple PL/SQL programs and usage of cursor and triggers.

List of Experiments are as follows:

   PART- A

1	Introduction to SQL Commands: DDL (Data Definition Language), Implementation of Create, Alter, Drop, rename, truncate
2	Implementation of relational and logical operators
3	Implementation of SQL Functions
4	DML(Data Manipulation Language):Implementation of Select, Insert, Update, Delete. Retrieval of data from a single table using simple queries
5	Implementation of Constraints: NOT NULL, Primary Key, Foreign Key, Unique. Combining tables and execution of queries on such tables.(Group by and Having Clause)

PART- B

1	Consider the following schema for a Library Database:
	BOOK(Book_id, Title, Publisher_Name, Pub_Year)
	BOOK_AUTHORS(Book_id, Author_Name)
	PUBLISHER(Name, Address, Phone)
	BOOK_COPIES(Book_id, Programme_id, No-of_Copies)
	BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)
	LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)
	1. Insert at least 5 records for each table. Add appropriate database constraints

	2. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc. 3. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. 4. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 5. Create a view of all books and its number of copies that are currently available in the Library.
2	Consider the following schema for OrderDatabase: SALESMAN (Salesman_id, Name, City, Commission) CUSTOMER (Customer_id, Cust_Name, City, Grade,Salesman_id) ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to Insert at least 5 records for each table. Add appropriate database constraints 1. Count the customers with grades above Bangalore's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. 5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also bedeleted.
3	Consider the schema for Movie Database: ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_Phone) MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST (Act_id, Mov_id, Role) RATING (Mov_id, Rev_Stars) Insert at least 5 records for each table. Add appropriate database constraints Write SQL queries to 1. List the titles of all movies directed by 'Hitchcock'. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015(use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one

	rating and find the highest number of stars that movie received. Sort the result by movie title.
	5. Update rating of all movies directed by 'Steven Spielberg' to 5
4	Consider the schema for College Database:
	STUDENT (USN, SName, Address, Phone, Gender)
	SEMSEC (SSID, Sem, Sec)
	CLASS (USN, SSID)
	SUBJECT (Subcode, Title, Sem, Credits)
	IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, Final IA)
	Insert at least 5 records for each table. Add appropriate database constraints
	Write SQL queries to 1. List all the student details studying in fourth semester 'C'section. 2. Compute the total number of male and female students in each semester and in each section.
	3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.
	4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
	5. Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT ='Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.
5	EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
	DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
	DLOCATION (DNo,DLoc)
	PROJECT (PNo, PName, PLocation, DNo)
	WORKS_ON (SSN, PNo, Hours)
	Insert at least 5 records for each table. Add appropriate database constraints
	Write SQL queries to
	1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
	2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise
	3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

	4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
                        Conduction   – 60%
                        Viva – Voce   – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests (50 Marks)
Remember	-
Understand	-
Apply	20
Analyze	-
Evaluate	-
Create	30

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	-
Apply	20
Analyze	-
Evaluate	-
Create	30

MINI PROJECT

Course Code : 21ISE38A   **Credits   : 2**
L:T:P:S   :0:0:2:0   **CIE Marks   : 50**
SEE Marks   : 50   **Exam Hours : 3**

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

CO1	Analyze the Real world problem through survey of existing problems
CO2	Design the modules for solving the problems identified
CO3	Implement the design modules with suitable programming language
CO4	Test the working modules at different levels

Mapping of Course Outcomes to Program Outcomes:

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

Note:

- Mini project should be developed using the techniques learned in the course.
- Every student should do mini project in a team of maximum 2 members in the areas suggested by the department expert committee.
- Minimum 2 reviews will be conducted by the department expert committee to know the progress of the mini project work.
- In each review student should give presentation on the work carried out and show the relevant Models.
- A mini project report should be submitted to the department at the end of the mini project work.
- Plagiarism check for the report: Similarity index of the report should not exceed more than 30%.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (50 Marks)
Remember	-
Understand	-
Apply	-
Analyze	-
Evaluate	25
Create	25

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	-
Understand	-
Apply	-
Analyze	-
Evaluate	25
Create	25

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: At the end of the Course, the Student will be able to do the following:

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

Mapping of Course Outcomes to Program Outcomes:

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

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, Ped equation for polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.	5	CO1, CO2

2.	**Partial differentiation:** Definition and Simple problems, Euler's theorem for Homogeneous function (NO Derivation and NO extended theorem) Problems, Jacobians of order two - definition and problems.	**5**	**CO1**
3.	**Integral Calculus and Differential Equations:** Problems on evaluation of $\sin^n x$ and $\cos^n x$ integrals with standard limits (0 to $\pi/2$). Solution of first order and first-degree differential equations-Variable separable, Linear and Exact differential equations.	**5**	**CO3**
4.	**Linear Algebra-1:** Problems on rank of a matrix by elementary transformations, Solution of system of linear equations by Gauss elimination method-Problems.	**5**	**CO4**
5.	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen Vectors of a square matrix-Problems.	**5**	**CO4**

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, Tenth Edition, 2014, ISBN: 9788126554232.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Forty fourth Edition, 2022, ISBN: 9788193328491.

Reference Books:

1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education, Fourth Edition, 2015, ISBN: 9780273719236.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, Fourth Edition, 2017, ISBN: 9780070634190.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., Twenty Second Edition, 2018, ISBN: 9789352533831.
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., Ninth Edition, 2014, ISBN: 9788131808320.

Assessment Pattern:

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	-	-	-	-	-

SEE- Semester End Examination (50Marks).

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

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Code: 21CEE41A/21CSE41A/21ISE41A   **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:

CO1	Explain the counting techniques and combinatorics by using the context of discrete probability.
CO2	Illustrate the fundamental concepts of trees, connectivity and planarity graphs.
CO3	Apply Pigeon hole principle to solve real life problems.
CO4	Solve the engineering problems involving relations and functions.
CO5	Analyze the computer science problems by using graph theory techniques.
CO6	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
CO1	3	3	3	3	-	-	-	-	-	3	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	3	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	-	-	2	3	-	3
CO6	3	3	3	3	-	-	-	-	2	3	-	3

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.

Assessment Pattern:

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	-	-	-	-	-

SEE- Semester End Examination (50Marks).

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

PROBLEM SOLVING USING C

Course Code : 21ISE422A   **Credits   : 02**
L: T: P: S   : 1:0:1:0   **CIE Marks   : 50**
Exam Hours : 3   **SEE Marks   : 50**

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

CO1	Design solutions to simple engineering problems by applying the basic programming principles of C language and basic mathematical knowledge
CO2	Choose a suitable C-construct to develop C code for a given problem.
CO3	Apply the C-language syntax rules to correct the bugs in the C program
CO4	Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.
CO5	Identify the bugs in the C program.
CO6	Reuse the code and be able to design programs that are easier to debug and maintain.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	CO's
1	Introduction to Programming Concepts: Software, Classification of Software, Modular Programming, Structured Programming, Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions. Managing Input and Output Operation: Formatted and Unformatted I/O Functions P1: Develop a program to find the area, perimeter and volume of triangle and square. P2: Develop a program to solve simple computational problem using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. P3: The Electricity Board charges from their consumers according to the units consumed per month. The amount is calculated as per the tariff given below. WAP to input consumer's name, consumer's number and the units consumed. The program displays the following information after calculating the amount. 	Units Consumed	Charges
---	---
Up to 100 units	5.50/unit
For next 200 units	6.50/unit
For next 300 units	7.50/unit

More than 600 units	8.50/unit |
	
	Money Receipt:
	    Consumer's Number: ....
	    Consumer's Name: ....
	    Units consumed: ....
	    Amount to be paid: ....
		9	CO1, CO2

2	Decision making, branching and looping: Decision Making Statements. Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions. P1: WAP to check whether the number given is Palindrome or not. P2: WAP to check whether the given number is Niven number or not. P3: WAP to print the below patterns: 	# * # * #	5
---	---
# * # * #	5 4
# * # * #	5 4 3
# * # * #	5 4 3 2
# * # * #	5 4 3 2 1		9	CO2, CO3
3	Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays - Passing arrays to functions. Strings.	9	CO4

	P1: WAP to input integer elements into an array of size 20 and perform the following operations:
	   i. Display largest number from the array.
	   ii. Display smallest number from the array.
	   iii. Display sum of all elements of the array.
	
	P2: WAP to input a sentence. Find and display the following:
	   i. Number of words present in the sentence
	   ii. Number of letters present in the sentence.
	
	Assume that the sentence has neither digit nor a special character.
	P3: WAP to accept different numbers in a Single Dimensional Array (SDA). Now, enter a number and search whether the number is present or not in the list of array elements by using Linear Search.		

4	Structures-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields. P1: Implement structures to read, write and compute average marks of the student and also print the student names who have scored above 50%. P2: WAP to demonstrate the concept of Unions.	9	CO5
5	Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions. P1: WAP to swap two numbers using Pointers. P2: Develop a program using pointers to compute sum, mean and standard deviation of all elements stored in an array of n real numbers.	9	CO5, CO6

TEXT BOOKS:

1. E. Balaguruswamy, "Programming In ANSI C", 4th edition, TMH Publications, 2007
2. Let Us C: Authentic guide to C programming language (18th Edition),Yashavant Kanetkar November 2021.
3. Ashok N. Kamthane, "Programming with ANSI and Turbo C", Pearson Education, 2006

REFERENCE BOOKS:

1. "Algorithmic Thinking: A Problem-Based Introduction", Daniel Zingaro, No Starch Press (15 December 2020).
2. "Problem Solving and Programming in C", Salaria R.S, Edition 5,2020.

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
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 ನಿಯಮುಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ

C02 ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಾಗುವ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು

C03 ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ವತ್ತ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು

C04 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ದಪಿಸಿಕೊಳ್ಳುವರು

CO – PO Mapping:

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

ಪಠ್ಯವಿಧಿ (ಪಠ್ಯ ಮಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ –1 ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ

ಅಧ್ಯಾಯ –2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತುಅವುಗಳ ನಿವಾರಣೆ

ಅಧ್ಯಾಯ –3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

ಅಧ್ಯಾಯ –4 ಪತ್ರ ವ್ಯವಹಾರ

ಅಧ್ಯಾಯ –5 ಆಡಳಿತ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸ್ಯೆನ್ ರೈಟಿಂಗ್),ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ

ಅಧ್ಯಾಯ –8 ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ

ಅಧ್ಯಾಯ –9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

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

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಮಸ್ತಕದ ಲೇಖಕರು

ಡಿ. ಎಲ್. ತಿಪ್ಪೇಸ್ವ, 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 (Kannada for use)

Course Code   : 21HSS333A/433A   Credits   01
L: T: P: S   : 1:0:0: 0   CIE Marks 50
Exam Hours   : 2   SEE Marks 50

Course Outcome: On completion of the course student will be able to:

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

Mapping of Course Outcomes to Program Outcomes:

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

Syllabus

Chapter – 1: Vyavaharika Kannada – Parichaya (Introducton to Vyavaharika Kannada)

Chapter – 2: Kannada Aksharamale haagu uchharane (Kannada Alphabets and Pronunciation)

Chapter – 3: Sambhashanegaagi Kananda Padagalu (Kannada Vocabulary for Communication)

Chapter – 4: Kannada in Conversations (Sambhashaneyalli Kannada)

Chapter – 5: Activities in Kannada. (Kannada Sambhashanegaagi Chatuvatikegalu)

Text Book:

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

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

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

ENVIRONMENTAL SCIENCE

Course Code: 21HSS342A / 21HSS442A   Credits: 1

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

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

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

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

Mapping of Course Outcomes to Program Outcomes:

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

CO4	-	-	-	-	1	3	3	3	-	3	-	3	1	1

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 wastes and its management. Role of society, NGO and Govt. agencies in prevention of pollution.	03	**CO3**
4	**Global Environmental issues, Environment acts and amendments:** Fluoride problem in drinking water, Acid Rain, Ozone layer depletion, Global warming and climate change. National forest policy, Environmental laws and acts. International agreements and protocols.	03	**CO3 & CO4**
5	**Human Population and Environment Impact Assessment:** Population growth & explosion, Population pyramids. Negative impact of agriculture and urbanization, Role of Technology in protecting environment and human health. Environment Impact Assessment.	03	**CO4**

Text Books:

1. Environmental studies by Benny Joseph, Tata McGraw Hill Education Private Limited, 2009,
ISBN: 9870070648135.
2. "Environmental Studies: Basic Concepts" by Ahluwalia, V. K. The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016. ISBN: 817993571X, 9788179935712.
3. "Textbook of Environmental Studies for Undergraduate Courses of all branches of Higher Education" by Bharucha, Erach for UGC, New Delhi, 2004. ISBN: 8173715408,
9788173715402.

Reference Books:

1. Handbook of Environmental Engineering by Rao Surampalli, Tian C. Zhang, Satinder
   Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma; McGraw Hill
   Professional, 2018. ISBN: 125986023X, 9781259860232 .
2. Environmental Science and Engineering by P. Venugopala, Prentice Hall of India Pvt. Ltd,
   New Delhi, 2012 Edition. ISBN: 978-81-203-2893-8.
3. Environmental Science- Working with the earth by G Taylor Miller Jr, Brooks Cole
   Thompson Publications, 10thEdition. ISBN: 10: 0534424082.
4. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of
   India Pvt. Ltd, 2005 Edition. ISBN: 8120327748, 9788120327740.

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	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	-	-	-	-

DATA STRUCTURES WITH C

Course Code : **21ISE45A**   **Credits** : **03**
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:

CO1	Understand the fundamentals of data structures and their applications essential for Programming/problem solving.
CO2	Analyze the operational aspects of linear data structures: stacks, queues in Problem solving.
CO3	Select an appropriate data structure for a specified application.
CO4	Understand and implement the concept of linked list data structure in Problem solving.
CO5	Analyze the operational aspects of non-linear data structures: Trees, Graphs in Problem solving.
CO6	Analyze various searching and sorting algorithms.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	3
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3
CO6	3	3

Module No.	Module Contents	Hours	CO's
1	**Basic Concepts**: Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions, Sparse Matrix.	9	CO1
2	**STACKS AND QUEUES:** Stacks, Applications of stacks: Recursion, Evaluation of Expressions, Factorial, Tower of Hanoi. Multiple Stacks. Queues: Definition, Queue representation, Primitive operations on queue, array representation of queues, Circular queue, Priority queue, Double ended queue, Applications of queues.	9	CO2, CO3
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, Linked representation of stack, Linked representation of queue.	9	CO3, CO4
4	**TREES:** Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Heaps. Binary Search Trees, Selection Trees, Forests, Balanced Trees.	9	CO5
5	**Graphs**: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Sorting**-Internal Sorting, External Sorting, Insertion Sort, Selection Sort, Stable vs. Unstable sort .**Searching** - Linear Search, Binary Search, **Linear Programming**, **Approximation Algorithms.**	9	CO5 CO6

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st

Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Gilberg&Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Engages Learning, 2014.
2. Narasimha Karumanchi, Data Structures And Algorithms Made Easy: Data Structures And Algorithmic Puzzles , 2016.
3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2 nd Ed, McGraw Hill, 2013.
4. Jean-Paul Tremblay , Paul Sorenson ,"An Introduction to Data Structures with Application ", July 2017.

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Marks
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

DATA STRUCTURES WITH C LABORATORY

Course Code 21ISL45A   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:

CO1	Analyze the operational aspects of linear data structures: stacks, queues in Problem solving.
CO2	Implement the concept of linked list data structure in Problem solving.
CO3	Analyze the operational aspects of non-linear data structures: Trees
CO4	Apply various searching and sorting algorithms.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2

Experiment No.	Experiment
	PART-A

1	Design, Develop and Implement a menu driven Program in C for the following array operations. a. Creating an array of N Integer Elements b. Display of array Elements with Suitable Headings c. Inserting an Element (ELEM) at a given valid Position (POS) d. Deleting an Element at a given valid Position (POS) e. Exit. Support the program with functions for each of the above operations.
2	Design, Develop and Implement a Program in C for the following operations on Strings. a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP) b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messagesin case PAT does not exist in STR. Support the program with functions for each of the above operations. Don't use Built-in functions.
3	Design, Develop and Implement a Program in C to create a structure to store the name, account number and balance of customers (more than 10) and store their information. 1 - Write a function to print the names of all the customers having balance lessthan$200. . 2 - Write a function to add $100 in the balance of all the customers having more than $1000 in their balance and then print the incremented value of their balance.
4	Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) a. Push an Element on to Stack b. Pop an Element from Stack c. Demonstrate how Stack can be used to check Palindrome d. Demonstrate Overflow and Underflow situations on Stack e. Display the status of Stack f. Exit Support the program with appropriate functions for each of the above operations
5	Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.
6	Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Postfix expression with single digit operands and operators: +, -, *, /, %, ^. b. Solving Tower of Hanoi problem with n disks.
PART-B	

7	Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) a. Insert an Element on to Circular QUEUE b. Delete an Element from Circular QUEUE c. Demonstrate Overflow and Underflow situations on Circular QUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations
8	Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Branch, Sem, PhNo a. Create a SLL of N Students Data by using front insertion. b. Display the status of SLL and count the number of nodes in it c. Perform Insertion / Deletion at End of SLL d. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) e. Exit
9	Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo a. Create a DLL of N Employees Data by using end insertion. b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Demonstrate how this DLL can be used as Double Ended Queue. f. Exit
10	Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
11	Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers. a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Traverse the BST in Inorder, Preorder and Post Order c. Search the BST for a given element (KEY) and report the appropriate message d. Exit
12	Demonstrate binary search algorithm using any one of the sorting techniques.

For SEE Examination:

- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks

- Marks Distribution : Procedure write-up – 20%

  Conduction　　　– 60%

  Viva – Voce　　 – 20%
- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

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

OBJECT ORIENTED PROGRAMMING USING JAVA

Course Code: 21ISE46A　　　　　　　　　　**Credits　　: 03**

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:

CO1	Model the real-world entities using Object Oriented Programming concepts.
CO2	Identify the importance of inheritance and interface concepts and apply to model relationships.
CO3	Analyze the importance of exception handling and string handling operations
CO4	Apply the concept of Multithreading in concurrent programming
CO5	Develop applications using collections framework for managing user defined types
CO6	Solve the real-world problems using Object Oriented concepts and collection framework in Java.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No.	Module Contents	Hours	CO's
1	**Introduction to Java:** The Java Language, Java Development Kit (JDK); Java Buzzwords, Byte Code, JVM ,JRE and Java environment, Data types, variables and Arrays, Operators, Control statement, command line Arguments, Language fundamentals **Object Oriented Programming with JAVA**: Object Oriented concepts, Classes, Objects and Methods, Method Overloading, Constructor, static members, Implicit this	9	CO1
2	**Inheritance and Interfacing:** Inheritance, Method Overriding, Access specifiers, Abstract Classes, Final members, The Object Class, Interfaces, Package Fundamentals**.**	9	CO2
3	**String Manipulation:** Constructors, Length Operations, Character Extraction, Comparison, Searching, Modifying, StringBuffer, **Exception handling:** Fundamentals, Types, Using try, catch, throw, throws, finally, User Defined Exceptions.	9	CO3
4	**Multi Threading:** Thread Concept, Java Thread Model, The main method, Creating Threads, Thread Priorities, Synchronization	9	CO4
5	**Collection Framework:** Collections Overview, Collection Interfaces, Set, List, Map, Queue, Collection Classes, Type Wrappers, Accessing a collection using an Iterator,Sorting collections, equals() and hashCode contract, overriding equals and hashCode methods in Java.	9	CO5 CO6

TEXT BOOKS:
1. Herbert Schildt, "Java: The Complete Reference", 12th Edition, Oracle Press, Tata McGraw Hill,2017 (Reprint).
2. T. Budd, "Understanding Object-Oriented Programming with Java", Updated Edition , Pearson Education,2018

REFERENCES:
1. J. Nino and F.A. Hosch, "An Introduction to programming and OO design using Java",John Wiley & sons,2019(Reprint)**.**
2. Y. Daniel Liang, "Introduction to JAVA Programming", 10th Edition, Pearson Education.
3. R. A. Johnson, "Java Programming and Object-Oriented Application Development", Cengage Learning, 2017

CIE- Continuous Internal Evaluation (50Marks)

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

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	-
Create	5

OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY

Course Code : 21ISL46A   **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:

CO1	Model the real world applications using Object Oriented Programming concepts.
CO2	Identify the importance of inheritance and interface concepts

CO3	Analyze the importance of exception handling and learn the importance of string handling
CO4	Apply the concept of Multithreading in concurrent programming
CO5	Develop applications using collections framework for managing user defined types
CO6	Solve the real world problems using Object Oriented concepts and collection framework in Java.

Mapping of Course Outcomes to Program Outcomes:

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

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2

List of programs:

Experiment No.	Experiment
	PART-A
1	Design and Implement a Java program to print the sum of the elements of the array with the given below condition. If the array has 6 and 7 in succeeding orders, ignore 6 and 7 and the numbers between them for the calculation of sum. Eg1) Array Elements - 10,3,6,1,2,7,9 O/P: 22 [i.e. 10+3+9] Eg2) Array Elements - 7,1,2,3,6 O/P:19 Eg3) Array Elements - 1,6,4,7,9 O/P:10
2	Design and Implement a Java program that displays a menu with options 1. Add 2. Sub, Based on the options chosen, read 2 numbers and perform the relevant operation. After performing the operation, the program should ask the user if he wants to continue. If the user presses y or Y, then the program should continue displaying the menu else the program should terminate. [Note: Use Scanner class, you can take help from the trainer regarding the same]

3	Design and implement an algorithm to accept an array of 5 positive integers. The algorithm must then find the smallest positive integer in the array which cannot be formed from the sum of 2 numbers in the array.
4	Develop a Java program Write a program to check if the program has received command line arguments or not. If the program has not received the values then print "No Values", else print all the values in a single line separated by ,(comma). Eg1) java Example O/P: No values Eg2) java Example Mumbai Bangalore O/P: Mumbai,Bangalore
	[Note: You can use length property of an array to check its length
5	Design and Develop a simple Java program to find the longest substring without repeating characters in a given String. Accept the String through CommandLine argument.
6	Given a string and a non-empty word string, return a string made of each char just before and just after every appearance of the word in the string. Ignore cases where there is no char before or after the word, and a char may be included twice if it is between two words. • If inputs are "abcXY123XYijk" and "XY", output should be "c13i". • If inputs are "XY123XY" and "XY", output should be "13". If inputs are "XY1XY" and "XY", output should be "11". Develop a Java program for the same.
PART-B	
7.	Design a class that can be used by a health care professional to keep track of a patient's vital statistics. Here's what the class should do: • Construct a class called Patient • Store a String name for the patient • Store weight and height for patient as doubles • Construct a new patient using these values • Write a method called BMI which returns the patient's BMI as a double. BMI can be calculated as BMI = (Weight in Pounds / (Height in inches x Height in inches)) x 703 Next, construct a class called "Patients" and create a main method. Create a Patient object and assign some height and weight to that object. Display the BMI of that patient.
8.	Create a class in Java called "Calculator" which contains the following:

	1. A static method called powerInt(int num1,int num2) that accepts two integers and returns num1 to the power of num2 (num1 power num2). 2. A static method called powerDouble(double num1,int num2) that accepts one double and one integer and returns num1 to the power of num2 (num1 power num2). 3. Call your method from another class without instantiating the class (i.e. call it like Calculator.powerInt(12,10) since your methods are defined to be static). Hint: Use Math.pow(double,double) to calculate the power.
9.	Develop a Program to take care of Number Format Exception if user enters values other than integer for calculating average marks of 2 students. The name of the students and marks in 3 subjects are taken from the user while executing the program. • In the same Program write your own Exception classes to take care of Negative values and values out of range (i.e. other than in the range of 0-100) • Include finally to output the statement "Program terminated".
10.	Create class of SalesPersons as a thread that will display fives sales persons name. Create a class as Days as other Thread that has array of seven days. Call the instance of SalesPersons in Days and start both the Threads. Suspend SalesPersons on Sunday and resume on Wednesday. Use Thread handling Apis to perform the same.
11.	Create a Student Attendance Management System using a HashMap Collection type. Perform the following operations: Add the key-value pair.Retrieve the value associated with a given key Check whether a particular key/value exist. replace a value associated with a given key in the HashMap
12.	Develop a program to solve the problem given: An array of length N is provided. Count the number of (i,j) pairs where 1<=i<j<=N such that the difference of the array elements on that indices is equal to the sum of the square of their indices. Input : 4, 9, 6, 29, 30 Output: 3 (1,2), (2,4),(1,5) satisfy the above condition

For SEE Examination:
- One experiment from part A & One experiment from part B to be given
- Examination will be conducted for 50 marks and scaled down to 25 marks
- Marks Distribution : Procedure write-up – 20%
              Conduction   – 60%
              Viva – Voce   – 20%

- Change of the experiment is allowed only once and procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Marks
Remember	-
Understand	10
Apply	30
Analyze	10
Evaluate	-
Create	-

INTERNET OF THINGS

Course Code : 21ISE47A   Credits   : 03
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:

CO1	Understand IoT concepts, underlying technologies and migration of M2M to IoT.
CO2	Understand the M2M fundamentals and data management
CO3	Analyze the various features of IoT standard protocols and platforms
CO4	Implement programs using Raspberry pi model
CO5	Understand the interface concepts with networks
CO6	Design and Develop real world IoT application using system like Raspberry pi.

Mapping of Course Outcomes to Program Outcomes:

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

CO4	3	2	2	2	2	2	1	1	2	1	2	1
CO5	2	3	2	2	3	2	1	1	2	1	2	2
CO6	3	3	2	2	2	2	1	1	2	1	2	2

Mapping of Course Outcomes to Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	1	1
CO5	2	2
CO6	1	1

Module No	Module Contents	Hours	Cos
1	**Introduction to IoT** Evolution of Internet of Things - Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT, -IoT and Digitization – Convergence of IT and IoT – IoT Challenges	9	CO1
2	**M2M and IoT Technology Fundamentals-** Devices and gateways, Actuators and its types, Data management, Connecting Smart Objects, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.	9	CO2
3	**IoT Protocols and Platforms:** 6LowPAN,Wi-fi,Bluetooth, COAP, MQTT, Zigbee Architecture, LoRaWAN **Platforms:** Components of Microsoft Azure, Google cloud	9	CO3
4	**IoT Programming :**Introduction to Raspberry PI, Rasbian OS, interfacing analog and digital devices, enabling network connectivity ,Connecting with web Server,API Connectivity:OpenWeathermap API	9	CO4 , CO5
5	**Applications of IoT**: Use of Big Data and Visualization in IoT - Industry 4.0 concepts , Web Enabled Constrained Devices, Role of Machine Learning, Monitoring ambient room temperature using DHT11 Sensor, Using an RPi to Control an RGB LED, Using a PIR Motion Sensor and detecting an object with Raspberry Pi	9	CO6

TEXT BOOKS:

1. Maciej Kranz,"Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry", 1st Edition,Wiley,2021
2. David Hanes , Gonzalo Salgueiro , Patrick Grossetete, Robert Barton (Author), Jerome Henry," IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things "1st Edition,Cisco Press,2021
3. Colin Dow, "Internet of Things Programming Projects: Build modern IoT solutions with the Raspberry Pi 3 and Python", 1st edition, Packt Publishing,2018
4. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", First Edition, Cisco Press, 2017

REFERENCE BOOKS:
1. Qinghao Tang (Author), Fan Du," Internet of Things Security: Principles and Practice", 1st edition,Springer,2021
2. Chandrasekar Vuppalapati, "Building Enterprise IoT Applications", 1st Edition, Academic Press, 2019.
3. Peter Waher, "Mastering Internet of Things: Design and create your own IoT applications using Raspberry Pi 3", First Edition, Packt Publishing, 2018
4. Abdulrahman Yarali , "IoT: Platforms, Connectivity, Applications and Services ",Nova Science Publishers Inc ,Apr 2018
5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014. (ISBN: 978-8173719547)

WEB RESOURCES:
1. "Raspberry pi", https://www.raspberrypi.org/
2. IoT protocols,https://www.postscapes.com/internet-of-things-protocols/
3. IoT Platforms, https://www.javatpoint.com/iot-tutorial

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

INTERNET OF THINGS LABORATORY

Course Code	**: 21ISL47A**	**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:

CO1	Understand functionalities of various single board embedded platforms fundamentals
CO2	Understanding interfacing devices with Raspberry Pi
CO3	Use Raspberry-Pi program to create simple application
CO4	Implement interfacing of various sensors with Raspberry Pi.
CO5	Use wireless peripherals for exchange of data.

Mapping of Course Outcomes to Program Outcomes:

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

Experiment No.	Experiment
1	Introduction to Raspberry PI platform and Install Raspbian OS on your SD card
2	Start Raspberry Pi and try various Linux commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown,chgrp, ping etc.
3	Run some python programs on Pi like: a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division.

	c) Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.
4	**Exporting Display On To Other Systems.** Making use of available laptop/desktop displays as a display for the device using SSH client & X11 display server.
5	**Light an LED through Python program** a)Get input from two switches and switch on corresponding LEDs b) Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
6	**ON/OFF Control Based On Light Intensity** Using the light sensors, monitor the surrounding light intensity & automatically turn ON/OFF the high intensity LED's by taking some pre-defined threshold light intensity value.
6	Understanding the connectivity of Raspberry-Pi with IR sensor. Write an application to detect obstacle and notify user using LEDs.
7	**Battery Voltage Range Indicator** Monitor the voltage level of the battery and indicating the same using multiple LED's (for ex: for 3V battery and 3 led's, turn on 3 led's for 2-3V, 2 led's for 1-2V, 1 led for 0.1-1V & turn off all for 0V)
8	The state of LED should toggle with every press of the switch Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds
9	Create a door lock application using a reed switch and magnet and give a beep when the door is opened.
10	Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, Green On, White On) for each clap (use sound sensor).
11	**Hosting a website on Board** Building and hosting a simple website(static/dynamic) on the device and make it accessible online. There is a need to install server(eg: Apache) and thereby host the website.
12	**Webcam Server** Interfacing the regular usb webcam with the device and turn it into fully functional IP webcam & test the functionality.

For SEE Examination:

- ☐ One experiment to be given
- ☐ Examination will be conducted for 50 marks
- ☐ Marks Distribution : Procedure write-up – 20%
  Conduction – 60%

Viva – Voce– 20%

☐ Change of the experiment is allowed only once and
procedure write-up marks will be considered as '0'

CIE - Continuous Internal Evaluation (50 Marks)

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

SEE – Semester End Examination (50 Marks)

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

COMMUNICATIVE ENGLISH

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

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

CO1	Recognize the grammatical structures in English and identify errors in sentences
CO2	Demonstrate conversational skills using situational vocabulary
CO3	Examine the importance of sub skills of listening for effective communication
CO4	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	POI0	POII	PO12
CO1										3		3
CO2									3	3		3
CO3										3		3
CO4										3		3

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 plays Adjectives, Adverbs **Verbal Ability:** Sentence correction, Sentence completion.	5	CO1 CO2 CO4
4	**Listening Skills:** Importance of listening for effective communication Traits of a good listener Listening sub skills Listening to audio files of short stories, news, TV clips, Documentaries Gap filling exercise and Paraphrasing **Verbal Ability:** Common Errors in English 1 (articles, prepositions) Cloze Exercises	4	CO2 CO4

5	**Presentation Skills:** **Nonverbal Communication (Body Language):** Kinesics, Oculesics, Paralanguage. Overcoming stage fear, Organising a speech - Preparation, Practise, Delivery **Articulation of Ideas:** How to generate ideas and express them. Fluency development activities like comparing, expressing opinions, agreeing & disagreeing **(SEE Task 3)** Group Discussion	5	CO1,

TEXT BOOKS:
1. Grammar Practice Activities- Penny Ur, Cambridge University Press.
2. Intermediate English Grammar Raymond Murphy Cambridge University Press

REFERENCE BOOKS:

1. Grammar & Composition. New Delhi: S. Chand. ISBN 81-219- 2197-X.
2. Wren, P.C.; Martin, H., A Final Course of Grammar & Composition, S Chand.

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 do the following:

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

Mapping of Course Outcomes to Program Outcomes:

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

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.

Assessment Pattern:

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	-	-	-	-	-

SEE- Semester End Examination (50Marks).

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