NEW HORIZON
COLLEGE OF ENGINEERING

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Academic Year 2022-2023

Third and Fourth Semesters

B.E. Scheme and Syllabus

2021-2025 Batch
(160 Credits)

NEP Scheme of III Semester B.E (Computer Science and Engineering) – 160 Credits

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21CSE31A	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	21CSE35A	Linux System Programming	CSE	3	0	0	0	3	4	50	50	100
6	21CSL35A	Linux System Programming Lab	CSE	0	0	1	0	1	2	50	50	100
7	21CSE36A	Data Structures and Applications	CSE	3	0	0	0	3	4	50	50	100
8	21CSL36A	Data Structures and Applications Lab	CSE	0	0	1	0	1	2	50	50	100
9	21CSE37A	Digital Electronics	CSE	3	0	0	0	3	4	50	50	100
10	21CSL37A	Digital Electronics Lab	CSE	0	0	1	0	1	2	50	50	100
11	21CSE38A	Mini Project-I	CSE	0	0	2	0	2	0	50	50	100
Total								21	27	550	550	1100

NEP Scheme of IV Semester B.E (Computer Science and Engineering) – 160 Credits

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21CSE41A	Discrete Mathematics and Graph Theory	AS	2	1	0	0	3	4	50	50	100
2	21CSE422A*	Web Design Technologies	CSE	1	0	1	0	2	3	50	50	100
3	21HSS432A/ 21HSS433A	Aadalitha Kannada / Vyavaharikha Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS442A	Environmental Science	HSS	1	0	0	0	1	1	50	50	100
5	21CSE45A	Computer Architecture and ARM	CSE	3	0	0	0	3	4	50	50	100
6	21CSL45A	ARM Processor Lab	CSE	0	0	1	0	1	2	50	50	100
7	21CSE46A	Object Oriented Programming	CSE	3	0	0	0	3	4	50	50	100
8	21CSL46A	Object Oriented Programming Lab	CSE	0	0	1	0	1	2	50	50	100
9	21CSE47A	Operating System	CSE	3	0	0	0	3	4	50	50	100
10	21CSL47A	Operating System Lab	CSE	0	0	1	0	1	2	50	50	100
11	21CSE48A	Summer Internship – I	CSE	0	0	0	2	2	0	50	50	100
Total								21	27	550	550	1100

LATERAL ENTRY ADDITIONAL COURSES

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
2	21DAEC40A	Communicative English	HSS	0	0	0	0	0	2	50	50	100
3	21DMAT41A	Basic Applied Mathematics – 2	AS	0	0	0	0	0	2	50	50	100

MATHEMATICAL FOUNDATION FOR COMPUTING SCIENCES

Course Code : 21CSE31A   Credits : 03
L: T: P: S : 3:0:0:0   CIE Marks : 50
Exam Hours : 03   SEE Marks : 50

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

CO #	COURSE OUTCOMES
21CSE31A.1	Use appropriate numerical methods to solve algebraic equations and transcendental equations.
21CSE31A.2	Solve initial value problems using appropriate numerical methods and also Evaluate definite integrals numerically.
21CSE31A.3	Fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data.
21CSE31A.4	Gain ability to use probability distributions to analyze and solve real time problems
21CSE31A.5	Justify the concept of sampling distribution to solve the engineering problems.
21CSE31A.6	Use the large/small samples to analyze the data to make decision about the hypothesis.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21CSE31A.1	3	3	3	3	3	-	3	-	-	-	3	3
21CSE31A.2	3	3	3	3	3	-	3	-	-	-	3	3
21CSE31A.3	3	3	3	3	3	2	3	-	-	3	3	3
21CSE31A.4	3	3	3	3	3	2	-	-	-	3	3	3
21CSE31A.5	3	3	3	3	3	-	-	-	-	3	3	3
21CSE31A.6	3	3	3	3	3	-	-	-	-	3	3	3

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

Module No.	Module Contents	Hours	Cos
1	**Numerical Methods 1:** Numerical solution of algebraic and transcendental equations: Regula-falsi method and Newton-Raphson method-Problems. Interpolation: Newton's forward and backward formulae for equal intervals, Newton divided difference, Lagrange's formula and Lagrange's inverse interpolation for unequal intervals (without proofs)-Problems. Case studies on Numerical Analysis.	9	21CSE31A.1
2	**Numerical Methods 2:** Numerical solution of ordinary differential equations of first order and of first degree: Taylor's series method, Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor and corrector methods-Problems. Numerical integration: Simpson's $1/3^{rd}$ rule, Simpson's $3/8^{th}$ rule, Weddle's rule (without proofs)-Problems. **Applications:** Application of numerical integration to velocity of a particle and volume of solids.	9	21CSE31A.2

3	Statistical Methods: Fitting of the curves of the form $y = a + bx$, $y = a + bx + cx^2$, $y = ae^{bx}$, $y = ax^b$, and $y = ab^x$ by the method of least square, Correlation and Regression, Regression coefficients, line of regression-Problems and applications. Case studies on Correlation and Regressions.	9	21CSE31A.3
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	21CSE31A.4
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	21CSE31A.5, 21CSE31A.6

Text Books:

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

Reference Books:

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

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
Remember	5	5	-
Understand	5	5	-
Apply	10	5	10
Analyze	2.5	-	-
Evaluate	2.5	-	-
Create	-	-	-

Note:

- *Assessments will be given on Analytical problems*
- *Team size should not exceed 5 members*

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	5
L5: Evaluate	5
L6: 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:

CO #	COURSE OUTCOMES
21HSS321A.1	Relate "SMART GOALS" to personal and professional life
21HSS321A.2	Articulate and communicate ideas and thoughts with clarity and focus
21HSS321A.3	Develop critical and creative thinking skills for problem solving and decision making for leadership.
21HSS321A.4	Analyze the importance of the concepts of personality development and grooming in corporate life
21HSS321A.5	Determine personal and professional responsibility by using ownership task bar

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21HSS321A.1	-	-	-	-	-	-	-	3	3	3	3	3
21HSS321A.2	-	-	-	-	-	3	3	3	3	1	3	3
21HSS321A.3	-	-	-	-	-	3	3	3	3	3	2	3
21HSS321A.4	-	-	-	-	-	-	3	3	3	3	2	3
21HSS321A.5	-	-	-	-	-	3	2	3	3	2	3	3

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

Module No.	Module Contents	Hours	CO'S
1	Goal Setting: Importance of Goals: Achiever's goal – Creating SMART for personal and professional life, Right action at right time, career planning, overcoming fear and face uncertainty, Mind Mapping. Communication – Intellectual preparation/Idea generation.	6	21HSS321A.1, 21HSS321A.2
2	You are the creator – Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career. Social responsibility. Communication – Organising thought flow.	6	21HSS321A.2, 21HSS321A.5
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	9	21HSS321A.2,

	grow. Individual 5omm.5or, attitude towards change and work in industry, being proactive and positive. Interpersonal skills – Knowing others, working well with others. Communication – Structured articulation		**21HSS321A.5**
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	**21HSS321A.2, 21HSS321A.3**
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	**21HSS321A.2, 21HSS321A.4**

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)

Revised Bloom's Taxonomy (RBT)	Tests (10 marks)	Assignments (15 marks)	Self-Study (15 marks)	Peer Evaluation (15 marks)
L1: Remember	-	-	-	-
L2: Understand	-	-	-	-
L3: Apply	5	5	-	5
L4: Analyze	-	-	5	-
L5: Evaluate	-	-	-	
L6: Create	5	10	10	5

Note:

- *Assessments will be given on Analytical problems*
- *Team size should not exceed 5 members*

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.

RBT Levels	Group Discussion
L1: Remember	5
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	5
L6: Create	10

ENTREPRENEURSHIPDEVELOPMENT- 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

CO #	COURSE OUTCOMES
21HSS331A.1	Identify the problem and understand the concept of blue ocean strategy
21HSS331A.2	Create Minimum viable product
21HSS331A.3	Analyze customer segment, Niche and early adopters
21HSS331A.4	Interpret the cost revenue Structure and feasibility of the venture
21HSS331A.5	Analyze and develop financial model for venture.
21HSS331A.6	Create sustainable venture through step wise process (problem solution fit, MVP and financial model).

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21HSS331A.1	0	3	0	0	0	3	1	2	0	0	0	1
21HSS331A.2	0	3	0	0	0	3	1	2	0	0	0	0
21HSS331A.3	0	3	0	0	0	3	1	2	0	0	0	0
21HSS331A.4	0	3	0	3	0	3	1	2	0	0	0	3
21HSS331A.5	0	3	0	3	0	3	1	2	0	0	0	3
21HSS331A.6	0	3	0	3	0	3	1	2	0	0	0	3

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

Module No.	Module Contents	Hours	Cos
1	**Refining Problem and solution –** Identify and refining the problem, Brainstorming Solutions, Problem-Solution Fit	3	21HSS331A.1
2	**Blue ocean strategy**– Meaning, Concept, Implementation	3	21HSS331A.2
3	**Minimum Viable Product**-Meaning of MVP, ways to Build an MVP, Present Your MVP	3	21HSS331A.3
4	**Business Model** – Cost Revenues and Pricing- concept, Business model- Lean Canvas – components, implementation	3	21HSS331A.4

5	**Financing and Financial Model** – Bootstrapping meaning and concept and Initial Financing, Financial Model- concept and implementation	3	21HSS331A.5 21HSS331A.6

Suggested Case Studies:
1. kentro water purifier business idea case study | Business
   [kentro water purifier business idea case study | Business Idea from Children – YouTube](#)
2. Red Bus Start up story [PhanindraSama: The RedBus journey – YouTube](#)

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

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

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

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

SEE- Semester End Examination (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	5
L5: Evaluate	5
L6: Create	10

Constitution of India and Professional Ethics

Course Code : **21HSS341A**   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:

CO #	COURSE OUTCOMES
21HSS341A.1	Gain knowledge of Indian Constitution and be able to solve the legal and societal issues.
21HSS341A.2	Understand the powers and functions of the Union, State and Local Governments in detail.
21HSS341A.3	Understand Electoral Process, Emergency provisions and Amendment procedure.
21HSS341A.4	Acquire the knowledge of their Ethical Duties, Responsibilities and the decision making Ability.
21HSS341A.5	Understand the cybercrimes and cyber laws for cyber safety measures.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21HSS341A.1	-	-	-	-	-	1	-	3	1	-	-	3
21HSS341A.2	-	-	-	-	-	1	-	3	1	-	-	3
21HSS341A.3	-	-	-	-	-	1	-	3	1	-	-	3
21HSS341A.4	-	-	-	-	-	1	-	3	1	-	-	3
21HSS341A.5	-	-	-	-	-	1	-	3	1	-	-	3

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

Module No	Module Contents	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	**21HSS341A.1**
2	**UNION EXECUTIVE and STATE EXECUTIVE** President, prime minister, parliament and supreme court of India. Judicial activism and judicial review. Important parliamentary terminology. Center- state relations. Attorney General of India, Comptroller and Auditor General of India. State Executive- Governor, Chief Minister, State Legislature.	3	**21HSS341A.1**

	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	21HSS341A.1
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	21HSS341A.2
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	21HSS341A.3

Text Books:

1. Durga Das Basu: "Introduction to the constitution"19th/20thEdn., or 2008,Lexis Nexis; Twentieth edition (2011).
2. Shubham Singles, Charles E.Haries: Constitution of India and Professional Ethics.Latest Edition-2018, Cengage Learning India Private Limited (2019).
3. Cyber Security and Cyber Laws Alfred Basta and et al Cengage Learning India 2018 Reference Books.

Reference Books:
1. M.Govindarajan, Natarajan, V.S.Senthilkumar, Engineering Ethics", Prentice Hall India Learning Private Limited (2013).
2. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing 2002.
3. Cyber Security and Cyber Laws Alfred Basta and et al Cengage Learning India 2018 Reference Books.

Assessment Pattern

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment
Marks (Out of 50)	25	25
L1: Remember	10	10
L2: Understand	10	10
L3: Apply	5	5
L4: Analyze	--	--
L5: Evaluate	--	--
L6: Create	--	--

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	20
L2: Understand	20
L3: Apply	10
L4: Analyze	--
L5: Evaluate	--
L6: Create	--

LINUX SYSTEM PROGRAMMING

Course Code : **21CSE35A**   **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

CO #	COURSE OUTCOMES
21CSE35A.1	Explain the fundamentals of Multi-User Operating system and commands
21CSE35A.2	Apply the file manipulation commands and file APIs.
21CSE35A.3	Analyze the mechanism of process creation and process APIs
21CSE35A.4	Apply the networking commands and IPC mechanism.
21CSE35A.5	Evaluate and execute shell scripts effectively
21CSE35A.6	Evaluate awk programs for various real-time applications.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE35A.1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
21CSE35A.2	3	3	-	-	-	-	-	-	-	3	-	-	3	-
21CSE35A.3	3	3	-	3	-	-	-	-	-	3	-	-	3	-
21CSE35A.4	3	3	2	3	-	-	-	-	-	-	-	-	3	-
21CSE35A.5	3	3	2	-	-	-	-	-	-	3	-	-	3	-
21CSE35A.6	3	3	-	3	-	-	-	-	-	3	-	-	3	-

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

Module No.	Module Contents	Hours	Cos
1	**Getting Started & Understanding LINUX Commands:** LINUX Operating System, LINUX architecture, Features of LINUX, The POSIX Standards, API Common Characteristics **General Purpose Utilities:** passwd, who, tty, lock, sty, script, clear and tput, uname, date, cal, calendar, bc, man, echo, script, passwd, uname, who, date, 12om **Simple filters and Regular Expressions:** more, wc, od, pr, cmp, diff, 12omm., head, tail, cut, paste, sort, tr, uniq, nl, grep – searching for a pattern, grep options, regular expressions, egrep and fgrep	9	21CSE35A.1
2	**File System and Attributes:** Introduction to LINUX file system, inode, File Types, File Attributes, Application program Interface to Files, LINUX kernel support for files **File Handling Commands:** ls, cat, cp, mv, rm, wc, od, printf, pwd, mkdir, rmdir, cd, file and directory permissions-chmod, file ownership-chown,chgrp, umask, tar, gzip,unlink, du, df,	12	21CSE35A.2

	find, file modification and access times-touch **System Calls for File Management** – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, File and Record locking **Directory API** – opendir, readdir, closedir, mkdir, rmdir.		
3	**PROCESS:** Process, LINUX kernel support for processes, process attributes, process table, viewing processes – ps, system processes, starting new processes, waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec	8	**21CSE35A.3**
4	**Networking commands:** ifconfig, ulimit, finger, arp, ftp, telnet, hostname, traceroute, ping, netstat, nslookup **INTER PROCESS COMMUNICATION:** Pipe, process pipes, pipe call, Named Pipes – FIFO, Message Queues – msgget, msgsnd, msgrcv, msgctl	8	**21CSE35A.4**
5	**Shell Programming:** Shell variables, shell scripts, read, positional parameters, exit status, logical operators, exit, if conditions, test and [], case, expr, sleep and wait, while and for. **AWK Programming:** Splitting line into fields, printf – formatting output, comparison operators, number processing, BEGIN and END section, positional parameters, getline, built in variables and functions.	8	**21CSE35A.5** **21CSE35A.6**

Text Books:

1. Linux for Beginners: A Practical and Comprehensive Guide to Learn Linux, Ethem Mining, ISBN: 978-1671228085, 2019.
2. Your UNIX – The ultimate Guide, SUMITABHA DAS, TATA McGraw Hill Edition, 4th Edition Paperback 2017, McGraw Hill, ISBN: 978-0070446878

Reference Books:

1. UNIX System Programming Using C++, Terrence Chan, Prentice-Hall of India Private Limited, ISBN: 978-9332549975, 2015.
2. Advanced Programming in the UNIX Environment, W Richard Stevens and Stephen A Rago, Addison Wesley Publications, Third Edition, 2013,ISBN:978-0321637734.
3. UNIX and SHELL Programming, Richard F Gilberg and Behrouz A Forouzan, 15th impression, 2015, Cengage Learning, ISBN: 978-8131503256.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quiz
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember			
L2: Understand	5		
L3: Apply	5		5
L4: Analyze	10	7.5	5
L5: Evaluate	5	7.5	
L6: Create			

Note:

- *Assessment will be the kind of analysis of case study with presentation.*
- *Team size should not exceed 5 members*

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	--

Course Code	: 21CSL35A	Credits	: 01
L:T:P:S	: 0:0:1:0	CIE Marks	: 50
Exam Hours	: 3	SEE Marks	: 50

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

CO #	COURSE OUTCOMES
21CSL35A.1	Apply various LINUX commands on a Multi-User operating system.
21CSL35A.2	Analyze the file permissions and ownership using advance LINUX commands.
21CSL35A.3	Evaluate system programs using LINUX APIs.
21CSL35A.4	Interpret real-time scripts using shell and AWK.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL35A.1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
21CSL35A.2	3	3	-	-	-	-	-	-	-	3	-	-	-	3
21CSL35A.3	3	3	-	3	-	-	-	-	-	3	-	-	-	3
21CSL35A.4	3	3	2	3	-	-	-	-	-	-	-	-	2	3

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

Exp. No	List of Programs	Hours	CO's
1	Execution of various general purpose utility commands	3	21CSL35A.1, 21CSL35A.2
2	Execution of various filter commands	3	
3	Execution of various file/directory handling commands	3	
4	Write a program to emulate the ln command.	2	21CSL35A.3
5	Write a program to read the alternate nth byte and write it in another file.	2	21CSL35A.3
6	Write a program that creates a zombie and then calls system to execute the ps command to verify that the process is zombie.	2	21CSL35A.3
7	Write a program to implement the system function.	2	21CSL35A.3
8	Write a program which demonstrates inter-process communication between a reader process and a writer process. (Use mk fifo, open, read, write and close APIs)	2	21CSL35A.3
9a 9b	Write a shell script to accept a file and check if it is executable. If not make it executable. Write a shell script which will accept a filename and starting and ending line numbers and displays those lines from given file.	3	21CSL35A.4
10a	Write a shell script which displays a list of all the files in the current directory to which you have read, write and	3	21CSL35A.4

10 b	execute permissions. A shell script receives even number of filenames as arguments. Suppose four files are supplied as arguments then the first file should get copied into second, third file into fourth and so on. If odd number of filenames is supplied then no copying should take place and an error message should be displayed.		
11a 11b	Write a shell script which gets executed the moment the user logs in. It should display the message, " Good Morning", " Good Afternoon", " Good Evening", depending upon the time at which the user logs in. Write a shell script which accepts any number of arguments and prints them in reverse order. Ex: If file name is test then $sh test A B C should produce C B A.	3	21CSL35A.4
12a 12b	Write a script to demonstrate built in variables available in AWK Write a script to demonstrate built in functions available in AWK	2	21CSL35A.4

Reference Books:

1. Linux for Beginners: A Practical and Comprehensive Guide to Learn Linux, Ethem Mining, ISBN: 978-1671228085, 2019.
2. Your UNIX – The ultimate Guide, SUMITABHA DAS, TATA McGraw Hill Edition, 4th Edition Paperback 2017, McGraw Hill, ISBN: 978-0070446878.
3. UNIX System Programming Using C++, Terrence Chan, Prentice-Hall of India Private Limited, ISBN: 978-9332549975, 2015.

CIE – Continuous Internal Evaluation: Lab (50 Marks)

Revised Bloom's Taxonomy (RBT)	Weekly Evaluation	CIE -1	CIE -2
Marks (Out of 25)	**10**	**20**	**20**
L1: Remember	-	-	-
L2: Understand	-	-	-
L3: Apply	10	10	10
L4: Analyze	-	5	5
L5: Evaluate	-	5	5
L6: Create	-	-	-

RBT Levels	Marks
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

DATA STRUCTURES AND APPLICATIONS

Course Code : 21CSE36A   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

CO #	COURSE OUTCOMES
21CSE36A.1	Understand the essentials of programming constructs
21CSE36A.2	Apply the concepts of function, pointer, structure and union
21CSE36A.3	Analyze the operations of stack and queue data structures
21CSE36A.4	Investigate on the applications of stack and queue data structures
21CSE36A.5	Evaluate the primitive operations of various types of linked lists and its applications.
21CSE36A.6	Interpret the operations involving Trees and Heaps

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE36A.1	3	3	-	-	-	-	-	-	-	-	-	3	3	3
21CSE36A.2	3	3	-	-	3	-	-	-	2	-	-	3	3	3
21CSE36A.3	3	3	-	-	3	-	-	-	2	-	-	3	3	3
21CSE36A.4	3	-	2	2	3	-	-	-	2	-	-	3	3	3
21CSE36A.5	3	3	-	-	3	-	-	-	-	-	-	3	3	3
21CSE36A.6	3	3	2	2	-	-	-	-	-	-	-	-	3	3

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

Module No	Module Contents	Hours	Cos
1	**C Programming Basics**: Structure of a Program, Data Types, operators and expressions, Managing Input and Output operations, Decision Making and Branching, Looping statements, Arrays, Initialization, Declaration, One dimensional	9	21CSE36A.1

	and Two-dimensional arrays, matrix operations, String operations		
2	**Function, Pointer, Structure and Union:** Function, Recursion, Pass by value, Pass by reference, Pointer – Definition, Initialization, Pointer arithmetic, Structure and Union, Nested Structure, Storage classes, Preprocessor Directives	9	**21CSE36A.2**
3	**Stack Data Structure:** Definition, Representation, Primitive operations on stack, Array representation of stacks. **Applications of Stack:** Recursion, Fibonacci series, Towers of Hanoi problem, Conversion of expressions, Evaluation of postfix expression **Queue Data Structure:** Definition, Representation, Primitive 4operations on queue, Array representation of queues, Circular queue, Priority queue, Double ended queue, Applications of queues	9	**21CSE36A.3, 21CSE36A.4**
4	**Dynamic memory allocation functions**: malloc, calloc, realloc, free, **Linked Lists:** Representation, Primitive Operations, Searching a linked list, Circular linked list, Doubly linked list **Applications of linked list:** Josephus problem, Addition of two long Integers, Addition of two Polynomials, Linked representation of Stack and Queue.	9	**21CSE36A.5**
5	**Trees Data Structure:** Introduction, Binary tree – Strictly binary tree, Complete binary tree, Representing binary tree in memory, Traversing a binary tree, binary search tree, insertion and deletion in binary search tree, Threaded binary tree. Expression trees, construction of an expression tree from prefix and postfix, Heap tree – creation, insertion and deletion.	9	**21CSE36A.6**

Text Books:

1. Data Structures with C, SEYMOUR LIPSCHUTZ, Special Indian Edition, Thirteenth reprint 2015, McGraw Hill Education, ISBN: 9780070701984.
2. Data Structures Through C – 4th Edition, Yashavant Kanetkar, BPB Publications, March 2022, ISBN 978-93-5551-189-8.

Reference Books:

1. Data Structures – A Pseudocode Approach with C, Richard F Gilberg and Behrouz A Forouzan, Second edition, Fifth Indian Reprint 2015, Cengage Learning, ISBN: 9788131503140.
2. Data Structures using C, Aaron M. Tanenbaum, Yedidyah Langsam, Moshe J Augenstein, Thirteenth Impression 2014, Pearson Education, ISBN: 9789332549319.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	25	15	10
L1: Remember	-	-	-
L2: Understand	5	-	-
L3: Apply	5	5	5
L4: Analyze	10	5	5
L5: Evaluate	5	5	-
L6: Create	-		-

Note:

- *Assessments will be given on Analytical problems*
- *Team size should not exceed 5 members*

SEE: Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	15
L4: Analyze	15
L5: Evaluate	10
L6: Create	-

DATA STRUCTURES AND APPLICATIONS LAB

Course Code : **21CSL36A**   **Credits** : **01**
L:T:P:S : **0:0:1:0**   **CIE Marks : 50**
Exam Hours : **3**   **SEE Marks: 50**

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

CO #	COURSE OUTCOMES
21CSL36A.1	Apply the elementary programming constructs to problem solving
21CSL36A.2	Implement Sorting Algorithms and Primitive operations on linear data structure
21CSL36A.3	Implement Primitive operations on nonlinear data structure.
21CSL36A.4	Apply skill of identifying appropriate programming constructs for problem solving.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL36A.1	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSL36A.2	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSL36A.3	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSL36A.4	3	3	3	-	3	-	-	-	3	3	-	3	3	-

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

S. No	List of Programs	Hours	Cos
1	Write a program to sort the numbers using Insertion sort		
2	Write a program to sort the numbers using Selection sort		
3	Write a program to sort the numbers using Bubble sort	6	**21CSL36A.1**
4	Write a program to sort the numbers using Merge sort		
5	Write a program to sort the numbers using Quick sort		
6	Write a program to perform binary search using recursion		
7	Write a program to swap two numbers using pointers	6	**21CSL36A.2**
8	Write a program to deploy the array of structures		
9	Develop a program for STACK that performs following primitive operations: push, pop and display		
10	Develop a program for evaluation of POSTFIX notation.		
11	Develop a program to convert INFIX notation to POSTFIX	6	**21CSL36A.3**
12	Develop a program for LINEAR QUEUE that performs following primitive operations: insert, delete and display		
13	Develop a program for CIRCULAR QUEUE that performs following primitive operations: insert, delete and display		
14	Write a menu driven program to perform the following primitive operations using single linked list 　A. Create a list 　B. Insertion 　C .Deletion 　D. Display	6	**21CSL36A.4**
15	Develop a program for adding two polynomials using linked list.		
16	Write a Menu driven program to perform the following operations		

	using double linked list:
	     A. Insertion
	     B. Deletion
	     C. Display		

17 **18**	Develop a program to traverse a tree using in-order, pre-order and post-order Develop a program to perform insertion, deletion and traversal of a binary search tree	**6**	**21CSL36A.4**

CIE – Continuous Internal Evaluation: Lab (50 Marks)

Revised Bloom's Taxonomy (RBT)	Weekly Evaluation	CIE -1	CIE -2
Marks (Out of 25)	**10**	**20**	**20**
L1: Remember	-	-	-
L2: Understand	-	-	-
L3: Apply	10	10	10
L4: Analyze	-	5	5
L5: Evaluate	-	5	5
L6: Create	-	-	-

SEE – Semester End Examination: LAB (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

DIGITAL ELECTRONICS

Course Code : 21CSE37A		**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

CO #	COURSE OUTCOMES
21CSE37A.1	Implement Boolean function using Karnaugh maps and Quine Mc-Clusky method
21CSE37A.2	Design and analyze modular combinatorial logic circuits
21CSE37A.3	Develop Bi- stable elements like flip-flop and use its functionality to understand the sequential circuits and its applications
21CSE37A.4	Design and apply the concepts of state and state transition for the analysis of sequential circuits
21CSE37A.5	Construct Verilog code to implement the combinational circuits
21CSE37A.6	Construct Verilog code to implement the sequential circuits

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE37A.1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
21CSE37A.2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
21CSE37A.3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
21CSE37A.4	3	3	3	3	-	-	-	-	-	-	-	-	3	-
21CSE37A.5	3	3	3	3	2	-	-	-	-	-	-	2	3	-
21CSE37A.6	3	3	3	3	2	-	-	-	-	-	-	2	3	-

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

Module No.	Module Contents	Hours	Cos
1	**Simplification of Boolean Functions:** Canonical forms, Three Variable K–Maps, Four Variable K–Maps, Quine-McCluskey minimization technique, Reduced prime implicate tables, Map Entered Variables, Introduction to HDL.	9	21CSE37A.1
2	**Combinational Logic Circuits:** Introduction, Adders, Subtractors, Carry Look Ahead Adder, Parallel Adder, Magnitude Comparator, Priority Encoders, Decoders, Multiplexers, De-multiplexers, Read Only Memories (ROM), Programmable Logic Arrays (PLAs), Verilog implementation of combinational circuits.	9	21CSE37A.2 21CSE37A.5
3	**Sequential Logic Circuits-I:** The Basic Flip-flop circuit, Clocked Flip-flops, Triggering of Flip-flops, Types of Flip-flop, Master Slave Flip-flops, Conversion of Flip-flops, Types of Shift Registers, Universal Shift Register, Applications of Shift Register,	9	21CSE37A.3 21CSE37A.6

	Verilog implementation of Flip-flop and Shift Registers.			
4	**Sequential Logic Circuits-II:** Binary ripple counters, Synchronous binary counters, Design of a synchronous mod-n counter using clocked T, JK, D and SR flip-flops, Verilog implementation of counters.	9	**21CSE37A.3** **21CSE37A.6**	
5	**Analysis of Sequential Circuit:** Moore and Mealy Models, State Reduction and Assignment, Design Procedure, Design with State Equations, Verilog implementation of Moore and Mealy.	9	**21CSE37A.4** **21CSE37A.6**	

Text Books:

1. Digital Principles and Applications, Roger Tokheim and Patrick Hoope, 9th Edition, 2022, Tata McGraw Hill, ISBN- 9781259872983.
2. Introduction to Logic circuits and Logic Design with Verilog, Brock T LaMeres, 2018, Springer, ISBN- 9783319538822

Reference Books:

1. Digital Design: with an Introduction to Verilog HDL, VHDL and System Verilog, M Morris Mano and Michael D. Ciletti, 6th Edition, 2018, Pearson Education, ISBN-978-9353062019.
2. Digital Principles and Design- Donald Givone, 2017, Tata McGraw Hill, ISBN-978-0070529069.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	-	-	-
L2: Understand	05	-	-
L3: Apply	15	-	05
L4: Analyze	05	05	05
L5: Evaluate	-	05	-
L6: Create	-	05	-

Note:

- *Assessments will be given to implement **Verilog** code for real-time applications.*
- *Team size should not exceed 5 members.*

RBT Levels	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	15
L5: Evaluate	05
L6: Create	-

Digital Electronics Lab

Course Code : 21CSL37A
L:T:P:S : 0:0:1:0
Exam Hours : 03

Credits : 01
CIE Marks : 50
SEE Marks : 50

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

CO #	COURSE OUTCOMES
21CSL37A.1	Design and implement modular combinatorial logic circuits
21CSL37A.2	Design and implement modular sequential logic circuits
21CSL37A.3	Construct and simulate Verilog code to implement the combinational circuits
21CSL37A.4	Construct and simulate Verilog code to implement the sequential circuits

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL37A.1	3	3	3	3	-	-	-	-	-	-	-	-	-	-
21CSL37A.2	3	3	3	3	-	-	-	-	-	-	-	-	-	-
21CSL37A.3	3	3	3	3	2	-	-	-	-	-	-	2	2	-
21CSL37A.4	3	3	3	3	2	-	-	-	-	-	-	2	2	-

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

Exp. No	List of Experiments	Hours	Cos
1	Design and verify the Full Adder and Subtractor circuit using basic logic gates.	2	21CSL37A.1
2	Design and verify the Parallel Adder/ Subtractor using IC 9483.	2	21CSL37A.1
3	Design and verify the 4-variable function using IC 74151(8:1MUX).	2	21CSL37A.1
4	Design and implement the BCD to Gray code using NAND gates.	2	21CSL37A.1
5	Design and implement the Binary to excess-3 circuits using gates.	2	21CSL37A.1
6	Implement and verify SISO, PIPO, SIPO, PISO, Ring Counter and Johnson Counter using IC 7495.	2	21CSL37A.2

7	Design and implement synchronous up Mod-N Counter using JK-flip flop.	2	21CSL37A.2
8	Design and implement Mod-N asynchronous counter using Decade counter IC.	2	21CSL37A.2

9	Write a Verilog code to simulate the following circuit:
	  a. Adder and Subtractor
	  b. MUX and De-MUX
	  c. Decoder
		2	21CSL37A.3

10	Write a Verilog code to simulate the following circuit:
	  a. Magnitude comparator
	  b. Code converter
		2	21CSL37A.3

11	Write a Verilog code to simulate the following circuit:
	  a. Flip flops
	  b. Ring Counter and Johnson Counter
	  c. Synchronous up and down counter
		2	21CSL37A.4

12	Write a Verilog code to simulate Mealy sequence detector circuit	3	21CSL37A.4

Reference Books:

1. Verilog HDL Design Examples - Joseph Cavanagh, 2018, CRC Press, Taylor & Francis group, ISBN- 9781138099951
2. Hardware Description Language Demystified: Explore Digital System Design using Verilog HDL and VLSI Design Tools, Dr. Cherry Bhargava and Dr. RajkumarSarma, 2020, BPB Publications, ISBN- 9789389898040

CIE – Continuous Internal Evaluation: Lab (50 Marks)

Revised Bloom's Taxonomy (RBT)	Weekly Evaluation	CIE -1	CIE -2
Marks (Out of 25)	**10**	**20**	**20**
L1: Remember	-	-	-
L2: Understand	-	-	-
L3: Apply	10	10	10
L4: Analyze	-	5	5
L5: Evaluate	-	5	5
L6: Create	-	-	-

SEE – Semester End Examination: LAB (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

MINI PROJECT-I

Course Code	: 21CSE38A	Credits	: 02
L: T: P: S	: 0:0:2:0	CIE Marks	: 50
Exam Hours	: 03	SEE Marks	: 50

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

CO #	COURSE OUTCOMES
21CSE38A.1	Describe the comprise and clear statement of problem definition
21CSE38A.2	Identify the functional requirements
21CSE38A.3	Develop the Interface design for the identified modules
21CSE38A.4	Develop the functional code blocks for the specified modules
21CSE38A.5	Build the test strategies and evaluation methods
21CSE38A.6	Formulate the supportive documentation and presentation for the system development

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE38A.1	3	3	-	3	-	-	-	3	3	3	-	3	3	3
21CSE38A.2	3	3	-	3	3	-	-	3	3	3	-	3	3	3
21CSE38A.3	3	3	3	3	3	-	-	3	3	3	-	3	3	3
21CSE38A.4	3	3	3	3	3	-	-	3	3	3	-	3	3	3
21CSE38A.5	3	3	3	3	3	-	-	3	3	3	-	3	3	3
21CSE38A.6	3	-	-	-	3	-	-	3	3	3	1	-	-	-

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

Objectives:
1. Students should be able to use structured programming language libraries.
2. Students should be able to implement project based on various data structures.

Description:
The student shall be capable of identifying a problem related to any real-time application scenario. Each student is expected to do the mini project individually. The code developed for the mini project will be reviewed by panel of experts during the course of the semester. Plagiarized mini project and non-reviewed mini project will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a mini project the student will submit a mini project report and do the presentation which will be evaluated by duly appointed examiner(s).

Evaluation Stages:

Activity	Evaluation Attribute
Synopsis Submission	Unambiguous problem statement
Review-I	Interface design for the identified functional modules
Review-II	Code development and Implementation
Final Review / SEE	Final evaluation and testing with supportive documentation

CIE – Continuous Internal Evaluation (50 Marks)

Revised Bloom's Taxonomy (RBT) Marks (Out of 25)	Mini Project
L1: Remember	-
L2: Understand	-
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	20

SEE – Semester End Examination (50 marks)

RBT Levels	Marks (Out of 50)
L1: Remember	-
L2: Understand	-
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	20

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

CO #	COURSE OUTCOMES
21DMAT31A.1	Know the principles of engineering mathematics through calculus.
21DMAT31A.2	Determine the power series expansion of a function.
21DMAT31A.3	Find the definite integrals with standard limits and also develop the ability to solve different types of differential equations.
21DMAT31A.4	Apply ideas from linear algebra in solving systems of linear equations and determine the Eigen values and Eigen vectors of a matrix.

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21DMAT31A.1	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.2	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.3	3	3	3	-	-	-	-	-	-	-	-	3
21DMAT31A.4	3	3	3	-	-	-	-	-	-	-	-	3

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

Module No.	Module Content	Hours	Cos
1.	**Differential Calculus:** Polar Curves-Problems on angle between the radius vector and tangent, Angle between two curves-Problems, Pedal equation for polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.	5	**21DMAT31A.1, 21DMAT31A.2**
2.	**Partial differentiation:** Definition and Simple problems, Euler theorem for Homogeneous function (NO Derivation and NO extended theorem)-Problems, Jacobians of order two – definition and problems	5	**21DMAT31A.1**
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	**21DMAT31A.3**
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	**21DMAT31A.4**
5.	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen Vectors of a square matrix-Problems.	5	**21DMAT31A.4**

Text Books:

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

Reference Books:

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

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	5	5	-
L2: Understand	5	5	-
L3: Apply	10	5	10
L4: Analyze	2.5	-	-
L5: Evaluate	2.5	-	-
L6: Create	-	-	-

Note:

- *Assessments will be given on Analytical problems*
- *Team size should not exceed 5 members*

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	5
L5: Evaluate	5
L6: Create	-

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:

CO #	COURSE OUTCOMES
21DAEC40A.1	Recognize the grammatical structures in English and identify errors in sentences
21DAEC40A.2	Demonstrate conversational skills using situational vocabulary
21DAEC40A.3	Examine the importance of sub skills of listening for effective communication
21DAEC40A.4	Analyse the importance of receptive and productive skills of communication

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POI0	POII	PO12
21DAEC40A.1	-	-	-	-	-	-	-	-	-	3	-	3
21DAEC40A.2	-	-	-	-	-	-	-	-	3	3	-	3
21DAEC40A.3	-	-	-	-	-	-	-	-	-	3	-	3
21DAEC40A.4	-	-	-	-	-	-	-	-	-	3	-	3

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

Module No.	Module Contents	Hours	Cos
1.	Self-introduction – Talking about self, ambition, hobbies, likes, dislikes, talents and achievements. Asking for and Giving Information (Pair work) (SEE Task 1) Asking question. (WH, Aux Verbs), Helping Verbs usage chart, question tags. Nouns, Pronouns	5	21DAEC40A.1
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	21DAEC40A.1, 21DAEC40A.2
3.	Describing people, things, actions, process (SEE Task 2) Describing ongoing actions Situational conversations, role plays Adjectives, Adverbs Verbal Ability: Sentence correction, Sentence completion.	5	21DAEC40A.1, 21DAEC40A.2, 21DAEC40A.4

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	**21DAEC40A.2, 21DAEC40A.4**
5.	Presentation Skills: Nonverbal Communication (Body Language): Kinesics, Oculesics, Paralanguage. Overcoming stage fear, Organizing a speech – Preparation, Practice, 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	**21DAEC40A.1**

Text Books:

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

Reference Books:

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

CIE – Continuous Internal Evaluation: Theory (50 Marks)

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

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	-
L6: 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:

CO #	COURSE OUTCOMES
21DMAT41A.1	Gain knowledge of basic operations of vectors
21DMAT41A.2	Use curl and divergence of a vector function in three dimensions
21DMAT41A.3	Develop the ability to solve higher order Linear differential equations
21DMAT41A.4	Know the basic concepts of Laplace transform to solve the Periodic functions and also solve initial and boundary value problems using Laplace transform method

Course Outcomes to Program Outcomes Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21DMAT41A.1	3	3	3	3	-	-	-	-	-	-	3	3
21DMAT41A.2	3	3	3	3	-	1	-	-	-	-	3	3
21DMAT41A.3	3	3	3	3	3	-	3	-	-	3	3	3
21DMAT41A.4	3	3	3	3	3	-	3	-	-	3	3	3

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

Module No.	Module Contents	Hours	Cos
1.	**Vectors:** Definition of scalar and vector, Vector addition, Subtraction and Multiplication-Dot product, Cross product, Scalar triple product. Orthogonal, Co-planar and Angle	5	21DMAT41A.1

	between vectors-Problems.		
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	**21DMAT41A.2**
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	**21DMAT41A.3**
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	**21DMAT41A.4**
5.	**Inverse Laplace Transform:** Inverse Laplace Transform by partial fractions-Problems. Solution of linear differential equations using Laplace Transforms-Problems.	5	**21DMAT41A.4**

Text Books:

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

Reference Books:

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

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	5	5	-
L2: Understand	5	5	-
L3: Apply	10	5	10
L4: Analyze	2.5	-	-
L5: Evaluate	2.5	-	-
L6: Create	-	-	-

Note:

- *Assessments will be given on Analytical problems*
- *Team size should not exceed 5 members*

SEE – Semester End Examination: Theory (50 Marks)

RBT Levels	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	5
L5: Evaluate	5
L6: Create	-

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DISCRETE MATHEMATICS AND GRAPH THEORY

Course Code	: 21CSE41A	**Credits**	: 03
L: T: P: S	: 3:0:0:0	**CIE Marks**	: 50
Exam Hours	: 03	**SEE Marks**	: 50

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

CO #	COURSE OUTCOMES
21CSE41A .1	Explain the counting techniques and combinatorics by using the context of discrete probability.
21CSE41A .2	Illustrate the fundamental concepts of trees, connectivity and planarity graphs.
21CSE41A .3	Apply Pigeon hole principle to solve real life problems.
21CSE41A .4	Solve the engineering problems involving relations and functions.
21CSE41A .5	Analyze the computer science problems by using graph theory techniques.
21CSE41A .6	Justify the arguments with propositional and predicate logic and from truth tables.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21CSE41A.1	3	3	3	3	-	-	-	-	-	3	-	3
21CSE41A.2	3	3	3	3	-	-	-	-	-	-	-	3
21CSE41A.3	3	3	3	3	-	-	-	-	-	3	-	3
21CSE41A.4	3	3	3	3	-	-	-	-	-	-	-	3
21CSE41A.5	3	3	3	3	-	-	-	-	2	3	-	3
21CSE41A.6	3	3	3	3	-	-	-	-	2	3	-	3

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

Module No.	Module Contents	Hours	CO's
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	**21CSE41A.6**
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	**21CSE41A.1**
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	**21CSE41A.3, 21CSE41A.4**
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	**21CSE41A.5**
5	**Trees, Connectivity and Planarity**: Trees, Properties of trees, Rooted and binary trees. Spanning trees, cut sets, Properties of cut set, all	9	**21CSE41A.2**

	cut sets, Fundamental circuits Network flows, Planar graphs, Dual of planar graphs, Different representation of a planar graph. Case studies on Social Network Analysis.		

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.

CIE- Continuous Internal Evaluation (50 Marks)

Revised Blooms Taxonomy (RBT)	Tests	Assessment	Quiz
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	5	5	-
L2: Understand	5	5	-
L3: Apply	10	5	10
L4: Analyze	2.5	-	-
L5: Evaluate	2.5	-	-
L6: Create	-	-	-

SEE- Semester End Examination (50Marks)

RBT Level	SEE (50 Marks)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	5
L5: Evaluate	5
L6: Create	-

WEB DESIGN TECHNOLOGIES

Course Code	: 21CSE422A	**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

CO #	COURSE OUTCOMES
21CSE422A.1	Understand fundamental concepts of HTML, and XHTML, and use html tags to create aesthetic webpage using CSS
21CSE422A.2	Use JavaScript basic concepts in HTML / XHTML document for creating static web pages
21CSE422A.3	Apply advanced JavaScript concepts in html document for creating dynamic web pages
21CSE422A.4	Analyze XML structure to create web pages using DTD
21CSE422A.5	Analyze XML structure to develop web pages using DTD and apply styles using XSL, XSLT and CSS
21CSE422A.6	Experiment with database connectivity using MySQL to handle queries in PHP script

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE422A.1	3	3	3	-	3	-	-	3	3	3	3	3	3	-
21CSE422A.2	3	3	3	-	3	-	-	3	3	3	3	3	3	-
21CSE422A.3	3	3	3	-	3	-	-	3	3	3	3	3	3	-
21CSE422A.4	3	3	3	3	3	-	-	3	3	3	**3**	3	3	-
21CSE422A.5	3	3	3	3	3	-	-	3	3	3	3	3	3	-
21CSE422A.6	3	3	3	3	3	-	-	3	3	3	3	3	3	-

Module No.	Module Contents	Hours	CO's
1	**Introduction**: Web concepts, Basic HTML tags, fonts, color, hyperlink, Lists, Tables, images, forms, XHTML, Meta tags, Character entities, Introduction to XHTML, Structure, Difference between HTML and XHTML. **CSS:** Need for CSS, Introduction to CSS, Basic syntax and structure, Background images, Colors and Properties, Manipulating Texts, Fonts, Borders and Boxes, Margins, Padding, Positioning. **List of programs:** **1.** Design a simple user form using HTML tags which should include tables and lists (Minimum 7 elements) **2.** Design a web page using CSS with the following : A. Use different fonts and styles: The style definition should have all kinds of selector forms with different font, color etc. The body of the document should activate those styles. B. Set a background image for both the page and single elements on the page. Control the repetition of an image with the background-repeat property.	5	21CSE422A.1

2	**JavaScript:** Introduction, Variables, Functions, Strings, Arrays, loops and repetition, Keyboard input and screen outputs, JavaScript objects and Pattern matching **List of programs:** 3. Design HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be displayed next to the list. Use CSS to customize the properties of the font of the capital values. 4. Write a JavaScript to create a HTML page that takes a given set of integer numbers and sort it in descending order.	5	**21CSE422A.2**
3	**Dynamic Documents with JavaScript:** Introduction, Positioning Elements, Moving elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking elements, Locating the mouse, Reacting to a Mouse Click, Slow Movement of Elements, Drag and Drop elements 5. Develop and demonstrate using JavaScript: A XHTML document that contains three short paragraphs of text, stacked one above the other, when the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. 6. Develop and demonstrate using JavaScript: A XHTML document that contains three short paragraphs of text -when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom -Z index property.	5	**21CSE422A.3**
4	**XML**: Introduction to XML, Structure, Uses, Simple Example, Key components-Tags, Elements and Attributes, Attribute Type, DTD-Internal and External, Namespace - Schemas, XML Applications, XML Validation - DTD and XSD, Introduction to XSLT, Transforming XML using XSLT. **List of programs:** 7. Design a XML document to store information about Airline system which has the following information such as Airline number, Name, Destination, Year of manufacturing, Price. Create sample data for three airlines. Create using CSS style sheet and display it. 8. Design a XML document to store information about patients in a hospital. Information about patients must include Name (in 3 parts, First, Middle, last), Age, Room Number, Primary Insurance Company – including Member Identification number, group number, known medical problems, and known drug allergies. Both attributes and nested tags must be included. Create the XSLT style sheet to format all the patient elements XML document.	5	**21CSE422A.4, 21CSE422A.5**
5	**PHP**: Introduction and Basic syntax of PHP, Decision Statements and Looping Structures with Examples, PHP and HTML, Arrays, Functions, Browser Control and Detection, Strings, Form processing, Files, **Advance Features:** Cookies and Sessions, Object Oriented Programming with PHP **PHP and MySQL:** MySQL commands with PHP, Application using Database Connectivity. **List of programs:** 9. Create a database using MySQL command to perform data manipulation operations 10. Create cookies and sessions using PHP	5	**21CSE422A.6**

Text Books:

1. Robert W. Sebesta: Programming the World Wide Web, 8th Edition((20 May 2020) , Pearson Education, ISBN-13 : 978-9353946142, ISBN-10 : 935394614X

Reference books:

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 5thEdition, Pearson education, 2018. ISBN: 9789352868599, 9352868595

CIE – Continuous Internal Evaluation: Hands-on (50 Marks)

Revised Blooms Taxonomy (RBT)	Tests	Lab Based Project
Marks (Out of 50)	25	25
L1: Remember	-	-
L2: Understand	-	-
L3: Apply	10	10
L4: Analyze	10	5
L5: Evaluate	5	5
L6: Create	-	5

SEE: Semester End Examination: Theory (50 Marks)

RBT Level	SEE (50 Marks)
L1: Remember	-
L2: Understand	05
L3: Apply	20
L4: Analyse	15
L5: Evaluate	10
L6: Create	-

(Kannada for administration)

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

ಆಡಳಿತ ಕನ್ನಡ ಅಧ್ಯಯನದ ಕಲಿಕಾಂಶಗಳು

C01 ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ

C02 ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು

C03 ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು

C04 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವಹಿಸಿಕೊಳ್ಳುವರು

CO – PO Mapping:

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

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ –1 ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ

ಅಧ್ಯಾಯ –2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ

ಅಧ್ಯಾಯ –3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

ಅಧ್ಯಾಯ –4 ಪತ್ರ ವ್ಯವಹಾರ

ಅಧ್ಯಾಯ –5 ಆಡಳಿತ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು

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

ಅಧ್ಯಾಯ –8 ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ

ಅಧ್ಯಾಯ –9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

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

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದ ಲೇಖಕರು

ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ, 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 :21HSS432A/433A	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

CO #	COURSE OUTCOMES
21HSS432A/ 21HSS433A.1	Understand Kannada Language
21HSS432A/ 21HSS433A.2	CommunicateinKannadaLanguage
21HSS432A/ 21HSS433A.3	Read simpleKannadawords
21HSS432A/ 21HSS433A.4	PronounceKannadawords correctly

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21HSS432A/ 21HSS433A.1	-	-	-	-	-	-	-	-	-	3	-	-
21HSS432A/ 21HSS433A.2	-	-	-	-	-	-	-	-	-	3	-	-
21HSS432A/ 21HSS433A.3	-	-	-	-	-	-	-	-	-	3	-	-
21HSS432A/ 21HSS433A.4	-	-	-	-	-	-	-	-	-	3	-	-

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

Syllabus

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

Chapter–2: Kannada Akshara malehaaguuchharane (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:

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

CIE – Continuous Internal Evaluation: (50 Marks)

Revised Bloom's Taxonomy (RBT)	Marks
L1: Remember	50
L2: Understand	25
L3: Apply	25
L4: Analyze	-
L5: Evaluate	-
L6: Create	-
L1: Remember	-

SEE: Semester End Examination: Theory (50 Marks)

RBT Level	Marks
Marks (Out of 50)	50
L1: Remember	25
L2: Understand	25
L3: Apply	-
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

ENVIRONMENTAL SCIENCE

Course Code: 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:

CO #	COURSE OUTCOMES
21HSS442A.1	Understand the concepts of Environment, ecosystem and biodiversity.
21HSS442A.2	Explain the strategies for management of natural resources to achieve sustainability.
21HSS442A.3	Analyze the control measures of Environmental pollution and global Environmental issues.
21HSS442A.4	Apply the knowledge of Environment Impact Assessment, Technology, Environmental acts and laws in protecting Environment and human health.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21HSS442A.1	-	-	-	-	-	3	3	-	-	-	-	-	-	-
21HSS442A.2	-	-	-	-	-	3	3	-	-	-	-	3	1	-
21HSS442A.3	-	-	-	-	-	3	3	3	-	3	-	3	1	-
21HSS442A.4	-	-	-	-	1	3	3	3	-	3	-	3	1	1

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

Module No.	Content of Module	Hrs	Cos
1	**Introduction to Environment, Ecosystem and Biodiversity**: Environment: Definition, Components of Environment; Ecosystem: Types & Structure of Ecosystem, Energy flow in the ecosystem; Biodiversity:Types, Hot-spots, Threats and Conservation of biodiversity.	03	**21HSS442A.1**
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	**21HSS442A.2**

3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air Pollution, Water Pollution, soil Pollution and Noise pollution.Solid wastesand its management.Role of society, NGO and Govt. agenciesin prevention of pollution.	03	**21HSS442A.3**
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	**21HSS442A.3, 21HSS442A.4**
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	**21HSS442A.4**

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):

Revised Bloom's Taxonomy (RBT)	Tests	Assignments	Seminar
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	5	-	-
L2: Understand	15	-	-
L3: Apply	5	8	5
L4: Analyze	-	7	5
L5: Evaluate	-	-	-
L6: Create	-	-	-

SEE – Semester End Examination (50 Marks):

RBT Level	Marks (Out of 50)
L1: Remember	10
L2: Understand	30
L3: Apply	10
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

Percentage Evaluation of Various Blooms' levels:

Bloom's Category	CIE	SEE	Total	%
L1: Remember	5	10	15	15
L2: Understand	15	30	45	45
L3: Apply	18	10	28	28
L4: Analyze	12	-	12	12
L5: Evaluate	-	-	-	-
L6: Create	-	-	-	-

COMPUTER ARCHITECTURE WITH ARM

Course Code :21CSE45A   **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

CO #	COURSE OUTCOMES
21CSE45A.1	Discuss different computer architectures, instruction sets, addressing modes and memory
21CSE45A.2	Apply Cortex M3 architecture and instructions set to solve a problem
21CSE45A.3	Compute assembly and embedded C language programs for different applications.
21CSE45A.4	Analyze basic arithmetic operations used in hardwired control unit
21CSE45A.5	Categorize types of I/O organization and Interrupts
21CSE45A.6	Evaluate the design parameters and performance of types of memory

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE45A.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
21CSE45A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
21CSE45A.3	3	3	3	-	-	-	-	-	-	-	-	3	3	-
21CSE45A.4	3	3	3	-	-	-	-	-	-	-	-	3	3	-
21CSE45A.5	3	3	3	-	-	-	-	-	-	-	-	3	3	-
21CSE45A.6	3	3	-	-	-	-	-	-	-	-	-	3	3	-

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

Module No	Module Contents	Hours	COs
1	**Introduction to Architecture:** Flynn's Classification of Computers, Fundamental Blocks of Computer, RISC, CISC, Number representation, Signed and Unsigned Numbers and arithmetic, Memory locations and addresses, Instructions and Instruction sequence, Addressing modes, Bus Structure	9	**21CSE45A.1**
2	**ARM Architecture and Instruction Set-I:** Evolution of ARM**,** Cortex M3 Architecture, Operation Mode, Thumb-2 Technology, Registers, Special Registers, Data Transfer Instructions, Arithmetic instructions	9	**21CSE45A.2, 21CSE45A.3**
3	**ARM Architecture and Instruction Set-II:** Logical instructions, Branch Instructions, Barrier Instructions, Cortex-M3 assembly Programming **INTRODUCTION TO EMBEDDED C**: C-looping structures, Register allocation, Function calls, Inline functions and Inline assembly	9	**21CSE45A.2, 21CSE45A.3**

4	**Computer Arithmetic and Basic Processing Unit:** Multiplication of unsigned and signed numbers, Fast multiplication, Integer Division, Floating point numbers and operations, Hardwired control	9	**21CSE45A.4**
5	**Computer Memory System and I/O Organization:** The Memory hierarchy, Types of memory, Cache Memory, Replacement algorithms, write policy, Accessing I/O devices, Interrupts, ARM Cortex M3 exceptions, Priority and sub-priority levels	9	**21CSE45A.5, 21CSE45A.6**

Text Books:
1. Computer Organization and Design: The Hardware / Software Interface – ARM EDITION, David A. Patterson, John L. Hennessy, Morgan Kaufmann, 2017, ISBN-: 978-0-12-801733-3.
2. Digital Design and Computer Architecture- ARM edition, Sarah L. Harris, David Money Harris, Morgan Kaufmann,2016, ISBN-978-0-12-800056-4.

Reference Books:
1. Computer Organization and Embedded Systems, Carl Hamacher, ZvonksVranesic, SafeaZaky, McGraw Hill, Sixth Edition, 2012, ISBN- 978-0-07-338065-0
2. The Designer's Guide to the Cortex-M Processor Family - A Tutorial Approach, Trevor Martin, 2nd Edition, 2017, Newness Publication, ISBN- 978-0-08-10029-0

CIE - Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quiz
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	-	-	-
L2: Understand	5	-	-
L3: Apply	10	5	5
L4: Analyze	5	5	5
L5: Evaluate	5	5	-
L6: Create	-	-	-

Note:

- *Assessments will be given analytical problems and pragmatics (Assembly/C programs)*

SEE: Semester End Examination: Theory (50 Marks)

RBT Level	SEE (50 Marks)
L1: Remember	5
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	5
L6: Create	-

ARM PROCESSOR LAB

Course Code : 21CSL45A		**Credits**	: 01
L: T: P: S : 0: 0: 1: 0		**CIE Marks**	: 50
Exam Hours : 03		**SEE Marks**	: 50

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

21CSL45A.1	Apply the instruction set of 32- bit microcontroller ARM Cortex M3.
21CSL45A.2	Develop assembly language programs for different problem statements.
21CSL45A.3	Perform floating-point operations using ARM Cortex M4.
21CSL45A.4	Develop C language to interface external hardware with ARM Cortex M3.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL45A.1	3	-	-	-	3	-	-	-	-	-	-	-	-	-
21CSL45A.2	3	3	3	-	3	-	-	-	-	-	-	-	3	-
21CSL45A.3	3	3	3	-	3	-	-	-	-	-	-	3	3	-
21CSL45A.4	3	3	3	3	3	-	-	-	-	-	-	3	3	3

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

Exp. No	List of Experiments	Hours	COs
1	Program to count number of 1's or 0's in a given 32-bit number.	2	21CSL45A.1, 21CSL45A.2
2	Program to find whether a given number is odd or even.	2	21CSL45A.1, 21CSL45A.2
3	Program to sort a given array of N elements in ascending / descending order using bubble sort.	2	21CSL45A.1, 21CSL45A.2
4	Program to perform 64-bit addition, subtraction and multiplication operations.	2	21CSL45A.1, 21CSL45A.2
5	Program to generate Fibonacci series of N numbers	2	21CSL45A.1, 21CSL45A.2
6	Program to compute factorial and n C r using recursion	2	21CSL45A.1, 21CSL45A.2
7	Program to perform floating point operations	2	21CSL45A.2, 21CSL45A.3
8	Program to validate a given string.	2	21CSL45A.1,

				21CSL45A.2
9	Program to display a message using Internal UART	2	21CSL45A.4
10	Program to Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction	2	21CSL45A.4
11	Program to Interface a DAC and generate waveforms	2	21CSL45A.4
12	Program to display the given characters on a 7-segment LED display	3	21CSL45A.4
13	Program to display a given message on LCD display	3	21CSL45A.4

Reference Material(s):

1. An Engineers Introduction to the LPC2100 series, Trevor Martin, Hitex (UK) Ltd
2. LPC 214x User manual (UM10139) :- www.nxp.com
3. LPC 17xx User manual (UM10360) :- www.nxp.com

CIE – Continuous Internal Evaluation: Lab (50 Marks)

Revised Blooms Taxonomy (RBT)	Weekly Evaluation	CIE -1	CIE -2
Marks (Out of 25)	10	20	20
L1: Remember	2	-	-
L2: Understand	2	-	-
L3: Apply	2	5	5
L4: Analyze	2	5	5
L5: Evaluate	2	5	5
L6: Create	-	5	5

SEE – Semester End Examination: LAB (50 Marks)

RBT Level	Marks
L1: Remember	-
L2: Understand	-
L3: Apply	20
L4: Analyze	20
L5: Evaluate	10
L6: Create	-

OBJECT ORIENTED PROGRAMMING

Course Code :**21CSE46A**   **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

CO #	COURSE OUTCOMES
21CSE46A.1	Explain the basic constructs of OOP with Java for the development of simple programs
21CSE46A.2	Apply I/O and file concepts to develop Java programs
21CSE46A.3	Analyze Polymorphism, Inheritance, Interface and Package in Java
21CSE46A.4	Implement multithreading and exception handling mechanisms
21CSE46A.5	Evaluate various classes in collections framework
21CSE46A.6	Interpret the Swing components to handle various events.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE46A.1	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSE46A.2	3	3	-	-	3	-	-	-	3	3	-	3	3	-
21CSE46A.3	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSE46A.4	3	3	3	-	3	-	-	-	3	3	-	3	3	-
21CSE46A.5	3	3	3	1	3	-	-	-	3	3	-	3	3	-
21CSE46A.6	3	3	-	1	3	-	-	-	3	3	-	3	3	-

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

Module No	Module Contents	Hours	COs
1	**Introduction to Java, Objects and Classes:** Basics and Overview of Java programming, - "Hello, World" Program, Compiling and Running a Java Program, Data types, Variables, Operators, Control structures including Selection, Looping, Working with Objects, Implementing Classes, Object Construction, Static Variables and Methods, Overloading, Math class, Arrays in java.	9	**21CSE46A.1**
2	**I/O Basics &Files:** Reading input, Writing output - Scanner class, Buffered Reader class, Reading and Writing files**.** **Constructors:** Visibility modifiers, Methods and Objects, Inbuilt classes like String, Character, String Buffer, 'this' reference, nested classes.	9	**21CSE46A.2**
3	**Inheritance, Interface and Package:** Inheritance and types, Base and Derived classes, Overriding, Polymorphism, Dynamic Binding, Casting objects, Instance of operator, super(), final-keyword and method, finalize, Abstract class, Interface, Package , Object class.	9	**21CSE46A.3**

4	**Exception Handling and Multithreading:** Exception Types, Uncaught Exceptions, Using try and catch block, Multiple catch clauses, Nested try statements, throw, throws, finally, Java's Built-in Exceptions and User-defined Exceptions. **Threads:** Java Thread Model, Main Thread, Thread Life Cycle- Creating a Thread, Running, Suspending, Resuming and Stopping Threads, Creating Multiple Threads, Thread Priorities, Synchronization, Inter-thread Communication.	9	21CSE46A.4
5	**Collections Framework:** Collections Overview, Collection Interfaces- List Interface, Set Interface, Queue Interface, Collection Classes – ArrayList Class, LinkedList Class, TreeSet Class**.** **Swing & Event handling:** Basics of Swing, Components and Containers, Swing Packages, Simple Swing Application, Create a Swing Applet, JLabel, JTextField, Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, JTable.	9	21CSE46A.5 21CSE46A.6

Text Books:
1. Herbert Schildt, Java™: The Complete Reference, McGraw-Hill, 12th edition, November 2021, ISBN: 978-1-260-46341-5
2. Cay S. Horstmann, Core Java® SE 9 for the Impatient, Addison Wesley, Second Edition, 2018, ISBN: 978-013-4694726

Reference Book(s):
1. SAMS teach yourself Java–2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education. ISBN: 978-0672324550
2. Ken Kousen, Modern Java Recipes, O'Reilly Media, Inc., 2017, ISBN: 9781491973172

CIE - Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy(RBT)	Tests	Assessment	Quizzes
Marks (Out of 50)	25	15	10
L1: Remember	-	-	-
L2: Understand	5	-	-
L3: Apply	10	5	5
L4: Analyze	10	5	5
L5: Evaluate	-	5	-
L6: Create	-	-	-

Note:

- *Project based activities will be given as assessments.*
- *Project team size should not exceed maximum of 3-students*

SEE: Semester End Examination: Theory (50 Marks)

RBT Level	SEE (50 Marks)
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

OBJECT ORIENTED PROGRAMMING LAB

Course Code	: 21CSL46A		Credits	: 01
L:T:P:S	: 0:0:1:0		CIE Marks	: 50
Exam Hours	: 3		SEE Marks	: 50

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

CO #	COURSE OUTCOMES
21CSL46A.1	Apply basic constructs for development of simple Java programs.
21CSL46A.2	Apply OOP principles and proper program structuring to develop programs.
21CSL46A.3	Implement polymorphism and inheritance for an application program.
21CSL46A.4	Implement multithreading, swings and handle exceptions appropriately.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL46A.1	3	3	3	-	3	-	-	3	3	3	3	3	3	3
21CSL46A.2	3	3	3	-	3	-	-	3	3	3	3	3	3	3
21CSL46A.3	3	3	3	-	3	-	-	3	3	3	3	3	3	3
21CSL46A.4	3	3	3	-	3	-	-	3	3	3	3	3	3	3

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

Exp. No	List of Experiments	Hours	COs
1	Write a Java program to demonstrate the concept of: a) method overloading b) math class c) arrays	2	21CSL46A.1
2	a) Write a program to define a class, describe its constructor with overloading, instantiate its object and use static members b) Write a program to demonstrate File I/O operations	3	21CSL46A.2
3	Write a program to demonstrate String class, StringBuffer class and its methods	2	21CSL46A.2
4	Write a program to demonstrate nested classes and array of objects	2	21CSL46A.2
5	Write a program to implement inheritance and demonstrate dynamic binding using method overriding	2	21CSL46A.3
6	Write a program to implement multilevel inheritance by applying various access controls to its data members and methods	2	21CSL46A.3
7	Write a program to demonstrate the implementation of interfaces	2	21CSL46A.3
8	Write a program to demonstrate the use of extending interfaces	2	21CSL46A.3
9	Write a program to implement the concept of importing classes from user-defined packages	2	21CSL46A.3
10	Write a program to implement the concept of Exception Handling using pre-defined exceptions and user defined exceptions	2	21CSL46A.4

11	Write a program to implement the concept of threading by extending Thread class and implementing Runnable Interface	2	21CSL46A.4
12	Write a program that implements a multi-thread application that has three threads. First thread generates random integer in every second if the value is even; Second thread computes the square of the given number and prints if the value is odd; the third thread will print the value of cube of given number	2	21CSL46A.4
13	Write a program to demonstrate ArrayListClass, LinkedList Class, TreeSet Classes	2	21CSL46A.4
14	Write a program to implement event handling with swings	3	21CSL46A.4

Reference Books:

1. Herbert Schildt, Java™:TheCompleteReference,McGraw-Hill,12th edition, November 2021
2. Cay S. Horstmann, Core Java® SE 9 for the Impatient, Addison Wesley, Second Edition, 2018
3. CayS.Horstmann,CoreJava™VolumeI—Fundamentals,PrenticeHall,TenthEdition, 2015
4. SAMS teach Yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.
5. Ken Kousen, Modern Java Recipes, O'Reilly Media, Inc.,2017

CIE – Continuous Internal Evaluation: (50 Marks)

Revised Bloom's Taxonomy(RBT)	Weekly Evaluation	CIE Test-1	CIE Test-2
Marks (Out of 50)	10	25	25
L1: Remember	-	-	-
L2: Understand	-	-	-
L3: Apply	5	10	10
L4: Analyze	5	5	5
L5: Evaluate	-	5	5
L6: Create	-	5	5

SEE – Semester End Examination: Theory (50 Marks)

RBT Level	Marks (Out of 50)
L1: Remember	-
L2: Understand	-
L3: Apply	20
L4: Analyze	20
L5: Evaluate	10
L6: Create	-

OPERATING SYSTEM

Course Code :**21CSE47A**		**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:

CO #	COURSE OUTCOMES
21CSE47.1	Describe overview of the computer system and services provided by an operating system.
21CSE47.2	Explain various Inter Process Communication mechanisms and CPU scheduling algorithms.
21CSE47.3	Apply software and hardware solutions of the critical-section problem
21CSE47.4	Analyze various mechanism for handling deadlock
21CSE47.5	Evaluate different approaches of memory management
21CSE47.6	Analyze the organization of file systems and structure of secondary storage devices.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSE47.1	3	3	3	-	3	-	-	-	-	-	-	3	3	3
21CSE47.2	3	3	3	2	3	-	-	-	-	3	-	3	3	3
21CSE47.3	3	3	3	2	3	-	-	-	-	3	-	3	3	3
21CSE47.4	3	3	3	2	3	-	-	-	-	3	-	3	3	3
21CSE47.5	3	3	3	-	3	-	-	-	-	3	-	3	3	3
21CSE47.6	3	3	-	-	3	-	-	-	-	-	-	3	3	3

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

Module No	Module Contents	Hours	COs
1	**Introduction to Operating System:** Basics of Operating Systems: Definition, Operations – Dual-Mode and Multi-Mode, Services, System Calls – Types. **Operating System Structure:** Layered Structure, Microkernel's, Modules, Hybrid Systems – Mac OS X, iOS, Android	9	**21CSE47.1**
2	**Process Management:** Process Concept – The Processes, Process States, PCB, Process Scheduling – Scheduling Queues, Schedulers, Context Switch, Operations on Process, Inter-Process Communication – Shared-Memory System, Message Passing System **CPU Scheduling:** Basics, CPU-I/O Burst Cycle, CPU Scheduler – Preemptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling Algorithms – FCFS, SJF, Round-Robin, Priority	9	**21CSE47.2**
3	**Process Synchronization:** Background, The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores - Usage, Implementation, Deadlock and Starvation, Classical Problems of Synchronization – The Reader-Writer Problem, Dining-Philosopher Problem **Deadlocks:** System Model, Deadlock Characterization, Necessary	9	**21CSE47.3, 21CSE47.4**

	Conditions, Resource-Allocation Graph, Methods for Handling Deadlocks – Prevention, Avoidance, Detection and Recovery		
4	**Memory Management** – Swapping, Logical versus Physical Address Space, Contiguous Allocation, Paging - Basic Method, Hardware Support, Protection; Structure of Page Table – Hierarchical Paging, Segmentation – Basic Method, Segmentation Hardware. **Virtual Memory:** Demand Paging; Page Replacement – Basics, Algorithms - FIFO, Optimal, LRU, Thrashing – Causes of Thrashing.	9	21CSE47.5
5	**File-System Interface:** File Structure, Access methods – Sequential Access, Direct Access, Other Access Methods **Implementation:** Directory Implementation – Linear List, Hash Table, Allocation Methods – Contiguous Allocation, Linked Allocation, Indexed Allocation, Free Space Management – Bit-Vector, Linked List, Grouping, Counting. **Mass Storage Structures:** Overview, Disk Structure, Disk Scheduling – FCFS, SSTF, SCAN, CSCAN, LOOK	9	21CSE47.6

TEXT BOOK(s):

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, Inc., 10th Edition, 2018, ISBN978-1-118-06333-0.

REFERENCE BOOKS:

1. William Stallings, "Operating Systems: Internals and Design Principles", Eighth Edition, Prentice Hall, 2015.
2. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice, 4th Edition, PHI(EEE), ISBN 9788120348363, 2014.
3. D.M Dhamdhere, Operating Systems: A Concept Based Approach, 3rd Edition, McGraw- Hill, ISBN 978-0072957693, 2013.

CIE - Continuous Internal Evaluation: Theory (50 Marks)

Revised Bloom's Taxonomy (RBT)	Tests	Assessment	Quizzes
Marks (out of 50)	**25**	**15**	**10**
L1: Remember	5	-	-
L2: Understand	5	5	-
L3: Apply	10	5	5
L4: Analyze	5	5	5
L5: Evaluate	-	-	-
L6: Create	-	-	-

Note:

- *Assessment will be the kind of analysis of case study / numerical with presentation.*
- *Team size should not exceed 5 members*

SEE: Semester End Examination: Theory (50 Marks)

RBT Level	SEE (50 Marks)
L1: Remember	10
L2: Understand	20
L3: Apply	10
L4: Analyze	5
L5: Evaluate	5
L6: Create	-

OPERATING SYSTEM LAB

Course Code	: 21CSL47A	Credits: 01
L:T:P:S	: 0:0:1:0	CIE Marks: 50
Exam Hours	: 3	SEE Marks: 50

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

CO #	COURSE OUTCOME
21CSL47A.1	Demonstrate UNIX System Calls and execute CPU Scheduling algorithms
21CSL47A.2	Develop solutions for process synchronization, deadlock avoidance and prevention for a given scenario
21CSL47A.3	Analyze various techniques in memory allocation and page replacement strategies
21CSL47A.4	Apply disk scheduling algorithms for a given process description

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

CO #	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21CSL47A.1	3	3	3	3	3	-	-	3	3	3	3	3	3	3
21CSL47A.2	3	3	3	3	3	-	-	3	3	3	3	3	3	3
21CSL47A.3	3	3	3	3	3	-	-	3	3	3	3	3	3	3
21CSL47A.4	3	3	3	3	3	-	-	3	3	3	3	3	3	3

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

Exp. No	List of Programs	Hours	COs
1	Write a program using the following system calls: **a**. opendir, readdir, closedir **b**. fork, exec, getpid	3	**21CSL47A.1**
2	Implement a program to simulate the following CPU scheduling algorithms and draw a Gantt Chart: **a**. FCFS **b**.SJF	3	**21CSL47A.1**
3	Implement a program to simulate the following CPU scheduling algorithms and draw a Gantt Chart: **a**. Round Robin **b**. Priority	3	**21CSL47A.1**
4	Write a Program to implement the Shared memory and Inter Process Communication	3	**21CSL47A.2**
5	Implement a program to simulate producer-consumer problem using semaphores	3	**21CSL47A.2**
6	Implement a program to simulate the concept of Dining-Philosopher's problem	3	**21CSL47A.2**
7	Implement a program to simulate Banker's Algorithm for Deadlock Avoidance	3	**21CSL47A.2**
8	Implement a program to simulate Bankers Algorithm for Deadlock Prevention	3	**21CSL47A.2**

9	Implement a program to stimulate the following contiguous memory allocation techniques and also depict the pictorial representation of the memory:
	
	    a. First fit
	    b. Best fit
		3	**21CSL47A.3**

10	Implement a program to simulate the following memory management techniques: **a**. Paging Table **b**. Segment Table	3	**21CSL47A.3**
11	Implement a program for the following page replacement techniques: **a**. FIFO **b**. Optimal	3	**21CSL47A.3**
12	Implement a program for the following disk scheduling algorithms: **a**. FCFS **b**. SCAN	3	**21CSL47A.4**

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, Inc., 10th Edition, 2018, ISBN:978-1-118-06333-0.

REFERENCE BOOKS:
1. William Stallings, "Operating Systems: Internals and Design Principles", Eighth Edition, Prentice Hall, 2015.
2. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice, 4th Edition, PHI(EEE), ISBN 9788120348363, 2014.
3. D.M Dhamdhere, Operating Systems: A Concept Based Approach, 3rd Edition, McGraw- Hill, ISBN 978-0072957693, 2013.

CIE – Continuous Internal Evaluation: Lab (50 Marks)

Revised Blooms Taxonomy (RBT)	Weekly Evaluation	CIE -1	CIE -2
Marks (Out of 25)	10	25	25
L1: Remember	-	5	5
L2: Understand	-	-	-
L3: Apply	5	10	10
L4: Analyze	5	5	5
L5: Evaluate	-	5	5
L6: Create	-	-	-

SEE – Semester End Examination: LAB (50 Marks)

RBT Level	Marks
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

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SEE – Semester End Examination: LAB (50 Marks)

RBT Level	Marks
L1: Remember	10
L2: Understand	10
L3: Apply	20