NEW HORIZON
COLLEGE OF ENGINEERING
Autonomous College, Affiliated to VTU | Approved by AICTE New Delhi & UGC
Accredited by NAAC with 'A' Grade & Accredited by NBA

DEPARTMENT OF COMPUTER ENGINEERING

SCHEME AND SYLLABUS

BATCH: 2020-24

CREDITS: 175

(2018 Scheme)

Academic Year 2021-22

Third and Fourth Semester Scheme and Syllabus

CONTENTS

INSTITUTION

Vision

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

Mission

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

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

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

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

Quality Policy

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

Values

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

DEPARTMENT OF COMPUTER ENGINEERING

Vision

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

Mission

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

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

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

Program Educational Objectives (PEOs)

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

PEO to Mission Statement Mapping

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

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

Program Outcomes (POs) with Graduate Attributes

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems in Computer Engineering.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems in Computer Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
PO3	**Design / Development of Solutions:** Design solutions for complex Engineering problems and design system components or processes of Computer Engineering that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments in Computer Engineering, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modeling to complex Engineering activities in Computer Engineering with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in Computer Engineering.
PO7	**Environment and Sustainability:** Understand the impact of the professional Engineering solutions of Computer Engineering in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication Skills:** Communicate effectively on complex Engineering activities with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
PO12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

A graduate of the Computer Engineering Program will demonstrate

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

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

Mapping of POs with PEOs

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

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

DEPARTMENT OF COMPUTER ENGINEERING
THIRD SEMESTER-SCHEME

S. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	TOTAL
1	20CEE31A	Applied Mathematics-III	BS	2	1	0	0	3	4	50	50	100
2	20HSS322A	Life skills for Engineers	HSS	3	0	0	0	3	3	50	50	100
3	20HSS323A	Environmental Science and Awareness (Mandatory Course)	HSS	0	0	0	0	0	2	25	25	50
4	20CEE33A	Digital Logic Circuits	CEE	3	0	0	0	3	3	50	50	100
5	20CEE34A	Data Structures using C	CEE	3	0	0	0	3	3	50	50	100
6	20CEE35A	Data Base Management Systems	CEE	3	0	0	0	3	3	50	50	100
7	20CEL36A	Digital Logic Circuits Lab	CEE	0	0	2	0	2	4	25	25	50
8	20CEL37A	Data Structures using C Lab	CEE	0	0	2	0	2	4	25	25	50
9	20CEL38A	Data Base Management Systems Lab	CEE	0	0	2	0	2	4	25	25	50
10	20CEE39A	Mini Project-I	CEE	0	0	2	0	2	4	25	25	50
Total								23	30	375	375	750
Exclusively for Lateral Entry Students												
11	20DMAT31A	Basic Applied Mathematics-I (Mandatory Course)	BS	0	0	0	0	0	2	25	25	50
12	19HSS171	Essential English (Mandatory Course)	HSS	0	0	0	0	0	2	25	25	50
Total								0	4	50	50	100

DEPARTMENT OF COMPUTER ENGINEERING
FOURTH SEMESTER-SCHEME

S. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	TOTAL
1	20CEE41A	Discrete Mathematics and Graph Theory	BS	2	1	0	0	3	4	50	50	100
2	20HSS421A	Economics for Engineers	HSS	2	0	0	0	2	2	25	25	50
3	20HSS424 / 20HSS425	Aadalitha Kannada / Vyavaharika Kannada	HSS	1	0	0	0	1	2	25	25	50
4	20CEE43A	Object Oriented Programming using Java	CEE	3	0	0	0	3	3	50	50	100
5	20CEE44A	Microprocessor and Interfacing	CEE	3	0	0	0	3	3	50	50	100
6	20CEE45A	Computer Organization	CEE	3	0	0	0	3	3	50	50	100
7	20CEE46A	Design and Analysis of Algorithm	CEE	3	0	0	0	3	3	50	50	100
8	20CEL47A	Microprocessor and Interfacing Lab	CEE	0	0	2	0	2	4	25	25	50
9	20CEL48A	Object Oriented Programming using Java Lab	CEE	0	0	2	0	2	4	25	25	50
10	20CEE49A	Mini Project-II	CEE	0	0	2	0	2	-	25	25	50
Total								24	28	375	375	750
Exclusively for Lateral Entry Students												
11	20DMAT41A	Basic Applied Mathematics-II (Mandatory Course)	BS	0	0	0	0	0	2	25	25	50
12	19HSS272	Constitution of India and Professional Ethics (Mandatory Course)	HSS	0	0	0	0	0	2	25	25	50
Total								0	4	50	50	100

SEMESTER III

(SYLLABUS)

APPLIED MATHEMATICS-III

Course Code	**: 20CEE31A**	**Credits:**	**3**
L: T: P: S	**: 2: 1: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to:**
CO#	**COURSE OUTCOME**
20CEE31A.1	Illustrate the periodic functions as Fourier series expansion analytically and numerically.
20CEE31A.2	Apply appropriate numerical methods to solve algebraic equations and transcendental equations.
20CEE31A.3	Analyze the Fast Fourier transforms method to solve the discrete model problems.
20CEE31A.4	Determine definite integrals numerically by using appropriate numerical methods.
20CEE31A.5	Justify Fourier transforms/Z-transforms method to solve continuous/discrete model problems.
20CEE31A.6	Fit a suitable curve by the method of least squares and determine the lines of regression fora set of statistical data.

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
20CEE31A.1	3	3	3	3	3	-	-	-	-	-	3	3
20CEE31A.2	3	3	3	3	3	-	3	-	-	-	3	3
20CEE31A.3	3	3	3	3	-	-	-	-	-	-	3	3
20CEE31A.4	3	3	3	3	3	-	3	-	-	-	3	3
20CEE31A.5	3	3	3	3	3	-	-	-	-	-	3	3
20CEE31A.6	3	3	3	3	3	1	3	-	-	1	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 and Lagrange's formulae for unequal intervals (without proofs)-Problems.	**9**	**CO2**
2	**Numerical Methods 2:** Numerical solution of ordinary differential equations of first order and of first degree: Modified Euler's method and Runge-Kutta method of fourth-order-Problems. Milne's predictor andcorrector 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**	**CO4**

3	**Fourier series:** Periodic function, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period 2l, half range series. Fourier series and half Range Fourier series of periodic square wave, half wave rectifier, full wave rectifier, Saw-tooth wave with graphical representation, practical harmonic analysis.	**9**	**CO1**
4	**Fourier Transforms:** Infinite Fourier transforms, Fourier Sine and Cosine transforms, Inverse Fourier transform. **Z - Transform:** Definition, Z-transforms of some standard functions, properties, damping rule, shifting rule (without proof), initial and final value theorems, inverse Z- transforms. **Applications:** Solving difference equations using Z-transform.	**9**	**CO5**
5	**Discrete Fourier Transform and Fast Fourier Transform:** Definition of N-Point DFT, problems for 4-points and inverse DFT for four points only. FFT algorithm to compute the Fourier transforms 4-point only. **Statistical Methods:** Fitting of the curves of the form $y = a + b x$, $y = a + b x + c x^2$, $y = ae^{bx}$, $y = a x^b$, and $y = ab^x$ by the method of least square, Correlation and Regression, Regression coefficients, line of regression Problems.	**9**	**CO3, CO6**

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN: 978-81-265-5423-2.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN: 978-81-7409-195-5.

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2015, ISBN: 978-0-273-73409-3
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN: 978-0-07-063419-0.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.
4. P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN: 978-81-318-0832-0.

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

Bloom's Category	Questions (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

LIFE SKILLS FOR ENGINEERS

Course Code	**: 20HSS322A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20HSS322A.1	Relate "SMART GOALS" to personal and professional life
20HSS322A.2	Articulate and communicate ideas and thoughts with clarity and focus
20HSS322A.3	Develop critical and creative thinking skills for problem solving and decision makingfor leadership.
20HSS322A.4	Analyze the importance of the concepts of personality development and grooming in corporate life
20HSS322A.5	Determine personal and professional responsibility by using ownership task bar

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
20HSS322A.1	-	-	-	-	-	-	-	3	3	3	3	3
20HSS322A.2	-	-	-	-	-	3	3	3	3	1	3	3
20HSS322A.3	-	-	-	-	-	3	3	3	3	3	2	3
20HSS322A.4	-	-	-	-	-	-	3	3	3	3	2	3
20HSS322A.5	-	-	-	-	-	3	2	3	3	2	3	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No	**Module Contents**	**Hours**	**COs**
1	Goal Setting: Importance of Goals: Achiever's goal - Creating SMART for personal and professional life, Right action at right time, career planning, overcoming fear and face uncertainty, Mind Mapping. Communication – Intellectual preparation/Idea generation.	**6**	**CO1, CO2**
2	You are the creator - Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career. Social responsibility. Communication – 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, reasonfor fall and opportunities to grow. Individual behavior, attitude towards change and work, 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. The Bhagavad Gita for college students Sandeepa Guntreddy

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests (10 marks)**	**Assignments (15 marks)**	**Self-Study (15 marks)**	**Peer Evaluation (10 marks)**
Remember	10	15	15	10
Understand	-	-	-	-
Apply	5	5	-	5
Analyze	-	-	5	-
Evaluate	-	-	-	-
Create	5	10	10	5

SEE- Semester End Examination (50Marks)

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
Analyze	10
Evaluate	5
Create	10

ENVIRONMENTAL SCIENCE AND AWARENESS

Course Code	**: 20HSS323A**	**Credits:**	**0**
L: T: P: S	**: 0: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
20HSS323A.1	Explain the concepts of environment, ecosystem and biodiversity.
20HSS323A.2	Differentiate the use of natural resources for sustainability.
20HSS323A.3	Analyze the control measures of Environmental pollution, the role of Government andNGO in solving Socio-Environmental issues.
20HSS323A.4	Apply the Environmental ethics, acts and amendments 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**
20HSS323A.1	-	-	-	-	-	3	3	-	-	-	-	-
20HSS323A.2	-	-	-	-	-	3	3	-	-	-	-	3
20HSS323A.3	-	-	-	-	-	3	3	3	-	3	-	3
20HSS323A.4	-	-	-	-	-	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 Environment, Eco system and bio diversity:** Environment-Components of Environment,Scope and importance of Environmental studies, Eco system: Types & Structure of Eco system, Energy flow inthe eco system, Food chains–food webs & eco logical pyramids. Bio diversity–Definition, Hot-spots of biodiversity, Threats to bio diversity, Conservation of bio diversity.	**05**	**CO1**
2	**Natural Resources:** Renewable and non-renewable resources – Natural resources and associated problems, Role of an individual in conservation of natural resources, Water conservation, rain water harvesting. Balanced use of resources for sustainable lifestyle–strategies.	**04**	**CO2**

3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air pollution, Water Pollution, Soil Pollution, Marine Pollution,Noise pollution, Thermal Pollution and Nuclear hazards. Role of an individual in prevention of pollution - Waste management – urban and industrial wastes	**04**	**CO3**
4	**Social Issues and Environment:** Environmental ethics – issues and possible solutions, Environment protection act –Air (prevention and Control of pollution) act & Water (prevention and Control of pollution) act, Role of government: Swatch Bharat Abhiyan, National Mission for Clean Ganga (NMCG), River rejuvenation, Role of Non-governmental Organizations (NGOs), Global warming and climate change.	**04**	**CO3, CO4**
5	**Human Population and Environment:** Population growth & explosion, Family welfare programme, Environment and human health, Human rights, Value education, Role of Technology in protecting environment and human health	**05**	**CO4**

Text Books:

1. "Environmental Studies: Basic Concepts" by Ahluwalia, V.K The Energy and Resources Institute (TERI) Publication, 2nd edition, 2016, ISBN: 81799357 1X, 9788179935712.
2. "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. Hand book 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.Venu gopala, Prentice Hall of India Pvt. Ltd, New Delhi, 2012 Edition. ISBN:978-81-203-2893-8.
3. Environmental Science- Working with the earth by G Taylor Miller Jr, Brooks Cole Thompson Publications,10th Edition, ISBN:10:0534424082
4. Elements of Environmental Science and Engineering by P. Meenakshi, Prentice Hall of India Pvt. Ltd,2005 Edition, ISBN:8120327748, 9788120327740

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (15 marks)	Assignments (5 marks)	Quizzes (5 marks)
Remember	**15**	**5**	**5**
Understand	2	0	0
Apply	5	0	2
Analyze	4	2	3
Evaluate	4	3	0
Create	0	0	0

SEE- Semester End Examination (25Marks)

Bloom's Category	Questions (25 marks)
Remember	5
Understand	10
Apply	5
Analyze	5
Evaluate	0
Create	0

DIGITAL LOGIC CIRCUITS

Course Code	**: 20CEE33A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE33A.1	Define, discuss and describe the basic principles of the digital circuits and their significance.
20CEE33A.2	Apply the Knowledge of minimization techniques to digital circuits
20CEE33A.3	Analyze different types of combinational and sequential circuits based on the given application with the given specifications
20CEE33A.4	Design efficient combinational and sequential logic circuit implementations from functional description of digital systems
20CEE33A.5	Use HDL tools to simulate and verify Digital circuits
20CEE33A.6	Examine the concepts of state transition for the analysis of combinational and sequential circuits.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE33A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEE33A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEE33A.3	-	3	-	-	-	-	-	-	-	-	-	-	3	2
20CEE33A.4	-	-	3	-	-	-	-	-	-	-	-	-	3	2
20CEE33A.5	-	-	-	-	3	-	-	-	3	3	-	3	3	2
20CEE33A.6	-	-	-	2	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

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

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

Text Books:

1. Albert Paul Malvino, Donald P Leach and Goutam Saha, Digital Principles and Applications, McGraw Hill, 8thEdition, Special Indian Edition, 2017, ISBN: 978-9339203405
2. James Bignell and Robert Donovan, Digital Electronics, Cengage learning, 5th Edition, 2013, ISBN: 9788131520710
3. M. Morris Mano and Michael D. Ciletti, Digital Design with an Introduction to the VerilogHDL, VHDL,and SystemVerilog, Pearson Education,6th Edition 2018,ISBN: 978-0-13-277420-8
4. David J. Comer, Digital Logic & State Machine Design, Oxford University Press, 3rdEdition, 2016, ISBN: 978-0198092094
5. M. Morris Mano, Digital Logic and Computer Design, Pearson Education India, 1st Edition, 2017, ISBN: 978-9332542525

Reference Books:

1. Thomas L Floyd, Digital Fundamentals, Pearson Education India, 11th edition, 2018, ISBN: 9789332584600
2. R. D. Sudhakar Samuel, An Illustrative Approach to Logic Design, Pearson Education India, 2010, ISBN: 978-8131732304
3. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic Design with VHDL, Tata McGraw Hill, 2nd Edition, Special Indian edition, 2006, ISBN: 978-0070647756

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

DATA STRUCTURES USING C

Course Code	**: 20CEE34A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE34A.1	Describe the fundamentals of data structure.
20CEE34A.2	Apply the concept of Dynamic Memory allocation.
20CEE34A.3	Analyze the concepts of linear and non-linear data structures for problem solving.
20CEE34A.4	Investigate various techniques in linear data structure and submit report in a team.
20CEE34A.5	Prepare an effective written documentation for non-linear data structures.
20CEE34A.6	Develop algorithms to solve problems using fundamental data structures.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE34A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE34A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE34A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
20CEE34A.4	-	-	-	3	3	-	-	-	2	2	-	3	3	2
20CEE34A.5	-	-	-	-	3	-	-	-	-	2	-	3	3	2
20CEE34A.6	-	-	2	-	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

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

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

Text Books:

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

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

DATA BASE MANAGEMENT SYSTEMS

Course Code	**: 20CEE35A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE35A.1	Describe the concepts of data base management system.
20CEE35A.2	Apply the relational database concepts for the given scenario.
20CEE35A.3	Analyze various database concepts with ER model.
20CEE35A.4	Design database for the structured data by applying normalization techniques.
20CEE35A.5	Investigate, prepare and submit document for unstructured data as a team.
20CEE35A.6	Develop in-memory database for needed applications.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE35A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE35A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE35A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
20CEE35A.4	-	-	3	-	3	-	-	-	-	-	-	3	3	2
20CEE35A.5	-	-	-	-	3	-	-	-	3	3	-	3	3	2
20CEE35A.6	3	-	-	-	3	-	-	-	-	-	-	2	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

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

Text Books:

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

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

DIGITAL LOGIC CIRCUITS LAB

Course Code	**: 20CEL36A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEL36A.1	Apply the concepts of minimization techniques to realize the digital circuits
20CEL36A.2	Analyse and evaluate different methods to realize the logic circuits
20CEL36A.3	Design and simulate logic circuits using HDL tool
20CEL36A.4	Conduct experiments to demonstrate the specific application of digital electronics using suitable digital ICs/ Multisim/Xilinx/ FPGA board/- etc.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEL36A.1	3	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL36A.2	-	3	-	-	-	-	-	-	-	-	-	-	3	2
20CEL36A.3	-	-	3	-	-	-	-	-	-	-	-	-	3	2
20CEL36A.4	-	-	-	-	3	-	-	-	-	-	-	-	3	2
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)														

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

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

CIE- Continuous Internal Evaluation: LAB (25 Marks)

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

SEE- Semester End Examination: LAB (25 Marks)

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

DATA STRUCTURES USING C LAB

Course Code	**: 20CEL37A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEL37A.1	Apply Data structure techniques to solve the problem
20CEL37A.2	Analyse output for a given problem
20CEL37A.3	Conduct experiments as individual by using C programming language
20CEL37A.4	Make an effective report based on experiments

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEL37A.1	3	-	-	-	-	-	-	-	-	-	-	3	3	2
20CEL37A.2	-	3	-	-	-	-	-	-	-	-	-	3	3	2
20CEL37A.3	-	-	-	-	3	-	-	-	3	-	-	3	3	2
20CEL37A.4	-	-	-	-	-	-	-	-	-	3	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Module No	**Module Contents**	**Hours**	**COs**
1	Write a program to check whether the given matrix is sparse or not and represent the matrix in sparse representation and determine the transpose of sparse representation.	**3**	**CO1, CO2, CO3, CO4**
2	Write A Program to Implement Insertion Sort Using Functions		
3	Write a program to sort the numbers using quick sort with recursion.	**3**	**CO1, CO2, CO3, CO4**
4	Write a C program to search an element using Binary search technique.		
5	a. Write a program to demonstrate Tower of Hanoi problem b. Write a program for Ackermann's function	**3**	**CO1, CO2, CO3, CO4**
6	Develop a program for STACK that performs following primitive operations: push, pop and display		
7	Develop a program to convert INFIX notation to POSTFIX	**3**	**CO1, CO2, CO3, CO4**

8	Write a menu driven program to perform the following primitive operations on single linked list A. Create a list with one node B. Insertion at front, rear, after any given node C. Deletion at front, rear, after any given node D. Display E. Reverse	**3**	**CO1, CO2, CO3, CO4**
9	Develop a program for adding two polynomials.	**3**	**CO1, CO2, CO3, CO4**
10	Develop a C program for solving Josephus problem		
11	Write a Menu driven program to perform the following primitive operations in double linked list A. Insertion B. Deletion C. Display	**3**	**CO1, CO2, CO3, CO4**
12	Develop a program to traverse a tree using in-order, pre-order and post-order.	**3**	**CO1, CO2, CO3, CO4**
13	Develop a program to perform insertion, deletion and traversal of a binary search tree	**3**	**CO1, CO2, CO3, CO4**
14	Develop a program to implement BFS and DFS traversal of graph	**3**	**CO1, CO2, CO3, CO4**

CIE- Continuous Internal Evaluation: LAB (25 Marks)

Bloom's Category	**Tests (25 marks)**
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

SEE- Semester End Examination: LAB (25 Marks)

Bloom's Category	**Questions (25 marks)**
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

DATABASE MANAGEMENT SYSTEMS LAB

Course Code	**: 20CEL38A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEL38A.1	Design and develop database for the given scenario.
20CEL38A.2	Analyze output of database for a given problem.
20CEL38A.3	Conduct experiments as individual by using modern tools like MySQL/SQLite
20CEL38A.4	Make an effective report based on experiments.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEL38A.1	3	-	-	-	-	-	-	-	-	-	-	3	3	2
20CEL38A.2	-	3	-	-	-	-	-	-	-	-	-	3	3	2
20CEL38A.3	-	-	-	-	3	-	-	-	3	-	-	3	3	2
20CEL38A.4	-	-	-	-	-	-	-	-	-	3	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

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

CIE- Continuous Internal Evaluation: LAB (25 Marks)

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

SEE- Semester End Examination: LAB (25 Marks)

Bloom's Category	Questions (25 marks)
Remember	-
Understand	5
Apply	15
Analyze	5
Evaluate	-
Create	-

MINI PROJECT-I

Course Code	**: 20CEE39A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE39A.1	Understand the technological needs and/ or societal needs and sustainability of the environment.
20CEE39A.2	Design application high level programming language.
20CEE39A.3	Analyse and evaluate the outcome of the project.
20CEE39A.4	Test, validate and communicate the identified solutions in a structured way.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CEE39A.1	-	-	-	-	-	3	2	3	-	-	-	3	3	2
20CEE39A.2	-	-	3	-	3	-	-	-	-	-	-	3	3	2
20CEE39A.3	-	3	-	-	-	-	-	-	-	-	-	3	3	2
20CEE39A.4	-	-	-	3	-	-	-	-	3	3	3	3	3	2

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

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

Sample Mini project includes:

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

CIE- Continuous Internal Evaluation: (25 Marks)

Bloom's Category	**Mini Project (25 marks)**
Remember	-
Understand	-
Apply	10
Analyze	10
Evaluate	5
Create	-

SEE- Semester End Examination: (25Marks)

Bloom's Category	**Mini Project (25 marks)**
Remember	-
Understand	-
Apply	10
Analyze	10
Evaluate	5
Create	-

BASIC APPLIED MATHEMATICS-I

Course Code	**: 20DMAT31A**	**Credits:**	**0**
L: T: P: S	**: 0: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20DMAT31A.1	Know the principles of engineering mathematics through calculus
20DMAT31A.2	Determine the power series expansion of a function
20DMAT31A.3	Find the definite integrals with standard limits and also develop the abilityto solve different types of differential equations
20DMAT31A.4	Apply ideas from linear algebra in solving systems of linear equations and determine the Eigen values and Eigen vectors of a matrix

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
20DMAT31A.1	3	3	3	-	-	-	-	-	-	-	-	3
20DMAT31A.2	3	3	3	-	-	-	-	-	-	-	-	3
20DMAT31A.3	3	3	3	-	-	-	-	-	-	-	-	3
20DMAT31A.4	3	3	3	-	-	-	-	-	-	-	-	3
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)												

Module No	**Module Contents**	**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. Macluren's theorems 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, Partial differentiation of composite functions (chain rule)- Problems, Jacobians of order two - definition and problems.	**5**	**CO1**
3	**Integral Calculus and Differential Equations:** Problems on reduction formulae for functions $\sin^n x$, $\cos^n x$, Problems one valuation of these 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, consistency of a system of linear equations and solution (homogeneous and non-homogeneous)- Problems. Solution of system of linear equations by Gauss elimination method-Problems.	**5**	**CO4**
5	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen vectors, diagonalization of a square matrix-Problems.	**5**	**CO4**

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN:978-81-265-5423-2
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN:978-81-7409-195-5

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4thEdition,2015, ISBN: 978-0-273-73409-3
2. B.V.Ramana,HigherEngineeringMathematics,McGrawHillEducation(India)PrivateLimited, 4th Edition, 2016, ISBN:978-0-07-063419-0
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.
4. N.P.Bali and Manish Goyal ,A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN:978-81-318-0832-0

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (20 marks)	Assignments (5 marks)
Remember	5	-
Understand	5	5
Apply	5	-
Analyze	2.5	-
Evaluate	2.5	-
Create	-	-

SEE- Semester End Examination (25 Marks)

Bloom's Category	Questions (25 marks)
Remember	5
Understand	10
Apply	5
Analyze	2.5
Evaluate	2.5
Create	-

ESSENTIAL ENGLISH

(Common for Chemistry Cycle and Physics Cycle in I Semester)

Course Code	**: 19HSS171**	**Credits:**	**0**
L: T: P: S	**: 0: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**On completion of the course, student would be able to**
CO#	**COURSE OUTCOME**
19HSS171.1	Understand the grammatical forms and structures in English
19HSS171.2	Develop situational vocabulary and apply the same in basic and routine functions.
19HSS171.3	Analyze short texts and paraphrase them
19HSS171.4	Generate and expand ideas both in the oral and written forms

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
19HSS171.1	-	-	-	-	-	-	-	-	-	3	-	3
19HSS171.2	-	-	-	-	-	-	-	-	3	3	-	3
19HSS171.3	-	-	-	-	-	-	-	-	-	3	-	3
19HSS171.4	-	-	-	-	-	-	-	-	-	3	-	3
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No	**Module Contents**	**Hours**	**COs**
1	**Speaking activity** Social graces, Greeting, Self-introduction, introducing others Asking for and Giving Information **Grammar and Vocabulary in Use:**Parts of Speech, Nouns, Pronouns Articles, Asking question. (WH, Aux Verbs)	**6**	**CO1, CO2**
2	**Speaking activity** Speaking about Routine, Hobbies, Likes and Dislikes **Grammar and Vocabulary in Use:** Verb= Main / Assistant, Forms of Verbs, Tense: Simple present tense Writing exercises: Subject Verb Agreement, Positive and Negative sentences, Question tags	**6**	**CO1, CO2**
3	**Speaking activity** Describing People & Things, Describing Actions **Grammar and vocabulary in Use:** Adjectives, Adverbs, Articles Tense: Continuous Tenses (Present and Past), Preposition	**6**	**CO1, CO2**
4	Reading Comprehension, Sub Skills of Reading Paraphrasing and Summarizing **Grammar in use and (situation vocabulary):** Modals, Simple Past tense	**6**	**CO3,CO4**
5	**Writing Activity** Writing Skills: Expansion of Ideas, Dialogue Writing **Grammar in use (situational vocabulary):** Homonyms, Comparing and Contrasting, Common error in English 1	**6**	**CO3,CO4**

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 (25 Marks)

Bloom's Category	**Tests**
Marks (out of 25)	**25**
Remember	5
Understand	5
Apply	5
Analyze	5
Evaluate	5

SEE – Semester End Examination (25 Marks)

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

SEMESTER IV

(SYLLABUS)

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Code	**: 20CEE41A**	**Credits:**	**3**
L: T: P: S	**: 2: 1: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE41A.1	Explain the counting techniques and combinatorics by using the context of discrete probability.
20CEE41A.2	Illustrate the fundamental concepts of trees, connectivity and planarity graphs.
20CEE41A.3	Apply Pigeon hole principle to solve real life problems.
20CEE41A.4	Solve the engineering problems involving relations and functions.
20CEE41A.5	Analyze the computer science problems by using graph theory techniques.
20CEE41A.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**
20CEE41A.1	3	3	3	3	-	-	-	-	-	3	-	3
20CEE41A.2	3	3	3	3	-	-	-	-	-	-	-	3
20CEE41A.3	3	3	3	3	-	-	-	-	-	3	-	3
20CEE41A.4	3	3	3	3	-	-	-	-	-	-	-	3
20CEE41A.5	3	3	3	3	-	-	-	-	2	3	-	3
20CEE41A.6	3	3	3	3	-	-	-	-	2	3	-	3
Correlation levels: 1-Slight(Low) 2-Moderate(Medium) 3-Substantial(High)												

Module No	**Module Contents**	**Hours**	**Cos**
1	**Mathematical Logic:** Basic Connectives and Truth Tables, Tautology and Contradiction, Logic Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, Quantifiers Definition and the use of Quantifiers in logical implication.	**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, 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. Trees, Properties of trees, Distance and centers in tree, Rooted and binary trees.	**9**	**CO5**

5	**Trees, Connectivity and Planarity**: Spanning trees , Fundamental circuits, Spanning trees in a weighted graph, cut sets, Properties of cut set, All cut sets, Fundamental circuits and cut sets, Connectivity and separability, Network flows, 1-Isomorphism, 2-Isomorphism, Combinational and geometric graphs, Planar graphs, Different representation of a planar graph.	**9**	**CO2**

Text Books:

1. Ralph P. Grimaldi and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004
2. Narsingh Deo Graph Theory: With Application to Engineering and Computer Science, Prentice Hall of India 2003.

Reference Books:

1. Basavaraj S. Anami and Venakanna S. Madalli, Discrete Mathematics – A Concept based approach Universities press 2016.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
3. D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.
4. Thomas Koshy, Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 marks)	Assignment1 (7.5 Marks)	Assignment2 (7.5 Marks)	Quiz1 (5 Marks)	Quiz2 (5 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 (50 marks)
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

ECONOMICS FOR ENGINEERS

Course Code	**: 20HSS421A**	**Credits:**	**2**
L: T: P: S	**: 2: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20HSS421A.1	Summarize the knowledge of economics and its importance in business decision making.
20HSS421A.2	Make use of economic concepts in business.
20HSS421A.3	Examine the impact of market forces on business.
20HSS421A.4	Interpret the role of market structure in the economic development of a country.
20HSS421A.5	Evaluate the role of budgeting in business decisions.

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
20HSS421A.1	-	1	-	1	1	3	3	3	3	1	2	3
20HSS421A.2	1	1	1	1	2	2	1	2	2	2	3	3
20HSS421A.3	3	2	3	1	1	2	2	3	1	1	2	2
20HSS421A.4	1	2	1	2	1	3	1	2	2	2	2	2
20HSS421A.5	3	2	3	2	2	1	1	2	1	1	3	1
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No	**Module Contents**	**Hours**	**Cos**
1	Introduction to Economics: Role of Engineer as an Economist, Types and problem of economies, Basics of economics (GDP, National income, inflation, business cycle, fiscal and monetary policies, balance of payment).	**4**	**CO1, CO4**
2	Basic concepts of Microeconomics: concept of Demand & Elasticity of Demand. Concept of Supply & Elasticity of Supply, Meaning of Production and factors of production, Production Possibility Curve, Law of variable proportions and returns to scale. Relevance of Depreciation towards industry, Depreciation computing methods.	**4**	**CO2, CO3**
3	**Concepts of cost of production**: different types of cost; accounting cost, sunk cost, marginal cost and opportunity cost. Break even analysis, Make or Buy decision. Cost estimation, Elements of cost as Direct Material Costs, Direct Labor Costs, Fixed Over-Heads, Factory cost, Administrative Over-Heads.	**4**	**CO3**

4	**Market structure:** Perfect Competition: Features, Determination of Price under Perfect Competition - Monopoly: Features, Pricing under Monopoly, **Oligopoly**: Features, Kinked Demand Curve, Cartel, Price Leadership – Monopolistic Competition: Features, Pricing under Monopolistic Competition, Product Differentiation.	**5**	**CO1, CO4**
5	Capital budgeting: Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI. Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams, Personal loans and EMI Payment. Present worth, Future worth.	**7**	**CO3, CO5**

Text Books:

1. Riggs J.L, Engineering Economy, TMH, 2012 edition.
2. Jain T.R., Economics for Engineers, VK N Publications,2008 Edition
3. IM PANDEY, Financial Management, Vikas Pub. House, 2018 Edition
4. D N Dwivedi, Managerial Economics, Vikas Pub. House, 2018 Edition
5. Dr.A.R Sainath, Sasikala Devi, Engineering Economics and Financial Accounting, Charulatha Publications,2015 edition

Reference Books:

1. Thuesen H.G, Engineering Economy. PHI,1984 2.
2. Prasanna Chandra, Financial Management, TMH,2007
3. Singh Seema, Economics for Engineers, IK International,2014
4. Chopra P. N, Principle of Economics, Kalyani Publishers,
5. Dewett K K, Modern Economic Theory, S. Chand,2006

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Test	Assignment
Marks (out of 25)	**15**	**10**
Remember	5	-
Understand	5	-
Apply	5	-
Analyze	-	5
Evaluate	-	5
Create	-	-

SEE- Semester End Examination (25 Marks)

Bloom's Category	**Questions (25 marks)**
Remember	5
Understand	5
Apply	5
Analyze	5
Evaluate	5
Create	-

ಆಡಳಿತ / ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

(ಕನ್ನಡಿಗರಿಗಾಗಿ for Kannadigas common to all branches)

Course code : 20HSS324/424	Credits : 01
L:T:P:S : 1:0:0:0	CIE Marks : 25
Exam Hours : 2	SEE Marks : 25

ಸಾಂಸ್ಕೃತಿಕ 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 ಅರೆಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು .

C04 ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತವಹಿಸಿಕೊಳ್ಳುವರು.

CO-PO Mapping :

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-

ಪರಿವಿಡಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಭಾಗ–1 ಲೇಖನಗಳು : ಕನ್ನಡ ನಾಡು ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು

ಭಾಗ–2 ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)

ಭಾಗ–3 ಕಾವ್ಯ ಭಾಗ (ಆಧುನಿಕ)

ಭಾಗ–4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿ ಪರಿಚಯ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ

ಭಾಗ–5 ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕದ ಲೇಖಕರು

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

ಪರೀಕ್ಷೆಯ ವಿಧಾನ:

ನಿರಂತರ ಆಂತರೀಕ ಮೌಲ್ಯ ಮಾಪನ **(Continuous Internal Evaluation)** : **25**

ಸೆಮಿಸ್ಟರ್ ಎಂಡ್ ಪರೀಕ್ಷೆ **(Semester End Examination)** : **25**

Bloom's Category	CIE (25)	SEE(25)
Remember	12	12
Understand	13	13

Vyavaharika Kannada
(Kannada for use)

Course Code	**: 20HSS425**	**Credits:**	**1**
L: T: P: S	**: 1: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20HSS425.1	Understand Kannada Language.
20HSS425.2	Communicate in Kannada Language
20HSS425.3	Read simple Kannada words
20HSS425.4	Pronounce Kannada words correctly

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
20HSS425.1	-	-	-	-	-	-	-	-	-	3	-	-
20HSS425.2	-	-	-	-	-	-	-	-	-	3	-	-
20HSS425.3	-	-	-	-	-	-	-	-	-	3	-	-
20HSS425.4	-	-	-	-	-	-	-	-	-	3	-	-
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)												

Module No	**Module Contents**	**Hours**	**Cos**
1	Chapter – 1: Vyavaharika Kannada – Parichaya (Introducton to Vyavaharika Kannada)		
2	Chapter – 2: Kannada Aksharamale haagu uchharane (Kannada Alphabets and Pronunciation		
3	Chapter – 3: Sambhashanegaagi Kananda Padagalu (Kannada Vocabulary for Communication)		
4	Chapter – 4: Kannada in Conversations (Sambhashaneyalli Kannada)		
5	Chapter – 5: Activities in Kannada. (Kannada Sambhashanegaagi Chatuvatikegalu)		

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	**CIE(25)**	**SEE(25)**
Remember	12	12
Understand	13	13

OBJECT ORIENTED PROGRAMMING USING JAVA

Course Code	**: 20CEE43A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE43A.1	Define, describe and explain the object-oriented concepts.
20CEE43A.2	Apply OOP's concept to implement a given problem using Java.
20CEE43A.3	Analyze and ensure the flow of a program through appropriate exception handling techniques.
20CEE43A.4	Investigate and apply the concept of Multithreading in concurrent programming available in literature and submit report in a team
20CEE43A.5	Solve the real-world problems using Object Oriented concepts and collection framework in Java.
20CEE43A.6	Construct GUI applications using JAVA swing/applet package.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE43A.1	-	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE43A.2	3	-	-	-	3	-	-	-	-	-	-	3	3	2
20CEE43A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
20CEE43A.4	-	-	3	-	3	-	-	-	3	3	-	3	3	2
20CEE43A.5	-	-	3	-	3	-	-	-	-	3	-	3	3	2
20CEE43A.6	-	-	-	2	3	-	-	-	-	-	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

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

Text Books:

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

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

8086 MICROPROCESSOR AND INTERFACING

Course Code	**: 20CEE44A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE44A.1	Describe the concepts and explain the functional features of 8086 Microprocessor.
20CEE44A.2	Apply the knowledge of addressing modes to write assembly language program in 8086.
20CEE44A.3	Analyze and make use of assembler directives and interrupt methods in 8086 programming.
20CEE44A.4	Examine the timing diagrams using minimum and maximum mode configuration of 8086.
20CEE44A.5	Demonstrate the programmable peripheral Input-output interfacing with 8086.
20CEE44A.6	Evaluate assembly language programs and download the machine code that will provide solutions to real-time problems.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE44A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	-
20CEE44A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
20CEE44A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	-
20CEE44A.4	-	-	3	-	-	-	-	-	2	-	-	3	3	-
20CEE44A.5	-	-	-	-	3	-	-	-	-	2	-	3	3	-
20CEE44A.6	-	-	-	2	3	-	-	-	-	-	-	-	3	-
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

4	**PERIPHERAL INTERFACING -I:** Interfacing I/O ports**,** 8255 PIO, Modes of operation, Interfacing Analog **t**o Digital converters, Interfacing Digital to analog converters, Stepper motor interfacing.	**9**	**CO1, CO5**
5	**PERIPHERAL INTERFACING -II:** 8251 USART architecture and interfacing, Keyboard Display controller (8279), Programmable interrupt controller (8259),Programmable DMA Controller (8257).	**9**	**CO1, CO5**

Text Books:

1. Douglas V Hall and SSSP Rao, Microprocessor and Interfacing, McGraw Hill Education, 3rd edition, 2017, ISBN: 978-1259006159
2. A.K. Ray and K.M. Bhurchandi, Advanced Microprocessors and Peripherals, McGraw Hill Education, 3rd Edition, 2015, ISBN: 9781259006135
3. Muhammad Ali Mazidi, Janice G. Mazidi and Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems – using Assembly and C, Pearson New International Edition, 2nd Edition, 2014, ISBN: 978-8131710265

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

COMPUTER ORGANIZATION

Course Code	**: 20CEE45A**	**Credits:**	**3**
L: T: P: S	**: 3: 0: 0: 0**	**CIE Marks:**	**50**
Exam Hours:	**: 3**	**SEE Marks:**	**50**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE45A.1	Describe the different computer architectures, instruction sets, addressing modes and memory.
20CEE45A.2	Apply the concepts of basic functional units to demonstrate the working of computational system.
20CEE45A.3	Analyze the cache design parameters and evaluate performance.
20CEE45A.4	Design the working of hardwired and micro-programmed control of the CPU.
20CEE45A.5	Investigate the instruction pipeline concepts, memory delays and branch delays and prepare an effective report and submit as a team.
20CEE45A.6	Prepare an effective written documentation for multi-core architecture.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE45A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEE45A.2	3	-	-	-	3	-	-	-	-	-	-	-	3	2
20CEE45A.3	-	3	-	-	3	-	-	-	-	-	-	3	3	2
20CEE45A.4	-	-	3	-	3	-	-	-	-	-	-	3	3	2
20CEE45A.5	-	-	-	-	3	-	-	-	3	3	-	3	3	2
20CEE45A.6	-	-	-	-	-	-	-	-	3	-	-	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

Module No	**Module Contents**	**Hours**	**COs**
1	Introduction: Functional units, Basic operational concepts, Number representation and arithmetic operations and characters, Memory locations and addresses, Memory operations, Instructions and Instruction sequence, Addressing modes, Bus Structure, Bus operation, Arbitration	**9**	**CO1, CO2**
2	Computer Arithmetic: Addition subtraction of signed numbers, Design of fast adders, Multiplication of unsigned and signed numbers, Fast multiplication, Integer Division, Floating point numbers and operations	**9**	**CO1, CO2**
3	Computer Memory System &Input /Output Organization: Characteristics of Memory System, The Memory hierarchy, Elements of cache design: Cache addresses, Cache size, Mapping function, Performance considerations – Hit- ratio and Miss penalty – Caches on the processor chip, Semiconductor main memory: Organization, DRAM and SRAM, Accessing I/O devices, Interrupts.	**9**	**CO1, CO3, CO6**

4	Basic Processing Unit: Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, control signals, hardwired control, CISC style processors	**9**	**CO1 CO4**
5	Pipelining: Basic Concept, Pipeline Organization, Pipelining Issues, Data Dependencies, Memory Delays, Branch Delays, Resource Limitations, Performance Evaluation, Superscalar Operation	**9**	**CO1, CO5**

Text Books:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, McGraw Hill, 6th Edition, 2012, ISBN: 978-0073380650
2. William Stallings, Computer Organization and Architecture, Pearson Education India, 11th Edition, 2019, ISBN: 9780134997193

Reference Books:

1. John L. Hennessy and David A. Patterson, Computer Architecture a quantitative approach, Elsevier, Fifth Edition, 2012, ISBN: 9780123838728
2. Andrew S. Tanenbaum, Structured Computer Organization, Pearson Education India, 6th Edition, 2013, ISBN: 9780132916523
3. Joseph D. Dumas II, Computer Architecture: Fundamentals and principles of Computer Design, CRC Press, 2nd Edition, ISBN: 978-1498772716

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

DESIGN AND ANALYSIS OF ALGORITHM

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

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE46A.1	Recognize asymptotic notations for performance of different algorithms.
20CEE46A.2	Apply appropriate design techniques by analysing and evaluating algorithm to propose solution
20CEE46A.3	Analyze the efficiency of algorithms using time and space complexity theory
20CEE46A.4	Design algorithms for various computing problems.
20CEE46A.5	Investigate P, NP & NP-complete classes to analyse the limitations of an algorithm and submit a report as a team.
20CEE46A.6	Apply Backtracking and Branch & Bound technique to assess an algorithm and formulate solution.

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

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

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

Text Books:

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

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50Marks)

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

MICROPROCESSORS AND INTERFACING LAB

Course Code	**: 20CEL47A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEL47A.1	Write assembly level programs using 8086 to perform arithmetic and logical operations.
20CEL47A.2	Apply the knowledge of computer number system to write code conversion programs in8086.
20CEL47A.3	Analyze and develop assembly code for string operations, sorting of numbers and branch instructions of 8086.
20CEL47A.4	Develop assembly code for generating software interrupts

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEL47A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL47A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL47A.3	-	3	-	-	3	-	-	-	3	-	-	3	3	2
20CEL47A.4	-	-	-	-	3	-	-	-	3	3	-	-	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

5	Write an assembly level programs using 8086 for sorting operations like ascending, descending, largest and smallest in microprocessor	**CO3**
6	Programs on String manipulation like string transfer, string reversing, searching for a string, etc.	**CO3**
7	Programs involving Software interrupts note: programs to use DOS interrupt INT 21H function calls for reading a character from keyboard, buffered keyboard input, display of character/ string on console	**CO4**
8	Experiments on interfacing 8086 with the following interfacing modules through DIO (Digital Input/Output-PCI bus compatible) card a. Matrix keyboard interfacing b. Seven segment display interface c. Logical controller interface d. Stepper motor interface	**CO4**

Assessment Pattern

CIE- Continuous Internal Evaluation (25 Marks)

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

SEE- Semester End Examination (25 Marks)

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

OBJECT ORIENTED PROGRAMMING USING JAVA LAB

Course Code	**: 20CEL48A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEL48A.1	Apply OOP concepts with basic Java constructs to solve the given problem.
20CEL48A.2	Analyze the output for the programs in Java.
20CEL48A.3	Conduct experiments as individual by using modern tools like JDK
20CEL48A.4	Make an effective report based on experiments

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEL48A.1	-	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL48A.2	3	-	-	-	-	-	-	-	-	-	-	-	3	2
20CEL48A.3	-	3	-	-	-	-	-	-	3	-	-	3	3	2
20CEL48A.4	-	-	-	-	-	-	-	-	3	3	-	-	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

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

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	**Tests (25 marks)**
Remember	-
Understand	-
Apply	10
Analyze	5
Evaluate	-
Create	10

SEE- Semester End Examination (25Marks)

Bloom's Category	**Questions (25 marks)**
Remember	-
Understand	-
Apply	10
Analyze	5
Evaluate	-
Create	10

MINI PROJECT-II

Course Code	**: 20CEE49A**	**Credits:**	**2**
L: T: P: S	**: 0: 0: 2: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 3**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20CEE49A.1	Understand the technological needs and/ or societal needs and sustainability of the environment.
20CEE49A.2	Design and develop an algorithm by applying JAVA-programming features.
20CEE49A.3	Analyze and evaluate the algorithm performance metrics.
20CEE49A.3	Test, validate and communicate the identified solutions in a structured way.

Mapping of Course Outcomes to Program Outcomes														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
20CEE49A.1	-	-	-	-	-	3	2	3	-	-	-	3	3	2
20CEE49A.2	-	-	3	-	3	-	-	-	-	-	-	3	3	2
20CEE49A.3	-	3	-	-	-	-	-	-	-	-	-	3	3	2
20CEE49A.3	-	-	-	3	-	-	-	-	3	3	3	3	3	2
Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)														

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

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	**Mini Project (25 marks)**
Remember	-
Understand	-
Apply	-
Analyze	-
Evaluate	25
Create	-

SEE- Semester End Examination (25 Marks)

Bloom's Category	**Mini Project (25 marks)**
Remember	-
Understand	-
Apply	15
Analyze	-
Evaluate	10
Create	-

BASIC APPLIED MATHEMATICS-II

Course Code	**: 20DMAT41A**	**Credits:**	**0**
L: T: P: S	**: 0: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	**At the end of the Course, the Student will be able to**
CO#	**COURSE OUTCOME**
20DMAT41A.1	Gain knowledge of basic operations of vectors
20DMAT41A.2	Use curl and divergence of a vector function in three dimensions
20DMAT41A.3	Develop the ability to solve higher order Linear differential equations
20DMAT41A.4	Know the basic concepts of Laplace transform to solve the Periodic and Step 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**
20DMAT41A.1	3	3	3	3	-	-	-	-	-	-	3	3
20DMAT41A.2	3	3	3	3	-	1	-	-	-	-	3	3
20DMAT41A.3	3	3	3	3	3	-	3	-	-	3	3	3
20DMAT41A.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 between vectors-Problems.	**5**	**CO1**
2.	**Vector Differentiation:** Velocity and Accelerations, 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 (without proof), Periodic functions (without proof), Heaviside function (without proof) -Problems.	**5**	**CO4**

5.	**Inverse Laplace Transform:** Inverse Laplace Transform by partial fractions, completing the square method - Problems. Solution of linear differential equations using Laplace Transforms-Problems.	**5**	**CO4**

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10th Edition, 2014, ISBN:978-81-265-5423-2
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014, ISBN:978-81-7409-195-5

Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4thEdition,2015, ISBN: 978-0-273-73409-3
2. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4th Edition, 2016, ISBN:978-0-07-063419-0
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28th Edition, 2012, ISBN: 81-219-0345-9.
4. N.P.Bali and Manish Goyal ,A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9th Edition, 2014, ISBN:978-81-318-0832-0

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests (20 Marks)	Assignment (5 Marks)
Remember	5	-
Understand	5	5
Apply	5	-
Analyze	2.5	-
Evaluate	2.5	-
Create	-	-

SEE- Semester End Examination (25 Marks)

Bloom's Category	SEE Marks
Remember	5
Understand	10
Apply	5
Analyze	2.5
Evaluate	2.5
Create	-

CONSTITUTION OF INDIA & PROFESSIONAL ETHICS

Course Code	**: 19HSS272**	**Credits:**	**0**
L: T: P: S	**: 0: 0: 0: 0**	**CIE Marks:**	**25**
Exam Hours:	**: 2**	**SEE Marks:**	**25**

Course Outcomes:	On completion of the course, student would be able to
CO#	**COURSE OUTCOME**
19HSS272.1	Gain knowledge of Indian Constitution and be able to solve the legal and societal issues.
19HSS272.2	Acquire the knowledge about Amendment, Electoral Process, Fundamental Duties, Central and State Policies.
19HSS272.3	Understand Special Provisions in Indian Constitution and also in Human Rights Commission.
19HSS272.4	Understand Engineering Ethics and Responsibilities.

Mapping of Course Outcomes to Program Outcomes												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
19HSS272.1	-	-	-	-	-	1	-	3	1	-	-	3
19HSS272.2	-	-	-	-	-	1	-	3	1	-	-	3
19HSS272.3	-	-	-	-	-	1	-	3	1	-	-	3
19HSS272.4	-	-	-	-	-	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. Preamble to Indian constitution. Fundamental rights and its restriction and Limitations. Decided case studies. Right to Information Act. Directive principles of state policy.	**5**	**CO1**
2	**UNION EXECUTIVE** President, prime minister, parliament and supreme court of India. Judicial activism and judicial review. Important parliamentary terminology. Center- state relations**.** Attorney General of India, Comptroller and Auditor General of India**.** Fundamental Duties.	**4**	**CO2** **CO3**
3	**STATE EXECUTIVE** State Executive- Governor, Chief Minister, State Legislature. High Court and Subordinate Court. Advocate General of the State. Controller and Auditor General of State. Electoral process in India. Amendment procedure. Types of amendments- 42, 44, 61, 86, 73, 74, 75, 91, 94, 95, 100, 101, 118 amendments.	**4**	**CO2** **CO3**

4	**SPECIAL PROVISION** Special provision for SC & ST. Special provision for women, children and backward classes. Emergency provision, citizenship and National Human Rights Commission.	**5**	**CO4**
5	**SCOPE & AIM OF 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.	**5**	**CO4**

Text Books:

1. Durga Das Basu: "Introduction to the constitution"19th/20thEdn., or 2008,Lexis Nexis; Twentieth edition (2011)
2. Shubham Singles, CharlesE .Haries :Constitution of India and Professional Ethics. Latest Edition-2018, Cengage Learning India Private Limited (2019)

Reference Books:

1. M.Govindarajan,S.Natarajan,V.S.Senthilkumar,Engineering Ethics", Prentice Hall India Learning Private Limited (2013)
2. Pylee," An Introduction to Constitution of India", Vikas Publishing 2002.
3. Latest Publication of NHRC- Indian Institute of Human Rights, New Delhi.

Assessment Pattern:

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	**Marks (25)**
Remember	15
Understand	05
Apply	05

SEE – Semester End Examination (25 Marks)

Bloom's Category	**Marks (25)**
Remember	15
Understand	5
Apply	5

APPENDIX A

OUTCOME BASED EDUCATION

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

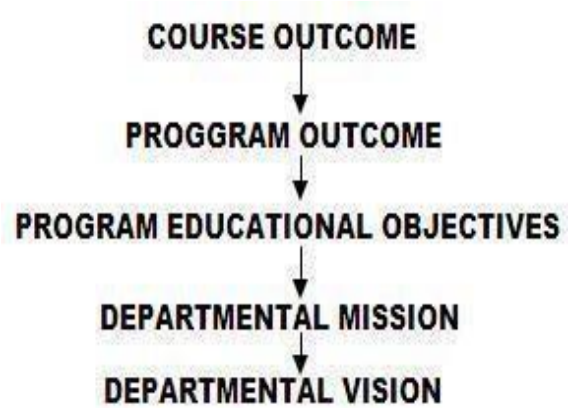
There are three educational Outcomes as defined by the National Board of Accreditation:

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

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

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

Mapping of Outcomes



APPENDIX B

The Graduate Attributes of NBA

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX C

BLOOM'S TAXONOMY

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