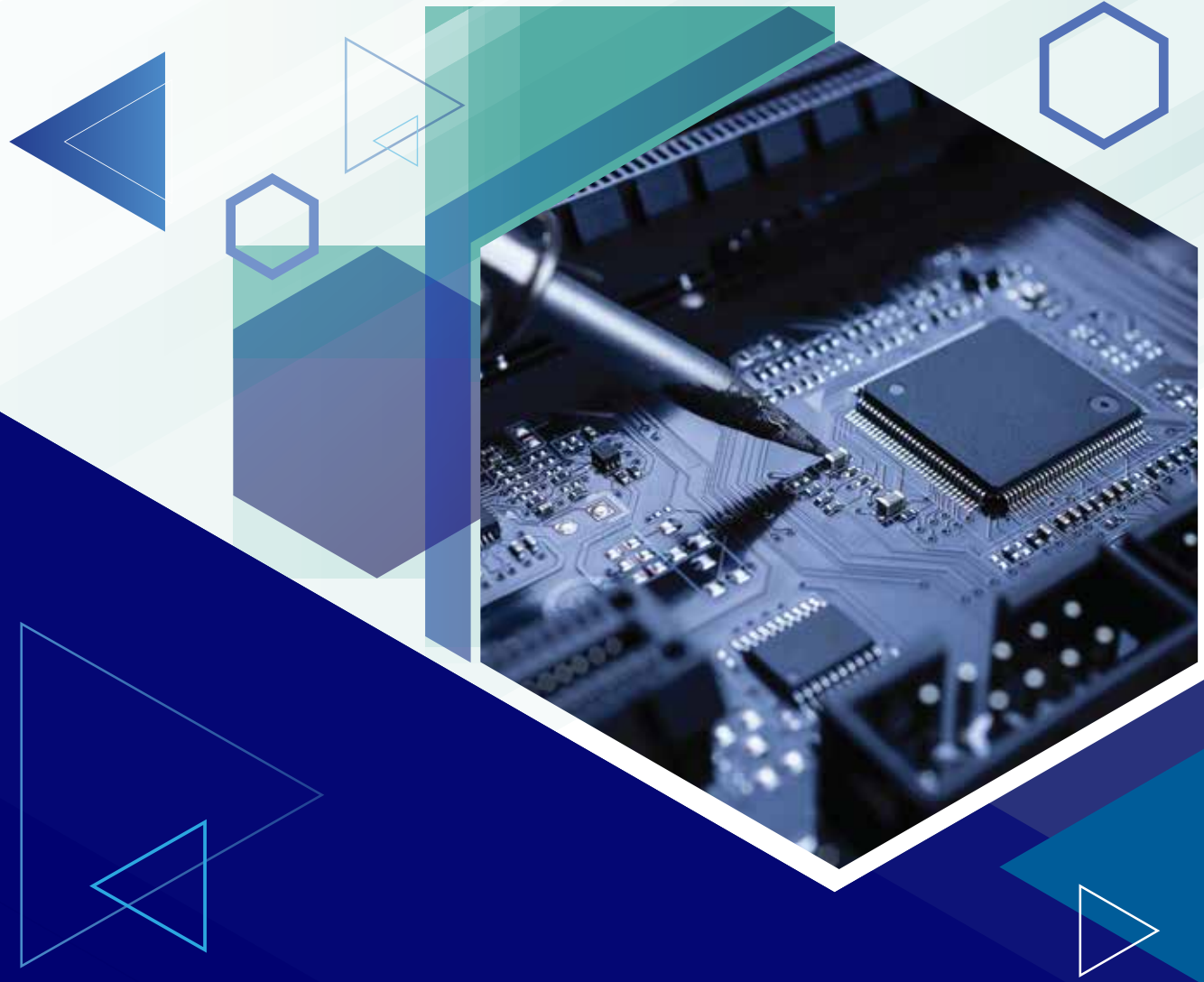# NEW HORIZON
COLLEGE OF ENGINEERING

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Academic Year 2022-2023

3^h and 4th Semesters
B.E. Scheme and Syllabus

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

ACADEMIC YEAR 2022-23

SYLLABUS

VISION

To evolve into a centre of excellence in Electrical and Electronics Engineering for bringing out contemporary engineers, innovators, researchers and entrepreneurs for serving nation and society.

MISSION

- To provide suitable forums to enhance the teaching-learning, research and development activities.
- Framing and continuously updating the curriculum to bridge the gap between industry and academia in the contemporary world and serve society.
- To inculcate awareness and responsibility towards the environment and ethical values.

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1	To provide good learning environment to develop entrepreneurship capabilities in various areas of Electrical and Electronics Engineering with enhanced efficiency, productivity, cost effectiveness and technological empowerment of human resource.
PEO2	To inculcate research capabilities in the areas of Electrical and Electronics Engineering to identify, comprehend and solve problems and adopt themselves to rapidly evolving technology.
PEO3	To create high standards of moral and ethical values among the graduates to transform them as responsible citizens of the nation.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1	Graduateswill be able to solve real life problems of power system and power Electronics using MiPower, PSPICE and MATLAB software tools and hardware.
PSO 2	Graduates will be able to Develop & support systems based on Renewable and sustainable Energy sources.

PEOs TO MISSION STATEMENT MAPPING

Mission Statements	PEO1	PEO2	PEO3
PEO1: To provide good learning environment to develop entrepreneurship capabilities in various areas of Electrical and Electronics Engineering with enhanced efficiency, productivity, cost effectiveness and technological empowerment of human resource.	3	3	1
PEO2: To inculcate research capabilities in the areas of Electrical and Electronics Engineering to identify, comprehend and solve problems and adopt themselves to rapidly evolving technology	2	3	2
PEO3: To create high standards of moral and ethical values among the graduates to transform them as responsible citizens of the nation.	1	2	3

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

PROGRAM OUTCOMES (POs) WITH GRADUATE ATTRIBUTES

S.No	Graduate Attributes	Program Outcomes (POs)
1	Engineering Knowledge	PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem Analysis	PO2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design and Development of Solutions	PO3: 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.
4	Conduct investigations of complex problems	PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern Tool usage	PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The Engineer and society	PO6: 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.
7	Environment and sustainability	PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	PO11: Demonstrate knowledge and understanding of the 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.
12	Lifelong learning	PO12: 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.

MAPPING OF POs TO PEOs

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

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

New Horizon College of Engineering
Department of Electrical and Electronics Engineering
Scheme of Third Semester B.E Program

S. No	Course Code	Course	BoS	Credit Distribution				Overall Credits	Contact Hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	21EEE31A	Applied Mathematics-III	AS	3	0	0	0	3	4	50	50	100
2	21EEE322A	Digital system design using verilog	EEE	1	0	1	0	2	3	50	50	100
3	21HSS332A / 21HSS333A	Aadalitha Kannada / Vyavaharikha Kannada	HSS	1	0	0	0	1	1	50	50	100
4	21HSS342A	Environmental Science	HSS	1	0	0	0	1	1	50	50	100
5	21EEE35A	Analog and linear integrated circuits	EEE	3	0	0	0	3	4	50	50	100
6	21EEE36A	Electric circuit theory	EEE	3	0	0	0	3	4	50	50	100
7	21EEE37A	DC machines and transformers	EEE	3	0	0	0	3	4	50	50	100
8	21EEL35A	Analog and linear integrated circuits Laboratory	EEE	0	0	1	0	1	2	50	50	100
9	21EEL36A	Electric circuit theory Laboratory	EEE	0	0	1	0	1	2	50	50	100
10	21EEL37A	DC machines and transformers Laboratory	EEE	0	0	1	0	1	2	50	50	100
11	21EEE38A	Mini Project I	EEE	0	0	2	0	2	4	50	50	100
12	21DMAT31A*	Basic Applied Mathematics-I	AS	0	0	0	0	0	2	**50**	**50**	**100**
Total								21	31/33	550/ 600	550/ 600	1100/ 1200

*Applicable to Diploma students

New Horizon College of Engineering
Department of Electrical and Electronics Engineering
Scheme of Fourth Semester B.E Program

S. No	Course Code	Course	BoS	L	T	P	S	Overall Credits	Contact Hours	CIE	SEE	Total
1	21EEE41A	Applied Mathematics-IV	AS	3	0	0	0	3	4	50	50	100
2	21HSS421A	Life Skills for Engineers	HSS	1	0	1	0	2	3	50	50	100
3	21HSS431A	Entrepreneurship Development -2	HSS	1	0	0	0	1	1	50	50	100
4	21HSS441A	Constitution of India & Professional Ethics	HSS	1	0	0	0	1	1	50	50	100
5	21EEE45A	Control systems	EEE	3	0	0	0	3	4	50	50	100
6	21EEE46A	Synchronous and induction machines	EEE	3	0	0	0	3	4	50	50	100
7	21EEE47A	Microcontroller and embedded systems	EEE	3	0	0	0	3	4	50	50	100
8	21EEL45A	Control systems Laboratory	EEE	0	0	1	0	1	2	50	50	100
9	21EEL46A	Synchronous and induction machines Laboratory	EEE	0	0	1	0	1	2	50	50	100
10	21EEL47A	Microcontroller and embedded systems	EEE	0	0	1	0	1	2	50	50	100

		Laboratory										
11	21EEE48A	Summer Internship - I	EEE	0	0	0	2	2	0	50	50	100
12	21DMAT41A*	Basic Applied Mathematics-II	HSS	0	0	0	0	0	2	**50**	**50**	**100**
13	21DAEC40A*	Communicative English	AS	0	0	0	0	0	2	**50**	**50**	**100**
Total								21	27/31	550/650	550/650	1100/1300

*Applicable to Diploma students

SYLLABUS

III SEMESTER

APPLIED MATHEMATICS – III

Course Code: 21EEE31A	**Credits: 03**
L: T: P: S : 3:0:0:0	**CIE Marks: 50**
Exam Hours: 03	**SEE Marks: 50**

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

CO1	Use appropriate numerical methods to solve algebraic equations and transcendental equations.
CO2	Evaluate a definite integral numerically and use appropriate numerical methods to solve Boundary Value Problems in Partial differential equations.
CO3	Justify Z-transforms method to solve continuous/discrete model problems.
CO4	Express the periodic functions as Fourier series expansion analytically and numerically.
CO5	Solve the continuous model problems using Fourier transforms.
CO6	Analyze the Fast Fourier transforms method to solve the discrete model problems.

Mapping of Course Outcomes to Program Outcomes:

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

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**Co's**
1.	**Numerical Methods-1:** Numerical solution of algebraic and transcendental equations: Regula-falsi method and Newton-Raphson Method-Problems. Interpolation: Newton's forward and backward formulae for equal intervals, Newton divided difference, Lagrange's formula and Lagrange's inverse interpolation formula for unequal intervals (without proofs)-Problems. Case studies on Numerical Analysis.	9	CO1
2.	**Numerical Methods-2**: Numerical integration: Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule (without proofs)-Problems. Numerical solution of one-dimensional wave equation, heat equation and two-dimensional Laplace's equation. **Applications:** Application of numerical integration to velocity of a particle and volume of solids.	9	CO2

3.	**Z - Transform**: Definition, Z-transforms of some standard functions, properties, damping rule, shifting rule (without proof), initial and final value theorems, inverse Z- transforms by partial fractions method. **Applications:** Solving difference equations using Z-transform. Case Studies -Application of Z-transform in filter Transformation.	9	CO3
4.	**Fourier series:** Periodic function, Dirichlet's conditions, Fourier series of periodic functions of period 2π and arbitrary period $2l$, half range series-Problems. **Applications:** Practical harmonic analysis-Problems. Case studies on Fourier Series.	9	CO4
5.	**Fourier Transforms:** Infinite Fourier transforms, Fourier Sine and Cosine transforms, Inverse Fourier sine and cosine transforms. **Discrete Fourier Transform and Fast Fourier Transform:** Definition of N-Point DFT, problems for 4-points and inverse DFT for four points only. FFT algorithm to compute the Fourier transforms 4-point only.	9	CO5, CO6

Text Books:

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

Reference Books:

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

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

DIGITAL SYSTEM DESIGN USING VERILOG

Course Code: 21EEE322A   Credits: 02
L: T:P :S   : 1:0:1 :0   CIE Marks : 50
Exam Hours: 02   SEE Marks: 50

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

CO1	Apply Boolean laws, Demorgan's Theorem and logic minimization techniques to solve the complex engineering problems
CO2	Identify combinational logic systems and its related variables to reach conclusions
CO3	Synthesize engineering requirements from a review of the state-of-the-art
CO4	Establish a relationship between measured data and underlying principles of digital electronics circuits
CO5	Formulate Boolean expression using first principles of digital electronics
CO6	Determine design objectives, functional requirements and arrive at specifications

Mapping of Course Outcomes to Program Outcomes:

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

Module No	Module Contents	Hours	Cos
1	**Digital Basics :** Boolean laws, Demorgan's Theorem, Karnaugh Maps, Quine Mc-clusky method , Verilog: data types, operators, modeling styles	6	CO1 CO5
2	**Verilog for Combinational logic circuits:** Half adder, Full adder, Parallel adder, decoder, encoder, Priority encoder, multiplexer, de-multiplexer	6	CO2
3	**Verilog for Sequential logic circuits:** S R, D, latch, Master slave configuration, SR, D, JK and T Flipflops, Shift registers	6	CO3 CO6
4	**Verilog for State Machines:** Moore and Mealy machines, sequence detectors and counters	6	CO4 CO6
5	**Verilog Test bench:** Test bench for Combinational and sequential logic circuits	6	CO4

Text Books:

1. Digital Design : With An Introduction To The Verilog HDL, VHDL And System Verilog, Pearson Education, 6th Edition, 2020.

Reference Books:

1. Digital VLSI Design and Simulation with Verilog, Suman Lata Tripathi, Sobhit Saxena, Sanjeet K. Sinha, Govind S. Patel Wiley, 2021
2. Digital Logic Design Using Verilog: Coding and RTL Synthesis. Taraate, V, Springer, 2021
3. Chin, W. Principles of Verilog Digital Design. United States: CRC Press, 2022.
4. https://www.aldec.com/en/downloads/4232
5. https://nptel.ac.in/courses/108103179

Assessment Pattern:

CIE-Continuous Internal Evaluation (50 Marks)

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

SEE-Semester End Examination (50 Marks)

Blooms levels	SEE - Theory
	Examination = 50
Remember	-
Understand	-
Apply	25
Analyze	20
Evaluate	5
Create	-

ANALOG AND LINEAR INTEGRATED CIRCUITS

Course Code: 21EEE35A   **Credits: 03**
L: T:P :S   : 3:0:0 :0   **CIE Marks : 50**
Exam Hours: 03   **SEE Marks: 50**

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

CO1	Apply the basic mathematical concepts like Linear algebra, differential equations to solve the Complex Engineering Problems
CO2	Deduce mathematical expression for diode, Transistor, amplifiers, oscillators and OP-Amps
CO3	Choose the discrete Component values for Electronics Circuits by considering societal concerns
CO4	Determine KVL, KCL and Network theory equations to solve complex engineering problems
CO5	Design process to meet the specified needs by electronics circuits
C06	Analyze analog Electronic circuits to reach substantiated conclusions

 Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	2	3	2	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-
C06	2	3	1	-	-	-	-	-	-	-	-	-

Module No	Contents of the Module	Hours	COs
1	**Diode Circuits and Transistor DC Biasing :** PN Junction Diode - Diode equivalent circuits -Diode Clipping and Clamping circuits - BJT – Operating point - Analysis and design of Fixed bias circuit - Emitter stabilized bias circuit - Voltage divider bias circuit - Stability factor.	08	CO4 CO2

2	**Transistor Modeling and Multi stage Amplifier:** BJT transistor modeling, r_e model and hybrid equivalent model - Analysis of CE Fixed bias configuration - Voltage divider bias, Emitter follower - CB configuration using approximate hybrid model- Frequency Response of CE single stage amplifier - Need for cascading - Cascade and Cascade connection - Darlington connection	08	CO1 CO6
3	**Power Amplifiers,Feedback Amplifier and Oscillator::** Definitions and amplifier types - Transformer coupled Class A amplifiers - Class B amplifier circuits - Feedback concept - Effects of Negative Feedback - Feedback connection types- Barkhausen criterion - analysis and working of Phase shift Oscillator- Tuned Oscillator circuits - Crystal Oscillator	08	CO1 CO2
4	**Operational amplifiers:** Introduction, Block diagram and characteristics of an Op-amp. Inverting & non –inverting amplifier, **General Linear Applications:** A.C. amplifier, summing, scaling & averaging amplifier, Instrumentation amplifier.	08	C04 C05
5	**Comparators & Active Filters:** Basic comparator, zero crossing detector, inverting Schmitt trigger circuit. Triangular Wave Generator. First & Second order high pass & low pass filter. **Timer:** Internal architecture of 555 timers, Mono stable multivibrator, Astable Multivibrator.	08	C02 C03

Text Books:
1. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, PHI, 11thEdition, 2015. ISBN: 9332542600
2. Electronics Devices and Circuits, David A. Bell, PHI, 5th Edition, 2008. ISBN: 019569340X
3. Linear Integrated Circuits ,S.Salivahanan, V S Kanchana Bhasskaran Mc Graw Hill , August 2018. ISBN: 9789351342885
4. Operational amplifiers and linear IC's, David A Bell, Oxford University Press, 2014, ISBN: 9780195696134
5. Operational Amplifiers & Linear Integrated Circuits Theory and Application / 3E, James M. Fiore Version 3.2.6, 07 May 2021, ISBN: 0314908935

Reference Books:

1. Integrated Electronics, Jacob Millman & Christos C. Halkias, Tata - McGraw Hill, 2nd Edition,2010. ISBN: 9780070151420
2. Fundamentals of Analog Circuits, Thomas L Floyd, Pearson, 2nd edition, 2012,ISBN: 0130606197
3. Electronic Devices and Circuits, S.Salivahanan, N.Suresh, McGraw Hill, 3rd edition, 2013 ISBN: 978-0070660847
4. Op Amps, Design, Applications and Trouble Shooting, Elsevier, 2nd Edition, 2015. ISBN: 9780750697026.

Assessment Pattern:

CIE-Continuous Internal Evaluation (50 Marks):

Bloom's Taxonomy	Test	Assignment	Quiz
Marks (Out of 50 Marks)	25 Marks	15 Marks	10 Marks
Remember	-	-	-
Understand	5	5	5
Apply	10	5	5
Analyze	10	5	
Evaluate		-	-
Create	-	-	-

− **SEE-Semester End Examination (50 Marks):**

Bloom's Taxonomy	Test Marks (Out of 50 Marks)
Remember	-
Understand	10
Apply	20
Analyze	20
Evaluate	-
Create	-

ELECTRIC CIRCUIT THEORY

Course Code : 21EEE36A   **Credits** : 03

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

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

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

CO1	Analyse circuit parameters using network reduction techniques apply different techniques for analysis of electrical circuit.
CO2	Solve DC and AC circuits using network theorems
CO3	Obtain the frequency response of RLC circuits
CO4	Investigate the transient response of RLC circuits with DC and AC excitation
CO5	Analyze three phase circuits with different connections
CO6	Build an electric system for a given application

Mapping of Course Outcomes to Program Outcomes:

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

Module No	Contents of the Module	Hours	COs
1	**Network Reduction** Practical and ideal sources, active and passive elements, dependent and independent sources. Mesh Analysis and Nodal Analysis of DC and AC Circuits- Super-Mesh and Super-Node. Network reduction of series and parallel resistors, star-delta transformation and Source transformation	08	CO1, CO6

2	**Network Theorems** Superposition theorem- Thevenin's theorem, Norton's theorem - Maximum power transfer theorem-Reciprocity theorem	08	CO2, CO6
3	**Resonance** Series, parallel, Series-Parallel circuits- effect of variation of Q on resonance. Relations between circuit parameters- Q, resonant frequency and bandwidth. **Coupled Circuits** Mutual Inductance, Coefficient of Coupling, Dot convention, Equivalent inductance of series and parallel connected inductors with mutual inductance, Analysis of coupled circuits.	08	CO3, CO6
4	**Transient Analysis** Source Free RL, RC and RLC Circuits, Step and sinusoidal Response of RL, RC and RLC Circuits.	08	CO4, CO6
5	**Three Phase Circuits** Analysis of Balanced three phase systems. Disadvantage and causes of (low power factor) LPF, Power factor improvement equipment's, Power factor correction of single phase and three phase circuits.	08	CO5, CO6

Text Books:

1. Fundamentals of Electric Circuits, Charles Alexander, McGraw Hill; Standard 7th Edition, 2022, ISBN-10 : 9355320167;ISBN-13 : 978-9355320162

2. Engineering circuit analysis, Hayt and Kemmerly, McGraw Hill, 7th edition, 2022. ISBN-13 9781259098635;ISBN-10 1259098635

Reference Books:

1. Circuit theory: Analysis and Synthesis, A Chakrabharti , Shree Hari Publications, 2021
2. Electric Circuits (Schaum's Outline Series), McGraw Hill Education; 5th edition ,2017, ISBN-10 : 0070151431 ;ISBN-13 : 978-0070151437
3. https://nvhrbiblio.nl/biblio/boek/Bird%20-%20Electrical%20circuit%20theory%20and%20technology,%205e.pdf

Assessment Pattern

CIE-Continuous Internal Evaluation (50 Marks):

Bloom's Taxonomy	Test	Assignment	Quiz
Marks (Out of 50 Marks)	25 Marks	15 Marks	10 Marks
Remember	-	-	-
Understand	5	3	-
Apply	10	5	4
Analyze	5	5	4
Evaluate	5	2	2
Create	-	-	-

SEE – Semester End Examination (50 Marks):

Bloom's Taxonomy	Test Marks (Out of 50 Marks)
Remember	-
Understand	10
Apply	20
Analyze	10
Evaluate	10
Create	-

DC MACHINES AND TRANSFORMERS

Course Code   : 21EEE37A   **Credits   : 03**

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

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

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

CO1	Describe the working principle and performance of DC Machines and analyze the effect of armature reaction and process of commutation in DC machines.
CO2	Identify a suitable DC machine along with starting and speed control techniques for various industrial applications.
CO3	Explain the constructional details and evaluate the performance of Transformer by conducting various tests.
CO4	Analyze the different configuration and phase conversion of three-phase transformer.
CO5	Categorize the construction details, principle of autotransformer and tap changing transformers.
CO6	Experiment the parallel operation of transformer used in various industrial applications.

Mapping of Course Outcomes to Program Outcomes:

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

Module No	Contents of the Module	Hours	COs
1	**DC Generator** Construction, principle of operation, EMF equation, types of armature windings, types of generator, armature reaction, commutation, characteristics, losses and efficiency.	08	CO1
2	**DC Motor** Principle of operation, significance of back EMF, types of motor, torque equation, characteristics, speed control, starters and testing.	08	CO1 CO2
3	**Single Phase Transformers** Principle of operation, types, EMF equation, transformer on no-load and load - phasor diagram, Equivalent circuit, efficiency, regulation and testing	08	CO3
4	**Three Phase Transformers** Construction- Configurations- Scott Connection, Auto transformers and tap changers.	08	CO4 CO5
5	**Parallel Operation** Need of parallel operation, essential and desirable conditions for parallel operation., Parallel operation and load sharing of single phase transformer, Construction and working of autotransformer; welding transformer.	08	CO6

Text Books:

1. Principles and Applications of Electrical Engineering, Giorgio Rizzoni and James Kearns, McGraw Hill Publications, 7th edition, 2022.
   ISBN-10: 1260258041, ISBN-13: 9781260258042
   https://www.mheducation.com/highered/product/principles-applications-electrical-engineering-rizzoni-kearns/M9781260258042.html
2. Electric Machines, Nagrath I. J and Kothari D. P, Tata McGraw Hill Publishing Company Ltd, 5th edition, 2017. ISBN-10: 935260640X, ISBN-13: 978-9352606405
   https://www.eeupdate.com/2018/11/electric-machines-by-dp-kothari-ij.html
3. Electrical Machinery, P.S. Bimbhra, Khanna Publishers, 7th edition, 2014.
   ISBN: 978-81-7409-152-9
   https://khannapublishers.in/index.php?route=product/product&product_id=92&search=electric+machinery
4. Electric Machinery, Fitzgerald & Kingsley's, Stephen Umans, McGraw Hill Education; 7th edition, 2014. ISBN10: 0073380466, ISBN13: 9780073380469

https://vdocuments.net/electric-machinery-by-a-e-fitzgerald-charles-kingsley-jr-stephen-umans.html?page=1

Reference Books:

1. Principles of Electrical Machines and Power Electronics, P.C.Sen, Wiley, 3rd edition, 2016. ISBN: 9789390395057
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2. Electrical Machines, Deshpande, M. V., PHI Learning,2nd edition, 2015. ISBN: 9788120340268
   https://www.phindia.com/Books/BookDetail/9788120340268/electrical-machines-deshpande
3. A Text book of Electrical Machines, K.R.Siddapura, D.B.Raval, Vikas publishing house, 1st edition, 2014. ISBN: 9789325975620
   https://www.vikaspublishing.com/books/engineering/electrical-engineering/a-textbook-electrical-machines/9789325975620/
4. Fundamentals of Electric Machines, B R Gupta, New Age Publishers 3rd Edition, Reprint 2020. ISBN : 978-81-224-1614-5
   https://newagepublishers.com/servlet/nagetbiblio?bno=001022

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

Bloom's Taxonomy	Test	Assignment	Quiz
Marks (Out of 50 Marks)	25 Marks	15 Marks	10 Marks
Remember	5	-	-
Understand	5	-	-
Apply	8	6	4
Analyze	7	5	4
Evaluate	-	4	2
Create	-	-	-

SEE – Semester End Examination (50 Marks):

Bloom's Taxonomy	Test Marks (Out of 50 Marks)
Remember	10
Understand	15
Apply	15
Analyze	10
Evaluate	-
Create	-

ANALOG AND LINEAR INTEGRATED CIRCUITS LABORATORY

Course Code: 21EEL35A   **Credits: 01**
L: T: P: S   : 0:0:1:0   **CIE Marks: 50**
Exam Hours: 03   **SEE Marks: 50**
Course Outcomes: At the end of the course, the students will be able to

CO1	Analyze the characteristics of semiconductor diodes and implement voltage regulator, clipper, clamper, rectifier and filter
CO2	Design series voltage regulator, RC coupled amplifier, Class B Push-Pull amplifier and RC phase shift oscillator
CO3	Explore the basic operational amplifier applications
CO4	Design Low pass, High pass and Band pass filter circuits

Mapping of Course Outcomes to Program Outcomes:

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

SYLLABUS		
S.No.	**List of experiments**	**COs**
Cycle-1		
1.	Design and implementation of Half-wave rectifiers with and without capacitor filter	CO1
2.	Design and implementation of Full-wave rectifiers with and without capacitor filter	CO1
3.	Design and implementation of Clipper and clamper circuits	CO1
4.	Design and implementation of Zener voltage regulator	CO1
5.	Design and Implementation of Series Voltage Regulator	CO2
6.	Design and Implementation of RC coupled amplifier	CO2
Cycle-2		
7.	Design and Implementation of Class B Push-Pull amplifier	CO2

8.	Design and Implementation of RC Phase Shift Oscillator	CO2
9.	Design and verify the operation of op – amp as an (a) adder (b) subtractor (c) integrator and (d) differentiator	CO3
10.	Design and realize to analyze the frequency response of an op – amp amplifier under inverting and non -inverting configuration for a given gain	CO3
11.	Design and realize Schmitt trigger circuit using an op – amp for desired upper trip point (UTP) and lower trip point (LTP)	CO3
12.	Design and realize an op – amp based first order Butterworth (a) low pass (b) high pass and (c) band pass filters for a given cut off frequency/frequencies to verify the frequency response characteristic	CO4

Assessment Pattern:

CIE-Continuous Internal Evaluation Lab (50 Marks):

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	Internal lab examination (30 Marks)
Remember	4	4
Understand	6	6
Apply	6	10
Analyze	4	10
Evaluate	-	-
Create	-	-

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	6
Understand	10
Apply	18
Analyze	16
Evaluate	-
Create	-

ELECTRIC CIRCUIT THEORY LABORATORY

Course Code: 21EEL36A   **Credits   : 1**
L: T: P: S   : 0:0:1:0   **CIE Marks : 50**
Exam Hours   : 03   **SEE Marks : 50**

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

CO1	Reduce and analyze the given network using star-delta and source transformation techniques
CO2	Verify experimentally mesh and nodal analyses
CO3	Investigate the application of network theorems
CO4	Assess the transient response of RL,RC and RLC circuits and evaluate the frequency response of a RLC circuit and steady state response of a mutually coupled circuit

Mapping of Course Outcomes to Program Outcomes:

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

S. No.	LIST OF EXPERIMENTS	COs
1	Network Reduction using Series-Parallel Combination	CO1
2	Network Reduction using Star-Delta Transformation	CO1
3	Network Reduction and Analysis using Source Transformation	CO1
4	Network Analysis using Mesh-Current Method	CO2
5	Network Analysis using Node-Voltage Method	CO2
6	Verification of Superposition Theorem	CO3
7	Verification of Thevenin's Theorem & Norton's Theorem	CO3
8	Verification of Maximum Power Transfer Theorem	CO3
9	Determination of Resonant Frequency, Bandwidth and Quality Factor of a RLC Circuit	CO4
10	Transient and steady state analysis of RL and RC circuits	CO4
11	Transient and steady state analysis of RLC circuits	CO4
12	Steady State Analysis of Mutually Coupled Circuits	CO4

Assessment Pattern:

CIE-Continuous Internal Evaluation Lab (50 Marks):

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	Internal Lab Examination (30 Marks)
Remember	-	-
Understand	4	-
Apply	8	10
Analyze	4	6
Evaluate	4	4
Create	-	10

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	-
Understand	-
Apply	20
Analyze	10
Evaluate	10
Create	10

DC MACHINES AND TRANSFORMERS LABORATORY

Course Code : 21EEL37A   **Credits** : 1

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

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

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

CO1	Develop the winding diagram for DC machines using AutoCAD.
CO2	Estimate the performance of a DC machines by conducting various tests.
CO3	Examine the operation of Scott connection with two single-phase transformers.
CO4	Evaluate the performance of Transformers by conducting various tests and load sharing

Mapping of Course Outcomes to Program Outcomes:

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

S. No	LIST OF EXPERIMENTS	COs
1	Develop a winding diagram for DC machines in AutoCAD	CO1
2	Speed control of DC shunt motor by armature voltage control and flux control methods	CO2
3	Brake test on a DC shunt motor –Determination of speed –torque and efficiency characteristics	CO2
4	Retardation Test on DC shunt machine	CO2
5	Fields test on series motor	CO2
6	Determination of magnetisation, internal & load characteristics of DC shunt generator.	CO2

7	Swinburne's Test on DC shunt machine	CO2
8	Calculation of efficiency and regulation by open circuit and short circuit test on single phase transformer	CO4
9	Polarity Test and connection of three single phase transformer in star-Delta	CO4
10	Sumner's test on similar transformer and determination of combined and individual transformer.	CO4
11	Scott connection with balanced and unbalanced resistive loads	CO3
12	Parallel operation of two dissimilar single-phase transformer	CO4

Assessment Pattern:

CIE-Continuous Internal Evaluation Lab (50 Marks):

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	Internal Lab Examination (30 Marks)
Remember	-	-
Understand	2	4
Apply	4	6
Analyze	6	8
Evaluate	8	12
Create	-	-

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	-
Understand	6
Apply	12
Analyze	12
Evaluate	20
Create	-

BASIC APPLIED MATHEMATICS-I

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

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

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

Mapping of Course Outcomes to Program Outcomes:

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

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**CO's**
1.	**Differential Calculus:** Polar Curves-Problems on angle between the radius vector and tangent, Angle between two curves-Problems, Pedal equation for polar curves-Problems. Maclaurin's theorem for function of one variable (statement only)-Problems.	5	CO1, CO2
2.	**Partial differentiation:** Definition and Simple problems, Euler's theorem for Homogeneous function (NO Derivation and NO extended theorem)-Problems, Jacobians of order two - definition and problems.	5	CO1
3.	**Integral Calculus and Differential Equations:** Problems on evaluation of $\sin^n x$ and $\cos^n x$ integrals with standard limits (0 to $\pi/2$).		

	Solution of first order and first-degree differential equations-Variable separable, Linear and Exact differential equations.	**5**	**CO3**
4.	**Linear Algebra-1:** Problems on rank of a matrix by elementary transformations, Solution of system of linear equations by Gauss elimination method-Problems.	**5**	**CO4**
5.	**Linear Algebra-2:** Linear transformation, Eigen values and Eigen Vectors of a square matrix-Problems.	**5**	**CO4**

Text Books:

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

Reference Books:

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

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks).

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

SEE- Semester End Examination (50Marks).

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

IV SEMESTER
SYLLABUS

APPLIED MATHEMATICS – IV

Course Code: 21EEE41A   Credits: 03
L: T: P :S   : 3:0:0: 0   CIE Marks : 50
Exam Hours: 03   SEE Marks: 50

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

CO1	Solve initial value problems using appropriate numerical methods
CO2	Apply the concepts of Complex variables to solve Engineering Problems
CO3	Apply the concepts of Transformations, Complex integration, Poles and Residuals in the stability analysis of engineering problems
CO4	Gain ability to use probability distributions to analyze and solve real time problems
CO5	Apply the concept of sampling distribution to solve engineering problems
CO6	Use the concepts to analyze the data to make decision about the hypothesis

Mapping of Course Outcomes to Program Outcomes:

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

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**CO's**
1.	**Numerical Methods:** Numerical solution of ordinary differenti equations of first order and of first degree: Taylor's series metho Modified Euler's method and Runge-Kutta method of fourth-orde Problems. Milne's predictor and corrector methods-Problems. Numerical Solutions of second order ordinary differential equations by Runge-Kutta method of fourth-order-Problems. Case studies on Numerical Analysis.	9	CO1

2.	**Complex Variables**: Functions of complex variables, Analytical functions, Cauchy-Riemann Equations in Cartesian and Polar forms, Harmonic functions and Construction of analytic functions-Problems using Milne-Thompson's method. **Applications:** Flow Problems-Velocity potential, Stream functions and complex potential functions.	9	CO2
3.	**Conformal Transformations and Complex Integrations:** $w = z^2$, and $w = e^z$. Cauchy's Theorem (with proof), Generalized Cauchy integral formula, Singularities, Poles and Residues, Residue theorem (without proof)-Problems.	9	CO3
4.	**Probability distributions:** Random variables (discrete and continuous), probability density functions, moment generating function. Discrete Probability distributions: Binomial and Poisson Distributions-Problems. Continuous Probability distributions: Exponential and Normal Distributions-Problems. Case Studies: 1. Application of Probability Theory in signal and image processing. 2. Application of Probability Theory in Optical communication system.	9	CO4
5.	**Sampling Theory:** Sampling, Sampling distributions, test of hypothesis of large samples for means and proportions, Inferences for variance and proportion. Central limit theorem (without proof), Confidence limits for means, Student's t-distribution and F-distribution for test of goodness of fit for small samples. Case Studies: 1. Sampling Theorem in multi band signal Analysis 2. Extension of Sampling Theorem in speech Compression.	9	CO5, CO6

Text Books:

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

Reference Books:

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

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks).

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

SEE- Semester End Examination (50Marks).

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

CONTROL SYSTEMS

Course Code	**: 21EEE45A**	**Credits**	**: 03**
L: T: P: S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Develop mathematical model of mechanical and electrical systems by using transfer function approach
CO2	Analyze the time response of systems and examine their stability
CO3	Deduce the closed loop frequency response from open loop system and determine their stability
CO4	Design a suitable controller/compensator to meet the required frequency response
CO5	Assess state model's controllability and observability by state space approach
CO6	Implement a suitable closed loop system for a given practical application

Mapping of Course Outcomes to Program Outcomes:

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

Course Syllabus			
Module No	**Contents of the Module**	**Hours**	**COs**
1	**Mathematical Modelling:** Open loop and closed loop systems - Mathematical modelling-Mechanical and electrical systems - electromechanical analogous systems- Transfer function of DC servo motors, AC servo motor- synchros -Block diagram reduction techniques - Signal flow graph.	08	CO1, CO6

2	**Time Response:** Standard signals-Time response-First and second order systems-Time domain specifications-Steady state error-Static and dynamic error constants - Effect of P-PD-PI-PID controllers.	08	CO2, CO6
3	**Stability and Root Locus:** Stability Concepts-Location of closed loop poles-Classification of stability-Routh stability criterion-Root locus construction- Addition of open loop poles and zeros-Assessment of relative stability	08	CO2, CO6
4	**Frequency Response:** Frequency domain specifications-Correlation between time and frequency domain specifications-Polar plot-Nyquist stability analysis-Bode plot-Determination of transfer function from bode plot-Simulation of frequency plots	08	CO3, CO6
5	**Compensator design:** Performance criteria-Lag/Lead compensator design using bode plots. Applications: Temperature control system and Position control system **State Space Analysis:** State space representation-State Models-Controllability and Observability	08	CO4, CO5,CO6

Text Books:

1. Control Systems Engineering, I.J.Nagrath and M.Gopal, New Age International Publishers, Sixth Edition, 2017, ISBN :9386070111.
2. Control Systems, Principles and Design, M. Gopal, Fourth Edition, Tata McGraw Hill, 2015, ISBN: 9780071333269.
3. Modern Control Engineering, K. Ogata, Fifth edition, PHI, 2012, ISBN: 0136156738.
4. https://www.academia.edu/35425584/Control_System_By_Norman_nise_Sixth_Ed

Reference Books:

1. Control System Engineering, S.K.Bhattacharya, Third Edition, Pearson, 2013, ISBN: 9788131791653.
2. Control System, Dhanesh. N. Manik, Cengage Learning, 2012, ISBN: 9788131518120.

3. https://controltheorymaster.files.wordpress.com/2017/11/farid-golnaraghi-benjamin-c-kuo-automatic-control-systems.pdf

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Taxonomy Marks (Out of 50)	Tests 25 Marks	Assignments 15 Marks	Quizzes 10 Marks
Remember	-	-	-
Understand	5	-	-
Apply	10	5	5
Analyze	10	5	5
Evaluate	-	5	-
Create	-	-	-

SEE- Semester End Examination (50 Marks):

Bloom's Taxonomy	Marks Theory (50)
Remember	-
Understand	10
Apply	20
Analyze	15
Evaluate	5
Create	-

SYNCHRONOUS AND INDUCTION MACHINES

Course Code : 21EEE46A　　　　　　　　　　　**Credits : 03**
L: T: P: S : 3:0:0:0　　　　　　　　　　　　　**CIE Marks : 50**
Exam Hours : 03　　　　　　　　　　　　　　**SEE Marks : 50**

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

CO1	Explain the operation and performance of three phase induction motor.
CO2	Select suitable starting and speed control technique(s) for three phase induction motors.
CO3	Implement the starting of single phase induction motors.
CO4	Develop winding design and predetermine the regulation of synchronous generators
CO5	Explain hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor.
CO6	Identify appropriate AC machines for real time applications.

Mapping of Course Outcomes to Program Outcomes:

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

Module No	Contents of the Module	Hours	COs
1	**Three phase Induction Machines** Concept of Rotating Magnetic Field - Principle of Operation – Construction - Types of Rotors - Torque - Slip Characteristics - Losses - Efficiency.	08	CO1,CO6

2	**Starting and Testing of Three-phase Induction Motors** Necessity of starter - Types of starters- Speed control methods- No load and blocked rotor tests - brake test- Circle diagram - Cogging and Crawling.	08	CO2,CO6
3	**Single-phase Induction Motor** Double revolving field theory - Principle of operation – Types - Split phase induction motors- Capacitor start motor - Capacitor start and run motor - Shaded pole motor - AC series motor - Applications.	08	CO3,CO6
4	**Synchronous Generator** Principle of operation- Construction - EMF equation - Armature reaction - Phasor diagram - Voltage regulation - EMF, MMF and ZPF methods - Parallel operation.	08	CO4,CO6
5	**Synchronous Motor** Principle of operation - Phasor diagram - V and inverted V curves - Starting Methods - Applications	08	CO5,CO6

Text Books:

1. Electric Machines, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill Education, 5th Edition, 2017. ISBN-10: 935260640X, ISBN-13: 978-9352606405
2. Electric Machinery, P. S. Bhimbra, Khanna publications, 7th Edition, 2015.
    ISBN: 978-81-7409-152-9
    https://khannapublishers.in/index.php?route=product/product&product_id=92&search=electric+machinery
3. Electrical Machines, S.K. Bhattacharya, McGraw Hill Education, 4th Edition, 2017.
    ISBN-10: 9332902852, ISBN-13: 978-9332902855

Reference Books:
1. Electric machinery, Ashfaq Hussain, Dhanpat Rai & Co, 3rd Edition, 2016.
    ISBN-10: 8177001663, ISBN-13: 978-8177001662
2. Electrical Machines, R. K. Rajput, Laxmi Publication, 6th Edition, 2018. ISBN: 9788131804469

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4. A Course in Electrical Technology-II, J.B. Gupta, S. K. Kataria and Sons, 14th Edition, 2017. ISBN-10 : 9350144158, ISBN-13: 978-9350144152
https://skkatariaandsons.com/view_book.aspx?productid=7650&Book=A%20Course%20in%20Electrical%20Technology-II

5. Principles of Electric Machines and Power Electronics, P.C. Sen, Wiley, 3rd Edition, 2015. ISBN: 9789390395057
https://www.wileyindia.com/principles-of-electric-machines-3ed-an-indian-adaptation.html

6. Electrical Machinery Fundamentals, Stephen J Chapman, Tata McGraw Hill Education, 4th Edition, 2010. ISBN-10: 0071284443, ISBN-13: 978-0071284448

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	25 Marks	15 Marks	10 Marks
Remember	3	1	2
Understand	6	5	2
Apply	7	3	2
Analyze	6	3	2
Evaluate	3	3	2
Create	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Category	Tests(theory)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

MICROCONTROLLER AND EMBEDDED SYSTEMS

Course Code : **21EEE47A**   Credits   : 03

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

Exam Hours   : 03   SEE Marks   : 50

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

CO1	Apply the concepts of embedded systems and addressing modes to develop programs
CO2	Develop complex assembly language programs using 8051
CO3	Construct embedded C programs using 8051 special function registers
CO4	Expand programs to interface 8051 with external devices
CO5	Realize embedded system concepts withATMEGA2560 for engineering applications
CO6	Deploy appropriate embedded system design for complex engineering tasks

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POI0	POII	PO12
CO1	-	3	-	-	-	-	-	-	-	-	-	3
CO2	3	1	1	2	3	-	-	-	1	1	-	-
CO3	-	-	3	-	3	3	3	3	-	-	-	-
CO4	3	3	3	3	3	3	3	1	3	-	2	3
CO5	-	3	3	3	3	2	1	2	3	-	3	3
CO6	3	3	3	3	3	3	1	1	3	-	3	3

Module No	Contents of the Module	Hours	COs
1	**Introduction** Introduction to Embedded Systems- Philosophy, Embedded Systems, Embedded Design and Development Process – Applications – Microcontroller - Microprocessor - Von-Neumann and Harvard Architecture – RISC & CISC - 8051 Block diagram-Pin Diagram- Internal Data Memory - Addressing Modes- External Memory Access.	08	**CO1** **CO2**

2	**Assembly Language Programming** Introduction to 8051 assembly programming, Instruction set: Data Transfer, Arithmetic and Logical Instructions, Branching and Looping Instructions- Programming	08	**CO2** **CO3**
3	**Embedded C Programming** Introduction to Embedded C Programming – Timer/Counter Registers-Modes of operation-Timer/Counter Programming- Basics of serial communication- Serial Communication Registers- Programming-Types of Interrupts - Programming	08	**CO2** **CO3**
4	**Microcontroller Interfacing** Input Device Interfacing- Output Device Interfacing - Communication Interfacing - 8255 Programmable Peripheral Interface -Programming	08	**CO6**
5	**ATMEGA2560 Microcontroller** Block/Pin Diagram – Introduction to Arduino IDE- Ardunio Programming	08	**CO5** **CO6**

Text Books:

1. The 8051 Microcontroller and Embedded Systems – using assembly and C, Muhammad Ali Mazidi, Janice Gillespie Mazidi, Rollin D.McKinlay, 2nd Edition, 2007, Pearson Education. ISBN: 9788131710265
2. The 8051 Microcontroller & Embedded Systems Using Assembly and C with CD, Kenneth Ayala, 1st Edition, 2010, Cengage Learning, India. ISBN: 9788131511053
3. Professional Embedded ARM Development, 2nd edition, 2014, John Wiley & Sons. ISBN: 9781118788943

Reference Books:

1. Microprocessors Principles and Applications, Ajit Pal, Kindle Edition, 30 August 2011, Tata McGraw Hill. ISBN: 9788120343924
2. Microprocessors and interfacing : Programming and Hardware, Douglas V. Hall, Second Edition 2006, McGraw Hill Inc. ISBN: 9780070601673
3. 8051 Microcontroller : An Application Based Introduction, David Calcutt, Fred Hassan, Newness, 2008. ISBN: 9780750657594
4. The 8051 Microcontroller, Dr. K. Uma Rao, 1 January 2010, Pearson Education. ISBN: 9788131732526

5. Atmel ATmega2560 Datasheet, 2549Q-AVR-02/2014.
    https://ww1.microchip.com/downloads/en/devicedoc/atmel-2549-8-bit-avr-microcontroller-atmega640-1280-1281-2560-2561_datasheet.pdf.

Assessment Pattern:

CIE-Continuous Internal Evaluation (50 Marks):

Bloom's Taxonomy	Test	Assignment	Quiz
Marks (Out of 50 Marks)	25 Marks	15 Marks	10 Marks
Remember	-	-	4
Understand	5	-	2
Apply	5	7.5	-
Analyze	-	-	2
Evaluate	5	-	2
Create	10	7.5	-

SEE – Semester End Examination (50 Marks):

Bloom's Taxonomy	Test Marks (Out of 50 marks)
Remember	5
Understand	5
Apply	10
Analyze	10
Evaluate	10
Create	10

CONTROL SYSTEMS LABORATORY

Course Code : 21EEL45A   **Credits**   : 1

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

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

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

CO1	Obtain the characteristics of components used in automatic controls and evaluate their transfer functions
CO2	Design a suitable controller and compensator for the desired application
CO3	Assess the system performance using time domain and frequency domain analysis
CO4	Obtain the state model and test for controllability and observability

Mapping of Course Outcomes to Program Outcomes:

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

Exp. No.	Experiments	COs
1	Determination of Transfer function of DC servo motor by obtaining its Torque Speed characteristics	CO1
2	Determination of Transfer function of AC servo motor by obtaining its Torque Speed characteristics	CO1
3	Experiment to draw synchro pair characteristics	CO1
4	Obtain the time response of the second order system and determine the time domain specifications and verify the same by simulation	CO3
5	To design a passive RC leg compensating network for the given specifications and obtain the frequency response and determine the transfer function experimentally	CO2

6	To design a passive RC lead compensating network for the given specifications and obtain the frequency response and determine the transfer function experimentally	**CO2**
7	To study the effect of P, PI, PD and PID controller on the step response of a feedback control system and Verify the same by simulation	**CO2**
8	DC position control system	**CO2**
9	Temperature Control system	**CO2**
10	Stability analysis using Bode and Nyquist of LTIV system using suitable software	**CO3**
11	Stability analysis using Root Locus of LTIV and effect of open loop and zeroes on root locus contour using suitable software	**CO3**
12	State space model for classical transfer function and verifying the controllability and observability using suitable software	**CO4**

Assessment Pattern:

CIE- Continuous Internal Evaluation (50 Marks)

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	**Internal Lab Examination (30 Marks)**
Remember	04	04
Understand	04	06
Apply	06	10
Analyze	06	10
Evaluate	-	-
Create	-	-

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	6
Understand	10
Apply	18
Analyze	16
Evaluate	-
Create	-

SYNCHRONOUS AND INDUCTION MACHINES LABORATORY

Course Code	**: 21EEL46A**	**Credits**	**: 1**
L: T: P:S	**: 0:0:1:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Investigate various speed control techniques of induction motors
CO2	Evaluate the performance of induction and synchronous machines
CO3	Analyze load sharing among different alternators
CO4	Choose a suitable starter for various applications

Mapping of Course Outcomes to Program Outcomes:

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

S. No	LIST OF EXPERIMENTS	COs
1	Load test on single phase induction motor	CO2
2	No load and Blocked rotor tests on single phase Induction Motor	CO2
3	Load test on three phase induction motor	CO2
4	No load and Blocked rotor tests on three phase squirrel cage Induction Motor	CO2
5	Speed control of three phase slip-ring induction motor	CO1

6	Regulation of three phase alternator by EMF Method	CO2
7	Regulation of three phase alternator by MMF Method	CO2
8	Regulation of three phase alternator by ZPF Method	CO2
9	Slip test and determination of regulation on Salient pole synchronous machine	CO2
10	Parallel operation of alternators	CO3
11	V and Inverted V curves of a synchronous motor	CO3
12	Study of starters	CO4

Assessment Pattern:

CIE-Continuous Internal Evaluation (50 Marks)

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	**Internal Lab Examination (30 Marks)**
Remember	-	-
Understand	4	8
Apply	4	9
Analyze	4	9
Evaluate	8	4
Create	-	-

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	-
Understand	6
Apply	12
Analyze	12
Evaluate	20
Create	-

MICROCONTROLLER AND EMBEDDED SYSTEM LABORATORY

Course Code	**: 21EEL47A**	**Credits**	**: 1**
L: T: P:S	**: 0:0:1:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Develop an assembly language program for basic operations on the memories
CO2	Develop an assembly language program for data processing
CO3	Develop an embedded C program to interface the microcontroller to an external world
CO4	Develop an embedded system for control applications

Mapping of Course Outcomes to Program Outcomes:

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

S. No	LIST OF EXPERIMENTS	COs
1	Data transfer – Program for block data movement, sorting, exchanging, finding largest element in an array	CO1
2	Arithmetic instructions: Addition, subtraction, multiplication and division. Square and cube operations for 16-bit numbers.	CO1 CO2
3	Counters, Boolean and logical instructions (bit manipulation)	CO1 CO2
4	Conditional call and return instructions	CO4
5	Code conversion programs – BCD to ASCII, ASCII to BCD, ASCII to decimal, Decimal to ASCII, Hexa decimal to and Decimal to Hexa	CO1 CO2
6	Programs for delay andcounter operations	CO4
7	Programs using serial port and on-chip timer	CO4

8	8051 Interfacing: Stepper Motor, DC motor	CO3 CO4
9	8051 Interfacing: LCD	CO3 CO4
10	8051 Interfacing: DAC (waveform generation)	CO3 CO4
11	AVR ATMEGA2560 Interface: 4 X 4 Dot Matrix Keypad, Voltage sensor, Current Sensor, Temperature sensor, IR sensor, PIR sensor, Ultrasonic sensor, Soil moisture sensor, Gas sensor.	CO3 CO4
12	AVR ATMEGA2560 Interface: Seven Segment, Relay, Opto-coupler with power switch drivers. Servo Motor, RS232, RF transceiver, ZigBee module.	CO3 CO4

Assessment Pattern:

CIE-Continuous Internal Evaluation Lab (50 Marks):

Blooms levels	CIE –LAB (50 Marks)	
	Assessment on Performance (20 Marks)	Internal Lab Examination (30 Marks)
Remember	-	-
Understand	2	2
Apply	10	20
Analyze	6	-
Evaluate	2	8
Create	-	-

SEE – Semester End Examination Lab (50 Marks):

Bloom's Taxonomy	External Lab Examination (50 Marks)
Remember	-
Understand	10
Apply	20
Analyze	20
Evaluate	-
Create	-

BASIC APPLIED MATHEMATICS-II

Course Code: 21DMAT41A   **Credits: 00**
L: T:P :S   : 0:0:0 :0   **CIE Marks : 5**
Exam Hours: 02   **SEE Marks: 50**

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

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

Mapping of Course Outcomes to Program Outcomes:

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

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

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

Text Books:

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

Reference Books:

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

Assessment Pattern:

  CIE- Continuous Internal Evaluation (50 Marks).

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

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

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

COMMUNICATIVE ENGLISH

Course Code: 21DAEC40A   Credits: 00
L: T: P : S: 0:0:0:0   CIE Marks   : 50
Exam Hours: SEE Marks   : 50
Course Outcomes: At the end of the Course, the student will be able to:

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

Mapping of Course Outcomes to Program Outcomes:

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

Module No	Module Contents	Hours	Cos
1	Self-introduction – Talking about self, ambition, hobbies, likes, dislikes, talents and achievements. Asking for and Giving Information (Pair work) **(SEE Task 1)** Asking question. (WH, Aux Verbs), Helping Verbs usage chart, question tags. Nouns, Pronouns	5	CO1
3	Describing people, things, actions, process **(SEE Task 2)** Describing on going actions Situational conversations, role plays Adjectives, Adverbs **Verbal Ability:** Sentence correction, Sentence completion.	5	CO1 CO2 CO4

4	**Listening Skills:** Importance of listening for effective communication Traits of a good listener Listening sub skills Listening to audio files of short stories, news, TV clips, Documentaries Gap filling exercise and Paraphrasing **Verbal Ability:** Common Errors in English 1 (articles, prepositions) Cloze Exercises	4	CO2 CO4
5	**Presentation Skills:** **Nonverbal Communication (Body Language):** Kinesics, Oculesics, Paralanguage. Overcoming stage fear, Organising a speech - Preparation, Practise, Delivery **Articulation of Ideas:** How to generate ideas and express them. Fluency development activities like comparing, expressing opinions, agreeing & disagreeing **(SEE Task 3)** Group Discussion	5	CO1,

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

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

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

Bloom's Category	Tests
Marks(out of 50)	-
Remember	10
Understand	10
Apply	20
Analyse	10
evaluate	-
create	-

SEE – Semester End Examination (50 Marks)

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

Syllabus for Common Subjects

ಆಡಳಿತ ಕನ್ನಡ

(Kannada for administration)

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

ಆಡಳಿತ ಕನ್ನಡ ಅಧ್ಯಯನದ ಕಲಿಕಾಂಶಗಳು

C01   ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಹಾಗೂ ಭಾಷಾ ರಚನೆ ನಿಯಮಗಳನ್ನು ಅರ್ಥೈಸಿಕೊಳ್ಳುತ್ತಾರೆ

C02   ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿನ ದೋಷಗಳು, ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಅರಿತುಕೊಳ್ಳುವರು

C03   ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ತಿಳುವಳಿಕೆ ಪಡೆಯುವರು

C04   ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಆಸಕ್ತಿ ವಹಿಸಿಕೊಳ್ಳುವರು

CO – PO Mapping:

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

ಪರಿವಿಧಿ (ಪಠ್ಯ ಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ –1 ಕನ್ನಡ ಭಾಷೆ–ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ

ಅಧ್ಯಾಯ –2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತುಅವುಗಳ ನಿವಾರಣೆ

ಅಧ್ಯಾಯ –3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ

ಅಧ್ಯಾಯ –4 ಪತ್ರ ವ್ಯವಹಾರ

ಅಧ್ಯಾಯ –5 ಆಡಳಿತ ಪತ್ರಗಳು

ಅಧ್ಯಾಯ –6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು

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

ಅಧ್ಯಾಯ –8 ಕನ್ನಡ ಶಬ್ದ ಸಂಗ್ರಹ

ಅಧ್ಯಾಯ –9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ

ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದ ಲೇಖಕರು

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

ಪರೀಕ್ಷೆಯ ವಿಧಾನ:

ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ (Continuous Internal Evaluation) : 50 ಅಂಕಗಳು

ಸೆಮಿಸ್ಟರ್ ಪರೀಕ್ಷೆ (Semester End Examination) : 50 ಅಂಕಗಳು

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

Vyavaharika Kannada (Kannada for use)

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

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

CO1   Understand Kannada Language.

CO2   Communicate in Kannada Language

CO3   Read simple Kannada words

CO4   Pronounce Kannada words correctly

CO – PO Mapping:

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

Syllabus

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

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

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

Chapter – 4: Kannada in Conversations (Sambhashaneyalli Kannada)

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

Text Book:

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

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

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

ENVIRONMENTAL SCIENCE

Course Code: 21HSS342A / 21HSS442A   **Credits: 1**
L: T: P: S: 1: 0: 0: 0   **CIE Marks: 50**
Exam Hours: 02 Hrs   **SEE Marks: 50**

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

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

Mapping of Course Outcomes to Program Outcomes:

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

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

Module No.	Content of Module	Hrs	Cos
1	**Introduction to Environment, Ecosystem and Biodiversity**: Environment: Definition, Components of Environment; Ecosystem: Types & Structure of Ecosystem, Energy flow in the ecosystem; Biodiversity: Types, Hot-spots, Threats and Conservation of biodiversity.	03	**CO1**

2	**Natural Resources:** Advanced Energy resources (Hydrogen, Solar, OTEC, Tidal and Wind), merits and demerits, Water resources – cloud seeding, Mineral resources, and Forest resources. Strategies of management, concept of sustainability.	03	**CO2**
3	**Environmental Pollution:** Definition, Causes, effects and control measures of Air Pollution, Water Pollution, soil Pollution and Noise pollution. Solid wastes and its management. Role of society, NGO and Govt. agencies in prevention of pollution.	03	**CO3**
4	**Global Environmental issues, Environment acts and amendments:** Fluoride problem in drinking water, Acid Rain**,** Ozone layer depletion, Global warming and climate change. National forest policy, Environmental laws and acts. International agreements and protocols.	03	**CO3 & CO4**
5	**Human Population and Environment Impact Assessment:** Population growth & explosion, Population pyramids. Negative impact of agriculture and urbanization, Role of Technology in protecting environment and human health. Environment Impact Assessment.	03	**CO4**

Text Books:

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

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

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

Reference Books:

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

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

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

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

CIE- Continuous Internal Evaluation (50 Marks):

Bloom's Category	Tests	Assignments	Seminar
Marks (Out of 50)	25 Marks	15 Marks	10 Marks
Remember	5	-	-
Understand	15	-	-
Apply	5	8	5
Analyze	-	7	5
Evaluate	-	-	-
Create	-	-	-

SEE – Semester End Examination (50 Marks):

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

Percentage Evaluation of Various Blooms' levels:

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

LIFE SKILLS FOR ENGINEERING

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

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

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

Mapping of Course Outcomes to Program Outcomes:

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

Module No.	Module Contents	Hours	CO'S
1	Goal Setting: Importance of Goals: Achiever's goal - Creating SMART for personal and professional life, Right action at right time, career planning, overcoming fear and face uncertainty, Mind Mapping. Communication – Intellectual preparation/Idea generation.	6	CO1,CO2
2	You are the creator - Taking Ownership, Being Responsible and Accountable. Meaning of Ownership, Responsibility and Accountability, Practicing these philosophies in course, career. Social responsibility. Communication – Organising thought flow.	6	CO2,CO5

3	Self-Awareness and Self-Management: Emotional Intelligence, know yourself- understanding personality, perception, techniques to understand self – Johari window and SWOT, reason for fall and opportunities to grow. Individual behaviour, attitude towards change and work in industry, being proactive and positive. Interpersonal skills - Knowing others, working well with others. Communication – Structured articulation	9	CO2,CO5
4	Leadership, meaning, self- motivation, coming out of comfort zone, mental preparation - accepting failure and resilience, decision making, thinking skills – critical and creative, six thinking hats, watchfulness - proactive risk management, problem solving mind set .Communication – Tips for Jam session, GD and Presentation	9	CO2,CO3
5	Personality Development and Grooming: - Expectations from the industry, building personal presence, corporate grooming, corporate etiquettes, Personal branding and image management. Communication – Mock GD sessions	6	CO2,CO4

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

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

SEE- Semester End Examination (50 Marks)

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

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

ENTREPRENEURSHIP DEVELOPMENT- 2

Course Code : 21HSS331A / 21HSS431A		**Credits** : 01	
L: T: P: S : 1:0:0:0		**CIE Marks** : 50	
Exam Hours : 2		**SEE Marks** : 50	

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

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

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	P02	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	3	0	0	0	3	1	2	0	0	0	1
CO2	0	3	0	0	0	3	1	2	0	0	0	0
CO3	0	3	0	0	0	3	1	2	0	0	0	0
CO4	0	3	0	3	0	3	1	2	0	0	0	3
CO5	0	3	0	3	0	3	1	2	0	0	0	3
CO6	0	3	0	3	0	3	1	2	0	0	0	3

Module No.	Contents of Module	Hrs	Cos
1	**Refining Problem and solution** Identify and refining the problem, Brainstorming Solutions, Problem-Solution Fit	3	CO1
2	**Blue ocean strategy** – Meaning, concept, Implementation	3	CO2

3	**Minimum Viable Product**- Meaning of MVP, ways to Build an MVP, Present Your MVP	**3**	**CO3**
4	**Business Model** - Cost Revenues and Pricing- concept, Business model- Lean Canvas – components, implementation	**3**	**CO4**
5	**Financing and Financial Model** - Bootstrapping meaning and concept and Initial Financing, Financial Model- concept and implementation	**3**	**CO5, CO6**

Suggested Case Studies :

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

   kent ro water purifier business idea case study | Business Idea from Children - YouTube

2. Red Bus Start up story Phanindra Sama: The RedBus journey - YouTube

Books for reference

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

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

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

Internal Assessment Pattern – 50 Marks

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

- VM1- Presentation- Forming team , Identifying problem , identifying solution (Module 1& 2)
- VM2- Presentation- Validate solution Identify customer segment , and early adopter, Create value proposition canvas ,(Module-3 & 4)
- VM3- Presentation -Create business plan using lean canvas (Module-5)

SEE- Semester End Examination (50 Marks)

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

CONSTITUTION OF INDIA AND PROFESSIONAL ETHICS

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

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

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

Mapping of Course Outcomes to Program Outcomes:

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

SYLLABUS			
Module No	**CONTENTS OF THE MODULE**	**Hours**	**COs**
1	**INTRODUCTION TO CONSTITUTION OF INDIA** Introduction to Constitution of India. The making and salient features of the constitution. The necessity of the constitution. The Role of the Constituent Assembly- Preamble to Indian constitution. Fundamental rights and its restrictions and Limitations. Decided case studies. Directive principles of state policy. Fundamental Duties and its Scope and significance in Nation building.	3	CO1

2	**UNION EXECUTIVE and STATE EXECUTIVE** Union Executive - President, prime minister, parliament and supreme court of India. Judicial activism and judicial review. Important parliamentary terminology. Center- state relations. Attorney General of India, Comptroller and Auditor General of India. State Executive- Governor, Chief Minister, State Legislature. High Court and Subordinate Court. Advocate General of the State. Controller and Auditor General of State. Special Provisions (Articles 370.371,371J) for some States.	**3**	**CO2**
3	**Amendments and Procedure, Elections and Emergency Provisions:** Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments – Types and Important Constitutional Amendments.Amendments-42,44,61,86,73,74,91,95,100,101,118. Emergency Provisions, types of Emergencies and its effects. **Special Provisions:** Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.	**3**	**CO3**
4	**ENGINEERING ETHICS:** Scope & aim of engineering ethics. Responsibility of engineers, Impediments to responsibility. Clash of ethics. Risk, safety and liability of Engineers. Trust and reliability in Engineering. IPR (Intellectual Property Right). Corporate Ethics.	**3**	**CO4**
5	**Internet Laws, Cyber Crimes and Cyber Laws:** Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types and causes for Cyber Crimes, Cyber Crimes land mark judgements in India and the information Technology Act 2000, Cybercrimes and enforcement agencies.	**3**	**CO5**

Text Books:

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

Reference Books:

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

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignment
Marks (out of 50)	25	25
Remember	10	10
Understand	10	10
Apply	5	5

SEE- Semester End Examination (50 Marks)

Bloom's category	SEE Marks (50)
Remember	20
Understand	20
Apply	10

Outcome Based Education

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

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

75
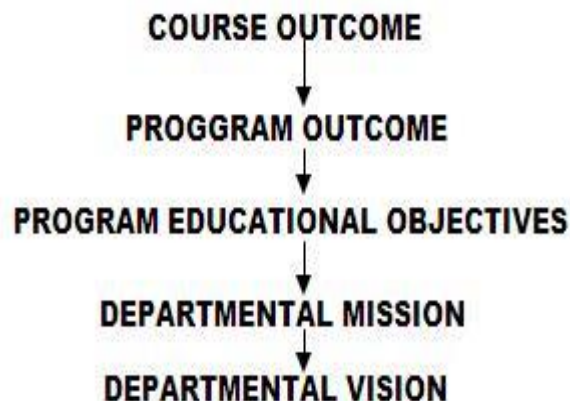
APPENDIX B

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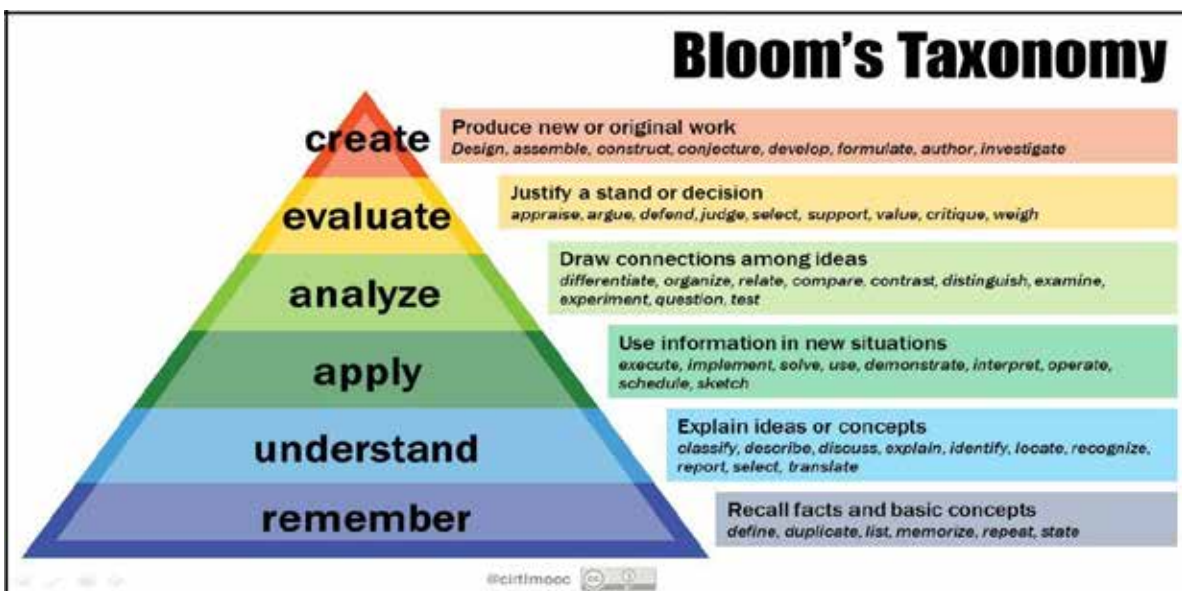
Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**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.

APPENDIX C

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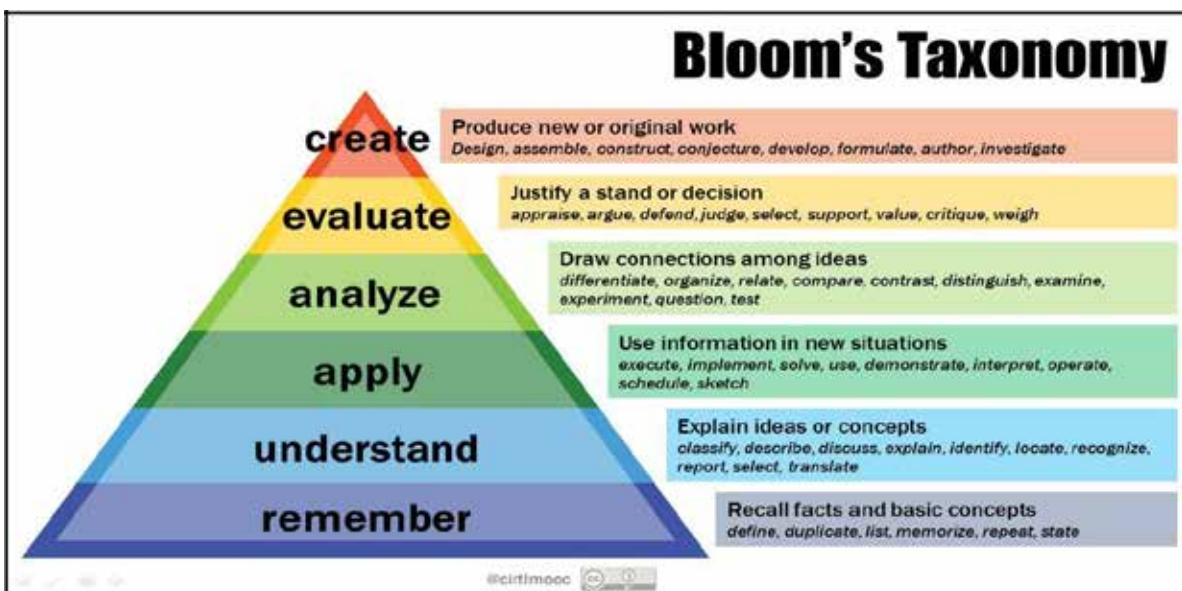
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