ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution
Vamanjoor, Mangaluru - 575028

Affiliated to VTU – Belagavi & Recognized by AICTE New Delhi
NBA – Accredited: B.E.(CSE,ECE,EEE, ME and CIV) & MBA
NAAC – Accredited with A+

B.E. SCHEME & SYLLABUS
(With effect from 2021-22)

Electrical & Electronics Engineering

SECOND YEAR
(III and IV Semester)

2022 - 2023

III Semester (B.E. – Electrical & Electronics Engineering)														
Sl. No.	**Course and Course Code**		**Course Title**	**Teaching Department**	**Paper Setting Board**	**Teaching Hours/Week**			**Examination**				**Credits**
						Theory Lecture	**Tutorial**	**Practical/ Drawing**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
						L	**T**	**P**					
1	BSC	21MAE301	Complex Functions, Transforms and Numerical Methods	MAT	MAT	2	2	-	03	50	50	100	3
2	PCC	21EEE302	Electric Circuit Analysis (Integrated Course)	EEE	EEE	3	-	2	03	50	50	100	4
3	PCC	21EEE303	Analog Electronic Circuits & Op-amps (Integrated Course)	EEE	EEE	3	-	2	03	50	50	100	4
4	PCC	21EEE304	Transformers and Generators	EEE	EEE	2	2	-	03	50	50	100	3
5	PCC	21EEL305	Transformers and Generators Laboratory	EEE	EEE	-	-	2	03	50	50	100	1
6	HSMC	21UHV306	Universal Human Values - II	COM		2	-	-	02	50	50	100	2
		21BFE306	Biology for Engineers	COM									
7	HSMC	21KBK307	Balake Kannada (Kannada for communication)/			--	2	--	02	50	50	100	1
		21KSK307	Saamskrutika Kannada (Kannada for Administration)										
		21CPC307	Constitution of India, Professional Ethics and Cyber Law			1	--	--					
8	SDC	21IEP308	IoT Enabled Prototyping	COM		-	-	2	03	50	50	100	1
9	SDC	21IOT309	Industry Oriented Training – Business Etiquettes	COM		-	-	2	02	50	-	50	-
					Total	12 **OR** **13**	6 **OR** **4**	10	24	**450**	**400**	**850**	**19**
10	HSMC	21ENG310	Business Communication	ENG		-	2	-	02	50	50	100	-
11	MNCC	21MAL301	Additional Mathematics- I	MAT	MAT	2	1	-	03	50	50	100	-

IV Semester (B.E. - Electrical & Electronics Engineering)													
SI. No.	**Course and Course Code**		**Course Title**	**Teaching Department**	**Paper Setting Board**	**Teaching Hours/Week**			**Examination**				**Credits**
						Theory Lecture	**Tutorial**	**Practical /Drawin**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
						L	**T**	**P**					
1	BSC	21MAE401	Linear Algebra & Statistical Methods	MAT	MAT	2	2	-	03	50	50	100	3
2	PCC	21EEE402	Digital System Design (Integrated Course)	EEE	EEE	3	-	2	03	50	50	100	4
3	PCC	21EEE403	Microcontrollers (Integrated Course)	EEE	EEE	3	-	2	03	50	50	100	4
4	PCC	21EEE404	Electric Motors	EEE	EEE	2	2		03	50	50	100	3
5	PCC	21EEL405	Electric Motors Laboratory	EEE	EEE	-	-	2	03	50	50	100	1
6	UHV	21UHV406	Universal Human Values – II	COM		2	-	-	02	50	50	100	2
	HSMC	21BFE406	Biology for Engineers	COM									
7	HSMC	21KBK407	Balake Kannada (Kannada for communication)/			-	2	--	--	50	50	100	1
		21KSK407	Saamskrutika Kannada (Kannada for Administration)										
		21CPC407	Constitution of India, Professional Ethics and Cyber Law			1	--	--					
8	SDC	21CTE408	Computational Tools for Engineers	COM		-	-	2	03	50	50	100	1
9	SDC	21IOT409	Industry Oriented Training – Computing Skills	COM		-	-	2	02	50	-	50	-
10	INT	21INT410	Summer Internship - I						03	50	50	100	2
					Total	12 OR **13**	6 OR **4**	10	19	**500**	**450**	**950**	**21**
11	HSMC	21ENG410	Business Communication	ENG		-	2	-	02	50	50	100	-
12	MNCC	21MAL401	Additional Mathematics- II	MAT	MAT	2	1	-	03	50	50	100	-

Note: BSC: Basic Science Courses; ESC: Engineering Science Courses; HSMC: Humanity, Social Science and Management Courses; MNCC = Mandatory Non-Credit Course. INT: Internship, PCC: Professional Core Course; PEC = Professional Elective Course; OEC = Open Elective Course; UHV: Universal Human Values SDC: Ability Enhancement (Skill Development) Course.

One-hour Lecture (L) per week per semester = 1 Credit Two-hour Tutorial (T) per week per semester = 1 Credit Two-hour Practical/Laboratory/Drawing (P) per week per semester = 1 Credit Four hours of Self-study = 1 Credit.

Summer Internship-II: All the students admitted shall have to undergo mandatory internship of minimum 04 weeks during the IV and V semester vacation. Summer Internship shall be Carried Out – based on industrial/ Govt./NGO /MSME/ Rural Internship /Innovation/Entrepreneurship, Credited in V Semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during subsequent examination after satisfying the internship requirements.

21KBK307/407 Balake Kannada (Kannada for communication) is prescribed for students who have not studied Kannada at any level of schooling (State/Central-CBSC/ICSE) and are not able to speak, write, read and understand Kannada.
21KSK307/407 Saamskrutika Kannada (Kannada for Administration) is prescribed for students who satisfy any one of the following. i. Studied 1 – 10th standard in Kannada medium ii. Studied Kannada as first or second language during high school and cleared SSLC examination iii. Studied Kannada at any level of schooling and are able to speak, write and read Kannada. iv. Passed diploma or certificate course in Kannada conducted by a university established by law in India v. Passed Kava, Jana and Rathna examinations conducted by Kannada Sahithya Parishat vi. Passed the SSLC examination or any other examination declared as equivalent thereto by the state government or any examinations higher than SSLC examination a) in which the question papers on different subjects are answered in Kannada language or b) in which Kannada was the main or second language or an optional subject but not one of the subjects in a composite paper.

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs:
(a)The mandatory non – credit courses Additional Mathematics I and Business Communication prescribed for III semester and Additional Mathematics II prescribed for IV semester, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the students have to fulfil the requirements during subsequent semester/s to appear for SEE. (b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

Courses prescribed to lateral entry B. Sc degree holders admitted to III semester of Engineering programs:
Lateral entrant students from B.Sc. Stream, shall clear the Mandatory non-credit courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE Activity Points to be earned by students admitted to BE/B.Tech Day College Programs:
Over and above the academic grades, every student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to fifth semester are required to earn 50 Activity Points from the year of entry. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, minimum hours' requirement should be fulfilled. Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, Eighth Semester Grade Card shall be issued only after earning the required Activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

SEMESTER –III

Complex Functions, Transforms and Numerical Methods

(Common to ECE & EEE)

Course Code	**21MAE301**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To have an insight into Fourier series, Fourier transforms, Difference equations and Z-transforms.
2. To provide an insight into applications of complex variables, conformal mapping and special functions arising in potential theory, quantum mechanics, heat conduction and field theory.
3. To get proficiency in solving ODE's arising in engineering applications, using numerical methods.

Module-1

Calculus of complex functions: Review of function of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms and properties of analytic functions (no proof). Construction of analytic functions: Milne-Thomson method-Problems. **8 Hours**

Module-2

Conformal transformations: Introduction. Discussion of transformations:
$\omega = z^2$, $\omega = e^z$, $\omega = z + \frac{1}{z}$ $(z \neq 0)$

Bilinear transformations- Problems.
Complex integration: Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems. **8 Hours**

Module-3

Fourier Series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2l. Half range Fourier series for arbitrary period. Practical harmonic analysis, examples from the engineering field. **8 Hours**

Module-4

Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Simple problems.
Difference Equations and Z-Transforms: Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules (statement only). Inverse z-transform (by partial fraction method) and applications to solve difference equation. **8 Hours**

Module-5

Numerical solution of second order ordinary differential equations:
Runge Kutta Method of 4^{th} order and Milne's predictor & corrector formulae. (No derivations of formulae).
Numerical Integration: Trapezoidal rule, Simpson's (1/3)th and (3/8)th rules, Weddle's rule (without proof) –Application Problems. **8 Hours**

Course Outcomes: At the end of the course the student will be able to:	
21MAE301.1	Model the given problems related to the electromagnetic field and solve using the concept of complex analysis.
21MAE301.2	Utilize conformal transformation and complex integral in problems arising in aero foil theory, fluid flow visualization and image processing.
21MAE301.3	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
21MAE301.4	Evaluate Fourier transform and Z-transform to illustrate discrete/continuous functions arising in wave and heat propagation, signals, and systems.
21MAE301.5	Solve second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods
21MAE301.6	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

Question paper pattern:

Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44th Edition., 2017.
Reference Books				
1	Advanced Engineering Mathematics	C.Ray Wylie, Louis C.Barrett	McGraw- Hill Book Co., New York.	6th Edition, 2017
2	Introductory Methods of Numerical Analysis	S.S.Sastry	Tata McGraw-Hill, Publication	11th Edition,2017
3	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw-Hill Publication	11th Edition,2016
4	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10th Edition. (Reprint), 2017.
5	Advanced Engineering Mathematics	H. C. Taneja	I.K. International Publishing House Pvt.	Ist Edition,2013

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO12
21MAE301.1		3	1									
21MAE301.2	3	1										
21MAE301.3		1	3									
21MAE301.4	2	2										
21MAE301.5		3	1									
21MAE301.6		3	1									

1: Low 2: Medium 3: High

ELECTRIC CIRCUIT ANALYSIS			
Course Code	21EEE302	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. To apply the basic laws and network theorems to analyse electrical circuits.
2. To analyse series and parallel resonance circuits.
3. To understand the behaviour of switching transients in electric circuits.
4. To impart basic knowledge on network analysis using Laplace transforms.
5. To determine the parameters of two port networks.
6. To simulate electric circuits and verify theoretical results.

Module-1 **8 Hours**

Basic Concepts: Concept of ideal and practical sources. Concept of Super-Mesh and Super node analysis. Analysis of networks by (i) Network reduction method including star – delta transformation, (ii) Mesh and Node voltage methods for AC and DC circuits with independent and dependent sources.

Module-2 **8 Hours**

Network Theorems: Super Position theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem and Millman's theorem. Analysis of networks, with and without dependent AC and DC sources

Module-3 **8 Hours**

Resonant Circuits: Analysis of simple series RLC and parallel RLC circuits under resonances. Problems on Resonant frequency, Bandwidth and Quality factor at resonance

Transient Analysis: Transient analysis of RL and RC circuits under DC excitations: Behavior of circuit elements under switching action, Evaluation of initial conditions

Module-4 **8 Hours**

Laplace Transformation: Laplace transformation (LT), LT of Impulse, Step, Ramp, Sinusoidal signals and shifted functions. Waveform synthesis. Initial and Final value theorems. Transfer function and Pole-zero Diagram. Solutions of networks using LT.

Module-5 **8 Hours**

Two Port Networks: Definition, Open circuit impedance, Short circuit admittance and Transmission parameters and their evaluation for simple circuits, relationships between parameter sets.

List of Laboratory Experiments related to above modules – 2 hours each

1. Verification of Thevenin's theorem
2. Verification of Norton's theorem.
3. Verification of Superposition theorem.
4. Verification of Maximum Power transfer Theorem.
5. Measurement of time constant of an RC circuit.
6. Determination of Transfer Function and frequency response of RLC circuit
7. Determination of resonant frequency, bandwidth, and Q of a series circuit & parallel circuit.
8. Determination of Open circuit impedance and Short circuit admittance parameter of a given two port network.
9. Analyze and determine circuit parameters for electric circuit.

Course Outcomes:

At the end of the course the student will be able to:

21EEE302.1	Solve complex electric circuits using basic concepts of network theory.
21EEE302.2	Solve complex electric circuits using network theorems.
21EEE302.3	Analyse the resonance and transient behaviour of electric circuit.

21EEE302.4	Analyze electric circuit using Laplace transformation.
21EEE302.5	Demonstrate the use of two port network parameters.
21EEE302.6	Simulate electric circuit using modern software tools.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Engineering Circuit Analysis	William H Hayt et al	McGraw Hill	8th Edition, 2014.
2	Network Analysis	M.E.Vanvalkenburg	Pearson	3rd Edition, 2014
3	Fundamentals of Electric Circuits	Charles K Alexander Matthew N O Sadiku	McGraw Hill	3rd Edition, 2013
Reference Books				
1	Engineering Circuit Analysis	J David Irwin et al	Wiley India	10th Edition, 2014
2	Electric Circuits	Mahmood Nahvi	McGrawHill	5th Edition, 2009
3	Introduction to Electric Circuits	A. Richard C Dorf and James A Svoboda	Wiley	9th Edition, 2015

Web links/Video Lectures/MOOCs/papers

1. https://nptel.ac.in/courses/108/105/108105159/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE302.1					2									
21EEE302.2					3									
21EEE302.3										1				
21EEE302.4		1								2				
21EEE302.5		2												
21EEE302.6													3	

1: Low 2: Medium 3: High

ANALOG ELECTRONIC CIRCUITS & OP-AMPS			
Course Code	21EEE303	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. Apply knowledge of diodes and BJTs to perform wave shaping and AC analysis.
2. Develop skills to design the electronic circuits like amplifiers and oscillators.
3. To understand op-amp configurations and their applications.
4. To understand the working of op-amps as active filters and comparators
5. To illustrate the applications of PLL, timers and voltage regulators.

Module-1 **8 Hours**

Diode Applications: Clipper and clamper circuits, voltage multiplier circuits.
Simulation of clippers and clamper circuits
BJT - AC Analysis: Introduction, BJT transistor modelling, CE fixed bias configuration, voltage divider bias, emitter follower, CB configuration, collector feedback configuration, analysis using h – parameter model.

Module-2 **8 Hours**

Power amplifiers: Amplifier types, Series Fed Class A amplifier, Transformer Coupled Class A amplifier, Class B amplifier.
Self – Study: Class C, Class D amplifiers
Feedback amplifiers: Feedback concept, different types, practical feedback circuits.

Module-3 **8 Hours**

Op-Amp Configurations: Op-amp with negative feedback, voltage series feedback amplifier, voltage shunt feedback amplifier (excluding derivations).
Op-amp Applications: AC Amplifiers with single supply, peaking amplifier, precision rectifiers
Self – Study: Instrumentation Amplifier

Module-4 **8 Hours**

Comparators & Converters: Basic comparator, zero crossing detector, inverting & non-inverting Schmitt trigger circuit, voltage to current converter with grounded load, current to voltage converter and basics of voltage to frequency and frequency to voltage converters.
Simulation of Schmitt Trigger Circuits
Active Filters: Introduction, First order Low pass & high pass filter, Bandpass filter, all pass filter.

Module-5 **8 Hours**

Phase Locked Loop (PLL): Basic PLL, components, performance factors.
Timer: Mono stable and astable operation using 555 timer
Self – Study: Applications of 555 timers
DC Voltage Regulators: voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators.

List of Laboratory Experiments related to above modules – 2 hours each

1. Frequency response of single stage BJT RC coupled amplifier.
2. Frequency response of an op-amp inverting and non-inverting amplifier.
3. Precision half wave and full wave rectifiers.
4. Operation of op-amp as voltage comparator and zero crossing detector.
5. Frequency response of an op-amp based low pass, high pass and band pass filters.
6. Operation of op-amp as RC phase shift oscillator.
7. Design and realization of R-2R ladder DAC.
8. Fixed and variable power supplies using ICs
9. Applications of IC 555 timer in home automation.

Course Outcomes:

At the end of the course the student will be able to:

21EEE303.1	Design and analyze the diode circuits for wave shaping.

21EEE303.2	Analyze the power amplifier circuits and oscillator circuits for different range of frequencies.
21EEE303.3	Demonstrate the knowledge of transistor amplifiers, feedback amplifier circuits for sustainable development of real time applications.
21EEE303.4	Apply the standards of electronic laboratory practices for the usage of signal processing circuits, signal generators, comparators, converters, based on data sheets.
21EEE303.5	Recognize the need for usage of Phase Locked Loops, 555 timers and their applications in open ended projects.
21EEE303.6	Simulate linear integrated circuits based on operational amplifiers using modern software tools like Multisim®.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electronic Devices and Circuit Theory	Robert L Boylestad, Louis Nashelsky	Pearson	11th Edition, 2015
2	Op-Amps and Linear Integrated Circuits	Ramakant A Gayakwad	Pearson	4th Edition, 2015
3	Operational Amplifiers and Linear ICs	David A. Bell	Oxford	3rd Edition 2011
Reference Books				
1	Electronic Devices and Circuits	Millman and Halkias	Mc Graw Hill	4th Edition, 2015
2	Electronic Devices and Circuits	David A Bell	Oxford University Press	5th Edition, 2008
3	Microelectronics Circuits Analysis and Design	Muhammad Rashid	Cengage Learning	2nd Edition, 2014
4	Linear Integrated Circuits; Analysis, Design and Applications	B. Somanthan Nair	Wiley India	2013
5	Linear Integrated Circuits	S. Salivahanan, et al	McGraw Hill	2nd Edition, 2014
6	Operational Amplifiers and Linear Integrated Circuits	K. Lal Kishore	Pearson	1st Edition, 2012

Web links/Video Lectures/MOOCs

1. https://nptel.ac.in/courses/108106068
2. https://nptel.ac.in/courses/108106084

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE303.1				2										
21EEE303.2				1										
21EEE303.3							1							
21EEE303.4								2						
21EEE303.5												1		
21EEE303.6													3	

1: Low 2: Medium 3: High

TRANSFORMERS AND GENERATORS			
Course Code	21EEE304	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To understand the concepts of transformers and their analysis.
2. To suggest a suitable three phase transformer connection for a particular operation.
3. To understand the concepts of generator and to evaluate their performance.
4. To explain the requirement for the parallel operation of transformers and synchronous generators.

Module-1 **8 Hours**

Single phase Transformers: Operation of practical transformer under no-load and on-load with phasor diagrams. Open circuit and Short circuit tests, calculation of equivalent circuit parameters and predetermination of efficiency-commercial and all-day efficiency. Voltage regulation and its significance.

Three-phase Transformers: Introduction, Constructional features of three-phase transformers. Choice betweensingle unit three-phase transformer and a bank of three single-phase transformers. Transformer connection for three phase operation– star/star, star/delta and V/V, comparative features. Phase conversion-Scott connection for three-phase to two-phase conversion. Labeling of three-phase transformer terminals

Self-Study: Three-Winding Transformers & Cooling of Transformers: Three-winding transformers. Cooling of transformers.

Module-2 **8 Hours**

Tests, Parallel Operation of Transformer& Auto Transformer: Polarity test, Sumpner's test, separation of hysteresis and eddy current losses

Parallel Operation of Transformers: Necessity of Parallel operation, conditions for parallel operation– Singlephase and three phase. Load sharing in case of similar and dissimilar transformers.

Auto transformers and Tap changing transformers: Introduction to autotransformer-copper economy.

Self-Study: Tap changing transformers: On load tap changing transformers.

Module-3 **8 Hours**

Direct Current Generator: Armature reaction, Commutation and associated problems,

Synchronous Generators: Armature windings, winding factors, e.m.f equation. Harmonics–causes, reduction and elimination. Synchronous reactance, Equivalent circuit. **08 Hours**

Module-4 **8 Hours**

Synchronous Generators Analysis: Alternator on load. Excitation control for constant terminal voltage. Voltage regulation. Open circuit and short circuit characteristics, Assessment of reactance-short circuit ratio, synchronous reactance, Voltage regulation by EMF, MMF and ZPF

Module-5 **8 Hours**

Synchronous Generators (Salient Pole): Effects of saliency, Parallel operation of generators and load sharing. Methods of Synchronization, Synchronizing power, Determination of X_d & X_q – slip test

Performance of Synchronous Generators: Power angle characteristic (power angle equation for salient and non-salient pole), Capability curve for large turbo generators. Hunting and damper windings.

Course Outcomes:

At the end of the course the student will be able to:

21EEE304.1	Design a solution using transformers for distribution substations.
21EEE304.2	Design a solution to install a three phase Alternator for a low power hydel generating station.

21EEE304.3	Analyze the performance parameters of transformers to evaluate the safety and environmental constraints near distribution substations.
21EEE304.4	Analyze the performance parameters of generators to evaluate the safety and environmental constraints near low power hydel generating station.
21EEE304.5	Demonstrate knowledge of transformers and generator operation, working in a team for commissioning /maintenance of low power hydel generating station.
21EEE304.6	Develop entrepreneurial skills in commissioning/maintenance of transformers and generators in low power hydel generating station.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electric Machines	D. P. Kothari, et al	McGraw Hill	4th Edition, 2011
2	Principals of Electrical Machines	V.K Mehta, Rohit Mehta	S Chand	2nd Edition, 2009
Reference Books				
1	Electric Machines	Ashfaq Hussain	Dhanpat Rai & Co	2004
2	Electrical Machinery	Dr. P.S. Bhimbra	Khanna Publications	7th Edition, 2007.
3	Theory and performance of Electrical Machines	J.B. Gupta	S.K. Kataria and sons-New Delhi	2013

Web links/Video Lectures/MOOCs

1. https://nptel.ac.in/courses/108105017
2. https://nptel.ac.in/courses/108106072

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE304.1			2											
21EEE304.2			1											
21EEE304.3						2								
21EEE304.4						1								
21EEE304.5											2			
21EEE304.6														2

1: Low 2: Medium 3: High

TRANSFORMERS AND GENERATORS LABORATORY			
Course Code	21EEL305	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	**01**	Exam Hours	03

Course Learning Objectives:

1. Conducting of different tests on transformers and synchronous machines and evaluation of their performance.
2. Verify the parallel operation of two single phase transformers.
3. Study the connection of single-phase transformers for three phase operation and phase conversion.
4. Study of synchronous generator connected to infinite bus.

Sl. No	Experiments
1.	Open Circuit and Short circuit tests on single phase step up or step down transformer and pre determination of (i) Efficiency and regulation (ii) Calculation of parameters of equivalent circuit.
2.	Sumpner's test on similar transformers and determination of combined and individual transformer efficiency.
3.	Parallel operation of two dissimilar single-phase transformers of different kVA and determination of load
4.	Polarity test and connection of 3 single-phase transformers in star – delta and determination of efficiency and regulation under balanced resistive load.
5.	Connection of 3 single-phase transformers in delta – delta and V – V (open delta) connection under load and determination of efficiency and regulation under balanced resistive load.
6.	Scott connection with balanced and unbalanced loads.
7.	Separation of hysteresis and eddy current losses in single phase transformer.
8.	Voltage regulation of an alternator by EMF, MMF and ZPF methods
9.	a. Load test on DC Generators. b. Open circuit test on DC generator to calculate the load characteristics.
10.	Power angle curve of synchronous generator or Direct load test on three phase synchronous generator to determine efficiency and regulation

Course Outcomes:

At the end of the course the student will be able to:

21EEL305.1	Design an experimental solution to test the performance parameters of transformers used in distribution substations.
21EEL305.2	Design an experimental solution to test the performance parameters of three phase Alternator used in low power hydel generating station.
21EEL305.3	Analyze the performance parameters of transformers from test data to evaluate the safety and environmental constraints near distribution substations.
21EEL305.4	Analyze the performance parameters of Alternator from test data to evaluate the safety and environmental constraints near low power hydel generating station.
21EEL305.5	Function effectively as a member of diverse team to demonstrate the knowledge on testing of power transformers and DC Generators.
21EEL305.6	Function effectively as a member of diverse team to demonstrate the knowledge on testing of Alternators.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electric Machines	D. P. Kothari, et al	McGraw Hill	4th Edition, 2011
2	Principals of Electrical Machines	V.K Mehta, Rohit Mehta	S Chand	2nd Edition, 2009
Reference Books				
1	Electric Machines	Ashfaq Hussain	Dhanpat Rai & Co	2004
2	Electrical Machinery	Dr. P.S. Bhimbra	Khanna Publications	7th Edition, 2007.
3	Theory and performance of Electrical Machines	J.B. Gupta	S.K. Kataria and sons-New Delhi	2013

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEL305.1			3											
21EEL305.2			2											
21EEL305.3						3								
21EEL305.4						2								
21EEL305.5									3					
21EEL305.6									1					

1: Low 2: Medium 3: High

Universal Human Values- II			
Course Code	**21UHV306/406**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:0)	SEE Marks	50
Credits	**02**	Exam Hours	02

Course Learning Objectives:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement toward value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Module-1

Introduction to Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.

Activities: Sharing about Oneself, Exploring Human Consciousness and Exploring Natural Acceptance. **5 hours**

Module-2

Harmony in the Human Being

Understanding Human beings as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

Activities: Exploring Sources of Imagination in the Self, Exploring Harmony of Self with the Body and Exploring the difference of Needs of Self and Body. **5 hours**

Module 3

Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

Activities: Exploring the Feeling of Trust, Exploring the Feeling of Respect and Exploring the Feeling systems to fulfil Human Goal. **5 hours**

Module-4

Harmony in the Nature/Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Activities: Exploring the Four Orders of Nature and Co-existence in Existence **3 hours**

Module-5
Implications of the Holistic Understanding – a Look at Professional Ethics Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession Activities: Exploring Ethical Human Conduct**,** Humanistic Models in Education and steps of Transition towards Universal Human Order **5 hours**

Course Outcomes: At the end of the course the student will be able to:	
21UHV306.1	Practice the method of self-exploration to understand the basic human aspiration.
21UHV306.2	Distinguish between needs of self and body.
21UHV306.3	Evolve a program for self-regulation and health.
21UHV306.4	Differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them
21UHV306.5	Realize sustainable solutions to the problems in society and nature
21UHV306.6	Develop competence in professional ethics and strategies for the transition towards a value-based life/profession

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Text Books				
1	Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books, New Delhi	2, 2019
2	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	Excel Books, New Delhi	2, 2019
Reference Books				
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	Jeevan Vidya Prakashan, Amarkantak	1999
2	Human Values	A.N. Tripathi	New Age Intl. Publishers, New Delhi	2004

Web links/Video Lectures/MOOCs/papers

1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
3. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
4. Economy of Permanence - J C Kumarappa
5. Bharat Mein Angreji Raj – Pandit Sunderlal
6. Rediscovering India - by Dharampal

7. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
8. India Wins Freedom - Maulana Abdul Kalam Azad
9. Vivekananda - Romain Rolland (English)
10. Gandhi - Romain Rolland (English)

11. UHV-I Teaching material (Presentations, Pre & Post Surveys etc.)
https://fdp-si.aicte-india.org/AicteSipUHV_download.php

12. Details of UHV-II: Universal Human Values – Understanding Harmony and Ethical Human Conduct
https://drive.google.com/file/d/1cznDaqDwKy__EKWmqJLWF94MeY4AXcsU/view?usp=sharing

13. Recorded FDP (Refresher 1 Part 1: Preparing to teach UHV-I in SIP)
https://www.youtube.com/watch?v=kejuD4faDDE&list=PLWDeKF97v9SOjS4RanhaYj4YLiImqm5pj&index=1

14. Resources, including the class notes and presentations
https://drive.google.com/drive/folders/1nh9m5ibEtvMyqekeiexAJtfbdNtmtt6-?usp=sharing

15. Hindi Recording of 5-day UHV FDP
https://www.youtube.com/playlist?list=PLWDeKF97v9SMRfe5PK1HPYnEcrrJOL6K7

16. English Recording of 5-day UHV FDP
https://www.youtube.com/playlist?list=PLWDeKF97v9SP7wSlapZcQRrT7OH0ZlGC4

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21UHV306.1						2			3	2				
21UHV306.2						3	3							
21UHV306.3	2								3			2		
21UHV306.4						3	3	3						
21UHV306.5	2					2			3					
21UHV306.6						3	3			2				

1: Low 2: Medium 3: High

Biology for Engineers			
Course Code	**21BFE306/406**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:0)	SEE Marks	50
Credits	**02**	Exam Hours	02

Course Learning Objectives:

1. To bring awareness of biological concepts to engineering students
2. To introduce the building blocks of life and their complexity
3. To encourage interdisciplinary studies and projects
4. To appreciate the discoveries that mimic nature and its working
5. To inculcate nature-inspired design and operational principles

Module-1

Basic Cell Biology: Introduction to Biology, The cell: the basic unit of life, Expression of genetic information-protein structure and function, Cell metabolism; Cells respond to their external environments, Cells grow and reproduce, Cellular differentiation. **5 Hours**

Module-2

Biochemistry and Molecular Aspects of Life: Biodiversity-Chemical bonds in Biochemistry; Biochemistry and Human biology, Protein synthesis -DNA; RNA, Transcription and translation factors play key roles in protein synthesis, Differences between eukaryotic and prokaryotic protein synthesis, Stem cells and their applications. **5 Hours**

Module-3

Bioinspired Engineering based on human physiology: Circulatory system (artificial heart, pacemaker, stents), Nervous system (Artificial neural network), Respiratory system, sensory system (electronic nose, electronic tongue), Visual and auditory prosthesis (Bionic eye and cochlear implant).

5 Hours

Module-4

Relevance of Biology as an interdisciplinary approach: Biological observation that led to major discoveries, Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf), Bird flying (aircraft), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro). **5 Hours**

Module-5

Bioinspired Algorithms and Applications: Genetic algorithm, Gene expression modelling, Parallel Genetic Programming: Methodology, History, and Application to Real-Life Problems, Dynamic Updating DNA Computing Algorithms, Bee-Hive: New Ideas for Developing Routing Algorithms Inspired by Honey Bee Behaviour. **5 Hours**

Course Outcomes:

At the end of the course the student will be able to:

21BFE306.1	Discuss how the cell forms the basic building block of life
21BFE306.2	Distinguish between transcription and translation
21BFE306.3	Describe the role played by proteins within the cell
21BFE306.4	Analyze the role of bioinspired design in novel applications
21BFE306.5	Apply bioinspired design principles to other domains
21BFE306.6	Implement a simple genetic algorithm

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1	Biology for Engineers	Thyagarajan.S., Selvamurugan. N., Rajesh.MP, Nazeer RA, Richard W. Thilagaraj, Barathi.S., and Jaganthan.M.K	Tata McGraw Hill	2012
2	Molecular Biology	Robert Weaver	McGraw-Hill	5, 2012
Reference books				
1	Lewin's Genes XII	Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick	Jones and Bartlett Learning	2017
2	Bioinspired Engineering	Jenkins, C.H.	Momentum Press	2012
3	Bio mimetics: Nature-Based Innovation	Yoseph Bar-Cohen	CRC Press	1, 2016
4	A Practical Guide to Bio-inspired Design	Hashemi Farzaneh, Helena, Lindemann, Udo,	Springer	2019

Web links/Video Lectures/MOOCs/papers

1. https://books.google.co.in/books?id=-2LNBQAAQBAJ&printsec=frontcover#v=onepage&q&f=false
2. https://www.aminotes.com/2017/02/biology-for-engineers-module-1-cocepts.html

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21BFE306.1	2					1								
21BFE306.2		1				1								
21BFE306.3	2					2								
21BFE306.4		2										2		
21BFE306.5	2											2		
21BFE306.6		2										2		

1: Low 2: Medium 3: High

Balake Kannada			
Course Code	**21KBK307/407**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50
Credits	**01**	Exam Hours	02

Course Learning Objectives:

1. To enable the students to understand, speak, read and write the Kannada language.
2. To communicate in the Kannada language in their daily life with Kannada speakers
3. To give the overall information about the Kannada language and Karnataka state

Module- 1	
Kannada Aksharamaale haagu Uchchaarane (Kannada Alphabets and Pronunciation)	**3 hours**
Module-2	
Sambhashanegaagi Kannada Padagalu (Usage of Kannada Words in General Communication and Vocabulary)	**3 hours**
Module-3	
Sambhashaneyalli Kannada (Usage of Kannada in the proper manner - in Kannada Conversation)	**3 hours**
Module-4	
Kannadadalli Chatuvatikegalu (Activities related to the Kannada Language - Development of Skill vocabulary)	**3 hours**
Module-5	
Karnataka raajya, Kannada Bhashe, Saahithyada bagege Maahithi (Information about the Karnataka State, Kannada Language and Literature)	**3 hours**

Course Outcomes:

At the end of the course the student will be able to:

21KBK307.1	Write and read the Kannada alphabet
21KBK307.2	Communicate Kannada fluently
21KBK307.3	Communicate in Kannada in his day-to-day life
21KBK307.4	Build confidence to address large gatherings
21KBK307.5	Develop skills, vocabulary and fluency
21KBK307.6	Make use of state language and literature

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Balake Kannada	Dr L Thimmesha	Prasaranga VTU Belagavi	1st Edition. 2020
2	Vyavaharika Kannada	Dr L Thimmesha, Prof V Keshavamoorthy	Prasaranga VTU Belagavi	1st Edition. 2020
Reference Books				
1	Kannada Kali	Lingadevaru Halemane	Kannada University Hampi	Fourth Edition 2016
2	Spoken Kannada	N. D Krishnamurthy, Dr S. M. Rameshchandra Swamy, Abdul Rehman Pasha	Kannada Sahithya Parishat	2018

Web links/Video Lectures/MOOCs/papers

1. https://youtu.be/daY6TRvHFB4
2. https://youtu.be/RuRmq7VyCaQ

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21KBK307.1	2									2				
21KBK307.2	2									2				
21KBK307.3	2									2				
21KBK307.4	2									2				
21KBK307.5	2									2				
21KBK307.6	2									2				

1: Low 2: Medium 3: High

Saamskruthika Kannada			
Course Code	**21KSK307/407**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50
Credits	**01**	Exam Hours	02

Course Learning Objectives:

1. ಕನ್ನಡ ಸಾಹಿತ್ಯ , ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು ನುಡಿಯ ಪರಿಚಯ
2. ಕನ್ನಡದಲ್ಲಿ ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನಗಳ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವಿಷಯಗಳ ಪರಿಚಯ
3. ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ , ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತದ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ
4. ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು
5. ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಅವುಗಳ ನಿವಾರಣೆ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳ ಪರಿಚಯ
6. ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರ ವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು

Module-1

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ; ಹಂಪ ನಾಗರಾಜಯ್ಯ
2.ಕನ್ನಡ ನಾಡು ನುಡಿ
3.ಕನ್ನಡ ಭಾಷೆ – ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ **3 Hours**

Module-2

4.ಕಾವ್ಯ ಭಾಗ- ಆಧುನಿಕ ಪೂರ್ವ
(ವಚನಗಳು, ಕೀರ್ತನೆಗಳು, ತತ್ವಪದಗಳು,ಜನಪದ ಗೀತೆ)
5. ಕಾವ್ಯ ಭಾಗ – ಆಧುನಿಕ
(ಡಿ ವಿ ಜಿ, ದ.ರಾ.ಬೇಂದ್ರೆ, ಕುವೆಂಪು, ಕೆ.ಎಸ್. ಎನ್, ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ, ಚಂದ್ರಶೇಖರ ಕಂಬಾರ, ಸಿದ್ಧಲಿಂಗಯ್ಯ) **3 Hours**

Module-3

6.ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ
7. ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ
8. ಪತ್ರವ್ಯವಹಾರ - ಆಡಳಿತ ಪತ್ರಗಳು; ಸಾಮಾನ್ಯ, ಸಾರ್ಕಾರಿ ಪತ್ರಗಳು, ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು **3 Hours**

Module-4

9. ಡಾ.ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ –ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ ; ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
10. ಯುಗಾದಿ; - ವಸುಧೇಂದ್ರ **3 Hours**

Module-5

ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ
11. “ಕ” ಮತ್ತು “ಬ” ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕನ್ನಡ ಟೈಪಿಂಗ್
12. ಕನ್ನಡ – ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ
13. ತಾಂತ್ರಿಕ ಪದಕೋಶ –ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು **3 Hours**

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

21KSK307.1	**ಕನ್ನಡ ನಾಡು ನುಡಿಯ ಅರಿವು ಹಾಗೂ ಸಂಸ್ಕೃತಿಯ ಹರಿವು**
21KSK307.2	**ಕವಿ ಕಾವ್ಯಗಳ ಪರಿಚಯ- ಕವಿತೆಗಳ ಮೂಲಕ ಬದುಕಿನ ನೈಜತೆಯ ಚಿತ್ರಣ**
21KSK307.3	**ಶುದ್ಧ ಕನ್ನಡದ ಬಳಕೆ, ಪತ್ರಗಳತ್ತ ಒಲವು, ಸುಲಭ ವ್ಯಾಕರಣ**
21KSK307.4	**ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳು- ವ್ಯಕ್ತಿ ಪರಿಚಯ ಹಾಗೂ ಕತೆಯ ತಂತ್ರಗಾರಿಕೆ**
21KSK307.5	**ತಂತ್ರಾಂಶಗಳ ಬಳಕೆ, ಪಾರಿಭಾಷಿಕ ಪದಗಳ ಪರಿಚಯ**
21KSK307.6	**ಕನ್ನಡ ಭಾಷಾಜ್ಞಾನ, ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ**

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	**ಆಡಳಿತ ಕನ್ನಡ**	**ಡಾ.ಎಲ್ .ತಿಮ್ಮೇಶ್ ಪ್ರೊ.ವಿ. ಕೇಶವಮೂರ್ತಿ**	**ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ**	2019
2	**ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**	**ಡಾ .ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ , ಡಾ.ಎಲ್ .ತಿಮ್ಮೇಶ್**	**ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ**	2020
Reference Books				
1	**ಕನ್ನಡ ಸಾಹಿತ್ಯಕೋಶ & ವ್ಯಾಕರಣ ಪುಸ್ತಕ**	**ರಾಜಪ್ಪ ದಳವಾಯಿ ———**	**ದಳವಾಯಿ ಪ್ರಕಾಶನ, ಬೆಂಗಳೂರು.**	2008
2	**ಕನ್ನಡ ಕ್ಲಿಷ್ಟಪದ ಕೋಶ (ಶಬ್ದದ ವ್ಯುತ್ಪತ್ತಿ ಸಹಿತ)**	**ಪ್ರೊ. ಜಿ. ವೆಂಕಟ ಸುಬ್ಬಯ್ಯ ಹಾಗೂ ರಾಜ್ಯಶ್ರೀ ಸತೀಶ್**	**ಪ್ರಿಸಮ್ ಬುಕ್ಸ್ ಪ್ರೈ.ಲಿ.**	2006

Web links/Video Lectures/MOOCs/papers

1. https://youtu.be/HS8InQR36E4
2. https://youtu.be/C_SF24_ygxQ
3. https://youtu.be/wuT7UED7yuQ
4. https://youtu.be/pxLwNWXhbnQ
5. https://youtu.be/H6FXRSBNO4c

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21KSK307.1		2										2		
21KSK307.2		2										2		
21KSK307.3		2								2				
21KSK307.4		2										2		
21KSK307.5		2				2								
21KSK307.6						2				2				

1: Low 2: Medium 3: High

Constitution of India, Professional Ethics and Cyber Law			
Course Code	**21CPC307/407**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(1:0:0)	SEE Marks	50
Credits	**01**	Exam Hours	02

Course Learning Objectives: To

1. Know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and *the* duties of citizens
2. Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society.
3. Know about cybercrimes and cyber laws for cyber safety measures.

Module-1

Introduction to Indian Constitution:

The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building. **3 Hours**

Module-2

Union Executive and State Executive:

Parliamentary System, Federal System, Centre-State Relations. Union Executive - President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism. State Executives - Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts, Special Provisions (Articles 370.371,37JJ) for some States. **3 Hours**

Module-3

Elections, Amendments and Emergency Provisions:

Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments - 7,9, 10,12,42,44,61,73,74,75,86, and 91,94,95,100,101,118 and some important Case Studies. Emergency Provisions, types of Emergencies and their consequences.

Constitutional special provisions:

Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.

3 Hours

Module-4

Professional/ Engineering Ethics:

Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of Ethics as defined in the website of Institution of Engineers (India): Profession, Professionalism, and Professional Responsibility. Clash of Ethics, Conflicts of Interest. Responsibilities **in** Engineering Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering, TPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering. **3 Hours**

Module-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 of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000, Internet Censorship. Cybercrimes and enforcement agencies. **3 Hours**

Course Outcomes: At the end of the course the student will be able to:	
21CPC307.1	Discuss the constitutional knowledge and legal literacy
21CPC307.2	Review the Indian constitution
21CPC307.3	Analyze the role and functions of Union and state executives
21CPC307.4	Review the Electoral Process, the System of Election Commission and its functions
21CPC307.5	Discuss professional ethics and responsibilities of engineers
21CPC307.6	Analyze the cybercrimes and cyber laws for cyber safety measures

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Text Books				
1	Constitution of India, Professional Ethics and Human Rights	Shubham Singles, Charles E. Haries, et al	Cengage Learning India	2018
2	Cyber Security and Cyber Laws	Alfred Basta and et al	Cengage Learning India	2018
Reference Books				
1	Introduction to the Constitution of India	Durga Das Basu	Prentice -Hall	2008
2	Engineering Ethics	M. Govindarajan, S. Natarajan, V. S. Senthilkumar	Prentice -Hall	2004

Web links/Video Lectures/MOOCs/papers

1.https://www.constitutionofindia.net/constitution_of_india

2. https://infosecawareness.in/cyber-laws-of-india

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
21CPC307.1						2		2						
21CPC307.2								2				2		
21CPC307.3						2		2				2		
21CPC307.4						2		2						
21CPC307.5						2		2						
21CPC307.6								2				2		

1: Low 2: Medium 3: High

IOT ENABLED PROTOTYPING			
Course Code:	**21IEP308**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	**01**	Exam Hours	03

Course Learning Objectives:

1. Understand the IoT concepts such as sensing, actuation, and communication.
2. Development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication and Protocols
3. Understand the significance of Project Management and the different techniques of planning
4. To introduce fundamental aspects of intellectual property rights, Govt. policies on IPR, and patentability search techniques.

Module 1

Internet of Things – Hardware / System Design

Introduction to IoT fundamentals, Introduction to sensors, Difference between analog and Digital sensors, Interfacing Temperature, Light and Humidity sensor with Arduino, Interfacing Motors with Arduino, A simple program to control actuator based on the analog sensor. **6 Hours**

Module 2

Internet of Things

Networking in IoT:

Introduction to wireless communication, Wifi Module ESP8266 interface with Arduino, Machine to Machine (M2M) communication using WiFi module. A simple demonstration of sensing temperature from one device and control actuator on a second device (M2M)

IoT in Web/ Cloud Platform:

Introduction to a web server - XAMPP(windows), A simple interactive web page using HTML5, Bootstrap (or CSS), and Javascript. Interfacing ESP8266 with webserver, ThingSpeak API, and MQTT protocol, A simple project to demonstrate the status of two IoT devices communicating with a Web Server. **6 Hours**

Module 3

Project Planning and Management

Project initiation, Project charter, Project planning, and implementation, Scheduling and costing, Project monitoring and control, Project closure and reports.

6 Hours

Module 4

Intellectual Property Rights

Introduction and the need for intellectual property right (IPR) – Kinds of Intellectual Property Rights, Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application, Non - Patentable Subject Matter, Registration Procedure, Patentability search methods, Patent landscape, Freedom-to-market, National IPR Policy, Govt. initiatives and scheme in promoting IPR. **6 Hours**

Course Project

Develop IoT-based prototypes (solutions) to solve any industrial or societal problems. The prototype building is teamwork of 3-5 students. The goals should be clearly defined and should use robust technologies and rigorous testing.

6 Hours

Course Outcomes: At the end of the course, the student will be able to:	
21IEP308.1	Analyze the basics of IoT and protocols
21IEP308.2	Develop IoT-based prototypes to solve industrial and societal problems
21IEP308.3	Apply appropriate approaches to plan a new project and develop a project schedule.
21IEP308.4	Discuss the ethical aspects in IPR, Govt. policies on IPR, and conducting patentability searches
21IEP308.5	Inculcate the teamwork and communication skills

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Reference Books				
1	Internet of Things (A Hands-on-Approach)	Vijay Madisetti and Arshdeep Bahga	Orient Blackswan Private Limited	1st Edition, 2015
2	Fundamentals of Intellectual Property	Dr. Kalyan C. Kankanala	Asia Law House	1st Edition, 2012
3	Project Management Absolute Beginner's Guide	Greg Horine	Pearson Education (US)	4th Edition, 2017

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
21IEP308.1			**2**		**2**				**2**	**2**				
21IEP308.2			**2**								**3**			
21IEP308.3					**2**						**2**			
21IEP308.4								**1**		**2**				
21IEP308.5								**1**	**2**	**2**				

1: Low 2: Medium 3: High

Industry Oriented Training - Business Etiquettes			
Course Code	**21IOT309**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	-
Credits	-	Exam Hours	2

Course Learning Objectives:

1. Know the components of self-introduction
2. Develop a resume with the inclusion of core competencies
3. Involve and contribute to group discussions
4. Develop effective communication to succeed in the professional career
5. Know the etiquettes of digital communication

Module-1

Self Introduction &Essentials of grooming

Self Introduction: Learn the secret to introducing Yourself, Things to avoid when introducing yourself. Activity: Video record the self-introduction. **Essentials of grooming:** Creating the first impression, what does the well-dressed man wear? What does the well-dressed woman wear? Personal hygiene and habits **4 Hours**

Module-2

Resume Writing

Purpose, Identifying Relevant Competencies, Understanding Applicant Tracking Systems, Lists of Competencies, Writing Accomplishment/ Objective Statements, Finding the Right Words- Action verbs, The Most Popular Resume Format, Other Popular Resume Formats, Do's and Don'ts. Activity: Students have to submit a copy of their resume **4 Hours**

Module-3

Group Discussion

Types, process, Evaluation criteria, Do's and Don'ts Activity: Group discussions have to be held during the training sessions **4 Hours**

Module-4

Communicate effectively

Build a Story, Just a Minute, Group Activities, Team building activities, Role Play, Presentation Skills. **4 Hours**

Module-5

Digital right and wrong

Virtual Communication: Agenda, being prepared, Dressing appropriately, background, Use Microphone and camera the right way, restraining from off tasks during virtual meetings, protecting confidential data during online presentations, time management. **4 Hours**

Course Outcomes:

At the end of the course the student will be able to:

21IOT309.1	Articulate the essential components required for self-introduction in any business or a networking event and also recognize the need to dress appropriately for a successful career in the corporate
21IOT309.2	Develop a resume inclusive of core competencies, and action verbs which are compatible with Applicant Tracking Systems
21IOT309.3	Demonstrate the types, process and evaluation process of Group Discussion and carry out effective group discussions
21IOT309.4	Develop skills required for effective communication
21IOT309.5	Associate and be accustomed to the etiquette to be followed during online meetings

Sources

1. English for Common Interactions in the Workplace: Basic Level: Coursera: https://www.coursera.org/learn/english-common-interactions-workplace-basic-level
2. Personal Communication-Introduce Yourself With Confidence: https://www.udemy.com/course/how-to-introduce-yourself/
3. Professionalism, Grooming and Etiquette: https://www.edx.org/course/professionalism-grooming-and-etiquette
4. How to Write a Resume: https://www.coursera.org/learn/how-to-write-a-resume#syllabus
5. Group Discussion Strategies: https://www.udemy.com/course/group-discussion-strategies/
6. Communication Strategies for a Virtual Age: https://www.coursera.org/learn/communication-strategies-virtual-age#syllabus

References

1. https://simplifytraining.com/course/personal-hygiene-and-good-grooming/
2. https://www.udemy.com/course/group-discussion-strategies/
3. https://www.educba.com/course/group-discussion/
4. https://getrafiki.ai/meetings/rules-of-virtual-meeting-etiquette-every-sales-professional-should-follow/
5. https://thedigitalworkplace.com/articles/online-meeting-etiquette-for-attendees/
6. https://rigorousthemes.com/blog/virtual-meeting-etiquette-guidelines-ground-rules/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21IOT309.1									2	3		1		
21IOT309.2										3		1		
21IOT309.3									2	3	1	1		
21IOT309.4									2	3	1	1		
21IOT309.5									2	3	1	1		

1: Low 2: Medium 3: High

Additional Mathematics - I

(A Bridge Course for Lateral Entry Students of BE Programmes)

(Common to all Programmes)

Course Code	**21MAL301**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:1:0)	SEE Marks	50
Credits	-	Exam Hours	03

Course Learning Objectives:

1. To familiarize concepts of Mathematics required for engineering study
2. To equip the students with standard concepts and tools to solve problems in their discipline of engineering.

Module-1

Complex Trigonometry: Complex Numbers, Definitions and properties. Modulus and amplitude of a complex number, De Moivre's Theorem, Argand diagram,
Vector Algebra: Scalars and vectors. Addition and subtraction and multiplication of vectors- Dot and Cross products, problems.

8 Hours

Module-2

Trigonometry: Trigonometric ratios, quadrant rule, trigonometric ratios of standard angles, compound angles, Sum and product formula and Hyperbolic functions
Partial fraction: Type 1- Denominator is a product of non repeated linear factors, Type 2 -repeated linear factors and Type 3: Quadratic factors. **8 Hours**

Module-3

Differentiation: Derivative of a function, Derivative of a composite function, Differentiation of Implicit function, Differentiation of inverse trigonometric function, product formula, Quotient formula, Chain rule, nth derivative, Leibnizs Rule, angle between radius vector and tangent (only formula), angle between polar curves. **8 Hours**

Module-4

Integration: Definition, standard formulae, Integration by substitution, , Integration by partial fraction method, Integration by parts, Bernoulli's rule ,$\int e^{ax}\ sin\ bx\ dx$ and $\int e^{ax} \cos bx\ dx$
Definite Integrals and properties of definite integrals. Application- Definite integral as an area. **8 Hours**

Module-5

Linear Algebra: Rank of matrices - Rank of a matrix by Echelon form, consistency of system of linear equations - homogeneous and non-homogeneous equations, Gauss – Elimination and Gauss - Seidel methods. Eigen values and Eigenvectors-properties, largest Eigenvalue by Rayleigh's power method. Diagonalization of a square matrix of order two. **8 Hours**

Course Outcomes:

At the end of the course the student will be able to:

21MAL301.1	Apply complex numbers and vectors in Engineering Applications
21MAL301.2	Apply trigonometry in real life applications
21MAL301.3	Resolve the Rational fraction into partial fractions.
21MAL301.4	Compute derivative of different functions

21MAL301.5	Compare and different methods integration and select appropriate method to solve given problem
21MAL301.6	Analyze given problem and use appropriate method of solving given set of equations

Question paper pattern:
Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

Sl No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	**Higher Engineering Mathematics**	B.S. Grewal	Khanna Publishers	44th Edition, 2017
2	NCERT Text Book for Mathematics I PUC and II PUC	NCERT	NCERT	Reprint 2007
3	Higher Engineering Mathematics	H.K Dass and R Verma	C. Chand and Company	First Edition, 2011
Reference Books				
1	Advanced Engineering Mathematics – Volume I	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	10th Edition 2010
2	"Higher Engineering Mathematics"	B.V.Ramana	Tata McGraw-Hill Publications	11th Edition,2010

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
21MAL301.1	**3**	**1**										
21MAL301.2	**3**	**1**										
21MAL301.3	**3**		**1**									
21MAL301.4	**3**		**1**									
21MAL301.5	**3**		**1**									
21MAL301.6	**3**		**1**									

1: Low 2: Medium 3: High

Business Communication (A Bridge Course for Lateral Entry Students BE programmes)			
Course Code	**21ENG310/410**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	50
Credits	**00**	Exam Hours	02

Course Learning Objectives:

1. To enable the learner to communicate effectively in real-life situations.
2. To review English grammar effectively for study purposes across the curriculum.
3. To enhance English vocabulary and language proficiency.
4. To achieve better writing and presentation skills.

Module-1	**2 Hours**
Subject Verb Agreement, Sequences of tenses, Active and Passive, Reported speech, Articles, Preposition.	
Module-2	**2 Hours**
Vocabulary, One word substitutes, Confused words, Phrasal Verbs, Idioms and Phrases, Analogies.	
Module-3	**2 Hours**
Technical vocabulary, Homophones, Homographs, Homonyms, Synonyms and Antonyms, Common errors in the English language, and Phrasal verbs.	
Module-4	**2 Hours**
Formal letter writing, Covering letter with Resume, Email Etiquette Cloze passage.	
Module-5	**2 Hours**
Communication skills: Group discussion, Etiquette of the job interview, Dialogues in various situations, Telephonic conversation.	

Course Outcomes:

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

21ENG310.1	Analyze the concepts of grammar and its usage
21ENG310.2	Identify the nuances of phonetics, intonation and flawless pronunciation
21ENG310.3	Implement English vocabulary and language proficiency.
21ENG310.4	Apply the forms of writing skills at the professional level.
21ENG310.5	Demonstrate speaking ability in terms of fluency and comprehensibility.
21ENG310.6	Demonstrate competence in the four modes of literacy: Writing, Reading, Speaking and listening.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Communication skills	Sanjay Kumar and Pushp Lata	Oxford University Press	Second Edition, 2015
2	High School English Grammar and Composition	Wren and Martin	S Chand and Company Ltd	2015
Reference Books				
1	Practical English Usage	Michael Swan	Oxford University Press	2016
2	English Grammar in Use	Raymond Murphy	Cambridge University Press	Second Edition, 1994

Web links/Video Lectures/MOOCs

1.https://englishforeveryone.org
2.https://owl.purdue.edu
3.http://guidetogrammar.org

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21ENG310.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
21ENG310.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

SEMESTER –IV

Linear Algebra and Statistical Methods

(Common to ECE & EEE)

Course Code	**21MAE401**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To learn principles of advanced engineering mathematics through linear algebra.
2. To understand probability theory and random process that serve as an essential tool for applications of electronics and communication engineering sciences.

Module-1

Linear Algebra- I

Vector spaces & subspaces, null spaces, Column spaces & linear transformations, Linearly independent sets; basis, Coordinate systems, The dimension of a vector space, Rank:Rank and nullity theorem (without proof). **8 Hours**

Module-2

Linear Algebra- II

Inner product, length & orthogonality, orthogonal set, orthogonal projection Gram-Schmidt process, QR factorization of matrices, Eigenvalues and Eigenvectors (Recapitulation).Diagonalization of symmetric matrices. The singular value decomposition. **8 Hours**

Module-3

Statistical Methods and Curve Fitting:

Correlation and regression-Karl Pearson's coefficient of correlation-problems. Regression analysis- lines of regression -problems. Curve Fitting: Curve fitting by the method of least squares-fitting the curves of the form y = ax + b, y = ax^2+ bx + c and y = ax^b

8 Hours

Module-4

Probability Distributions:

Random variables (discrete and continuous), probability mass/density functions, cumulative density function. Binomial, Poisson, exponential and normal distributions-problems (No derivation for mean and standard deviation) **8 Hours**

Module-5

Sampling theory:

Introduction, sampling distributions, Testing of hypothesis for means, level of significance, confidence limits, Sampling of variables, central limit theorem, confidence limits for unknown mean, student's **t**-distribution, Chi-square distribution as a test of goodness of fit. **8 Hours**

Course Outcomes:

At the end of the course the student will be able to:

21MAE401.1	Make use of vector spaces in the process of obtaining a matrix of linear transformations.
21MAE401.2	Apply the technique of singular value decomposition for data compression and least-square approximation in solving inconsistent linear systems.
21MAE401.3	Examine the given data for the probability distribution.
21MAE401.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.

21MAE401.5	Discover the relation between dependent & independent variables using the least square curve fitting method.
21MAE401.6	Demonstrate the validity of testing the hypothesis to arrive at a decision regarding the population through a sample

Question paper pattern:
Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44th Edition., 2017.
2	Linear Algebra & its applications	David C. Lay	Pearson Publication	3rd Edition, 2014
3	Introductory Probability and Statistical Applications	B L Mayer	Wiley Eastern Limited	2nd Edition,2014
Reference Books				
1	Advanced Engineering Mathematics	C.Ray Wylie, Louis C.Barrett	McGraw- Hill Book Co., New York	6th Edition,2017
2	Linear Algebra & its applications	Gilbert Strang	Cengage Learning India Edition	4th Edition 2006
3	Schaum's Outline of Linear Algebra	Seymour Lipschutz and Marc Lipson	McGraw Hill Education	5 th Edition, 2012
4	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill, Publication	11th Edition,2006

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
21MAE401.1		**3**	**1**									
21MAE401.2	**3**	**1**										
21MAE401.3		**1**		**3**								
21MAE401.4	**3**	**1**										
21MAE401.5		**3**	**1**									
21MAE401.6		**1**	**3**									

1: Low 2: Medium 3: High

DIGITAL SYSTEM DESIGN

Course Code	21EEE402	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. To apply Karnaugh Maps for the simplification of Boolean Algebraic equations
2. To analyze and apply the Combinational logic design approach to construct Decoders, Encoders, and Digital Multiplexers etc.
3. To construct Latches/ Flip-flops and their application in the design of Registers and Counters.
4. To examine Mealy and Moore Models to the sequential circuit application.
5. To illustrate the fundamentals and applications of VLSI and FPGA for digital system design.

Module-1 **8 Hours**

Principles of Combinational Logic: Logic families, logic gates, combinational logic, canonical forms, Karnaugh maps- Simplifying Max and Min term equations, prime implicants

Module-2 **8 Hours**

Analysis and Design of Combinational logic: Decoders, BCD decoders, Encoders, Digital multiplexers, multiplexers as Boolean function generators, Adders and subtractors, Binary comparators

Module-3 **8 Hours**

Flip-Flops: Basic Bistable elements, Latches, The master-slave flip-flops: SR , D, JK, T flip-flops, pulse & Edge triggered flip- flops, Characteristic equations

Module-4 **8 Hours**

Flip-Flops Applications and Sequential Circuit Design:,: Registers, binary ripple counters, synchronous binary counters, Mealy and Moore models, State machine Synchronous Sequential circuit analysis, Construction of state diagrams

Module-5 **8 Hours**

Digital System Design :MOS Transistors, CMOS Logic, CMOS Technologies, Pass Transistor, nMOS Fabrication, CMOS Fabrication [P-well process, N-well process, Twin tub process], MOS Layers, Stick Diagrams, Overview of FPGA architecture and programming with HDL.

List of Laboratory Experiments related to above modules – 2 hours each

1. Simplification, and realization of Boolean expressions using logic gates/Universal gates.
2. Realization of half/Full adder and Half/Full Subtractor using logic gates
3. Design and testing of Multiplexers and decoders
4. Design and testing of code conversion circuits
5. Design and testing of RS & JK flip-flop circuits
6. Design and testing of Ring counter/Johnson counter.
7. Design and testing of shift registers
8. Design of MOD – N counters using IC
9. Open-ended experiment generation of gating pulses.

Course Outcomes:

At the end of the course the student will be able to:

21EEE402.1	Apply the first principles of digital electronics to develop a simplified switching equation using Karnaugh Maps techniques for a given Boolean expression.
21EEE402.2	Apply the knowledge of digital electronics engineering principles to design Multiplexer, Encoder, Decoder, Adder, Subtractors, and Comparator
21EEE402.3	Understand the engineering practices for analyzing flipflop circuits
21EEE402.4	Apply the principles of flip-flops to design sequential circuits such as registers and counters
21EEE402.5	Demonstrate the knowledge of mealy and moore state diagrams to solve the sequential design problems
21EEE402.6	Recognize the need for application of VLSI and FPGA in digital system design

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Logic and computer design Fundamentals	M. Morries Mano and Charles Kime	Pearson Learning	2014
2	”Digital Logic Design and VHDL”,	A.A.Phadke S.M.Deokar	Wiley India	1 st Edition,2009
Reference Books				
1	Digital Principles and Design	Donald D Givone	Tata McGraw HillEdition,	2012
2	”Circuit Design and Simulation with VHDL”	Volnei A Pedroni	PHI	2nd Edition,

Web links/Video Lectures/MOOCs/papers

1. http://nptel.vtu.ac.in/econtent/courses/CSE/15CS32/index.php
2. https://nptel.ac.in/courses/108/105/108105113/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE402.1		2												
21EEE402.2		1												
21EEE402.3								2						
21EEE402.4											2			
21EEE402.5											1			
21EEE402.6												3	3	

1: Low 2: Medium 3: High

MICROCONTROLLERS

Course Code	21EEE403	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:2)	SEE Marks	50
Credits	**04**	Exam Hours	03

Course Learning Objectives:

1. Explain the internal organization and working of Computers, microcontrollers and embedded processors.
2. Compare and contrast the various members of the microcontroller family.
3. Explain the registers of the 8051 microcontroller, manipulation of data using registers and MOV instructions.
4. Explain in detail the execution of 8051 Assembly language instructions and data types.
5. Explain loop, conditional and unconditional jump and call, handling and manipulation of I/O instructions.
6. Explain different addressing modes of 8051, arithmetic, logic instructions, and programs.
7. Explain and develop 8051 C programs for time delay, I/O operations, I/O bit manipulation, logic, arithmetic operations and data conversion.

Module-1 **8 Hours**

8051 Microcontroller Basics: Inside the Computer, Microcontrollers and Embedded Processors, Block Diagram of 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of 8051, IO Port Usage in 8051, Types of Special Function Registers and their uses in 8051, Pins Of 8051. Memory Address Decoding, 8031/51 Interfacing With External ROM And RAM, 8051 Addressing Modes.

Module-2 **8 Hours**

Assembly Programming and Instruction of 8051: Introduction to 8051 assembly programming, Assembling and running an 8051 program, Data types and Assembler directives, Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming.

8051 Programming in C: Data types and time delay in 8051C, IO programming in 8051C, Logic operations in 8051 C, Data conversion program in 8051 C, Accessing code ROM space in 8051C, Data serialization using 8051C.

Module-3 **8 Hours**

8051 Timer Programming in Assembly and C: Programming 8051 timers, Counter programming, Programming timers 0 and 1 in 8051 C.

8051 Serial Port Programming in Assembly and C: Basics of serial communication, 8051 connection to RS232, 8051 serial port programming in assembly, serial port C programming in 8051

Module-4 **8 Hours**

8051 Interrupt Programming in Assembly and C: 8051 interrupts, Programming timer, external hardware, serial communication interrupt, Interrupt priority in 8051/52, Interrupt programming in C.

Interfacing: LCD interfacing, Keyboard interfacing.

ADC, DAC and Sensor Interfacing: ADC 0808 interfacing to 8051, Serial ADC Max1112 ADC interfacing to 8051, DAC interfacing, Sensor interfacing and signal conditioning.

Self-learning topics: ADC,DAC Interfacing

Module-5 **8 Hours**

Relay, PWM, DC and Stepper Motor: Relays and optocoupler isolators, stepper motor interfacing, DC motor interfacing and PWM.

8051 Interfacing with 8255: Programming the 8255, 8255 interfacing, C programming for 8255.

PIC Microcontroller: Introduction to PIC architecture.

Self-learning topics: motor interfacing.

List of Laboratory Experiments related to above modules – 2 hours each

1. Assembly language programs on data transfer, arithmetic and logic operations.
2. Assembly language programs for Conditional call and return instructions.
3. Code conversion programs in Assembly language – BCD to ASCII, ASCII to BCD, ASCII to decimal, Decimal to ASCII, Hexa decimal to decimal
4. Assembly language Programs using serial port and on-chip timer/counters.

5. 8051 C program for Stepper motor interface.
6. 8051 C program for DC motor interface for speed control using PWM.
7. 8051 C program to generate different waveforms: Sine, Square, Triangular, Ramp using DAC interface.
8. 8051 C program to interface External ADC
9. Execute 4 assembly language programs of your choice in keil software.

Course Outcomes:

At the end of the course the student will be able to:

21EEE403.1	Outline the 8051 architecture, registers, internal memory organization, addressing modes.
21EEE403.2	Discuss 8051 addressing modes, instruction set of 8051, accessing data and I/O port programming.
21EEE403.3	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counterprogramming.
21EEE403.4	Summarize the basics of serial communication and interrupts, also develop 8051 programs for serial data communication and interrupt programming.
21EEE403.5	Program 8051 to work with external devices for ADC, DAC, Stepper motor control, DC motor control, Elevator control.
21EEE403.6	Use modern software to analyze and implement microcontroller programs.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	The 8051 Microcontroller and Embedded Systems Using Assembly and C.	Muhammad Ali Mazadi	Pearson	2nd Edition, 2008.
2	The 8051 Microcontroller	Kenneth Ayala	Cengage Learning	3rdEdition, 2005
3	PIC microcontroller and Embedded Systems	Muhammad Ali Mazadi, Rolin D McKinlay	Pearson	2008
Reference Books				
1	The 8051 Microcontroller and Embedded Systems	Manish K Patel	McGraw Hill	2014
2	Microcontrollers: Architecture, Programming, Interfacing and System Design	Raj Kamal	Pearson	1st Edition, 2012

Web links/Video Lectures/MOOCs/papers

Video lectures on "Microprocessors and Microcontrollers " by Prof. Ajit Pal, Dept of Computer Science & Engg., IIT Kharagpur.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE403.1	2						1							
21EEE403.2	1						2							
21EEE403.3							3					2		
21EEE403.4												3	1	
21EEE403.5												3	2	
21EEE403.6							1						3	

1: Low 2: Medium 3: High

ELECTRIC MOTORS

Course Code	21EEE404	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:2:0)	SEE Marks	50
Credits	**03**	Exam Hours	03

Course Learning Objectives:

1. To study the constructional features, operational features of DC Motors.
2. To study the constructional features, operational features of single and three phase induction motors.
3. To study different tests to be performed for the assessment of performance characteristics of motors.
4. To study the different speed control methods for motors
5. To select a suitable drive for specific application.
6. To explain the construction and operation of synchronous motor and special motors.

Module-1 **8 Hours**

DC Motors: Classification, Back emf and its significance, Torque equation, Characteristics of shunt, series and compound motors, Speed control of shunt, series and motors, DC Motor starters- 3 point and 4 point.
Losses and Efficiency: Losses in DC Motors, efficiency and condition for maximum efficiency.
Self-Study: Application of DC Motors.

Module-2 **8 Hours**

Testing of DC Motors: Direct and Indirect method of testing, – Brake Test, Swinburne's test, Retardation test, Hopkinson's test, merits and demerits of tests.
Three Phase Induction Motors: Construction, classification and types. Slip, torque equation, slip-torque characteristic covering motoring generating and braking regions of operation. Maximum torque, significance of slip.
Self-Study: Generation of rotating magnetic field. Principal of operation.

Module-3 **8 Hours**

Performance of Three Phase Induction Motor: Phasor diagram on no load and on load, equivalent circuit, losses, efficiency, No-load and blocked rotor test, Performance evaluation from circle diagram and equivalent circuit. Cogging and Crawling. High torque rotors- double cage and deep rotor bars, equivalent circuit and performance evaluation of double cage induction motor. Induction motor working as induction generator.
Self-Study: Application of Induction Generators to renewable energy sources.

Module-4 **8 Hours**

Starting and Speed Control of Three Phase Induction Moors: Direct on line, star delta and auto transformer starting. Rotor resistance starting. Speed control by voltage, frequency and rotor resistance methods.
Single Phase Induction Motor: Double revolving field theory and principle of operation. Construction and operation of split phase, capacitor start, capacitor run and shaded pole motors.
Self-Study: Application of three phase and single phase induction motors.

Module-5 **8 Hours**

Synchronous Motor: Principle of operation, phasor diagram, torque and torque angle. Blondel diagram, effect of change in load, effect of change in excitation. V and inverted V curves. Synchronous condenser. Hunting and damping. Methods of starting of Synchronous Motors.
Special Motors: Construction and operation of Universal Motor, PMDC, Stepper Motor and AC Servo motor.
Self-Study: Application of special motors.

Course Outcomes:

At the end of the course the student will be able to:

21EEE404.1	Analyze the performance characteristics of DC Motors and select a suitable motor to provide solutions to the current industrial problems with priority to safety issues.
21EEE404.2	Apply the basic knowledge of basic electrical engineering to explain the constructional features and characteristics of three phase induction motors and select a suitable motor for the industrial application by adopting the professional engineering practice with addressing safety issues.
21EEE404.3	Apply the basic knowledge of basic electrical engineering to explain the constructional features of single phase induction motors and select a suitable motor for the industrial application by adopting the professional engineering practice with addressing safety issues.

21EEE404.4	Apply the basic concepts of synchronous generators to explain the constructional features, operation of synchronous motors and applications of the same to address the current industrial issues.
21EEE404.5	Explore various available techniques to test the dc motors, evaluate the performance and speed control techniques of three phase induction motors, and apply this to manage projects and multidisciplinary applications.
21EEE404.6	Apply the basic knowledge of basic electrical engineering to explain the constructional features operation of special purpose motors such as universal motors, AC servomotor, Linear induction motor and Stepper motor and application of theses motors to manage multidisciplinary projects.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electric Machines	D. P. Kothari, I. J. Nagrath	McGraw Hill	4th edition, 2011
2	Theory of Alternating Current Machines	Alexander Langsdorf	McGraw Hill	2nd Edition, 2001
Reference Books				
1	Electric Machines	Ashfaq Hussain	Dhanpat Rai & Co	2nd Edition, 2013
2	Electrical Machines, Drives and Power systems	Theodore Wildi	Pearson	6th Edition, 2014
Web links/Video Lectures/MOOCs/papers https://archive.nptel.ac.in/courses/108/102/108102146/				

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEE404.1			2											
21EEE404.2			1											
21EEE404.3						2								
21EEE404.4						1								
21EEE404.5											2			
21EEE404.6														2

1: Low 2: Medium 3: High

ELECTRIC MOTORS LABORATORY			
Course Code	21EEL405	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	**01**	Exam Hours	03

Course Learning Objectives:

1. To perform test on DC Motors to determine their characteristics
2. To study speed control methods of dc motor.
3. To conduct test on DC Motors for pre determination of performance characteristics of DC Machines.
4. To perform load test on single phase and three phase induction motors
5. To conduct test on three phase induction motor to determine performance characteristics.
6. To conduct test on synchronous motor to draw the performance characteristics.

Sl. No	Experiments
1.	Load test on DC shunt motor to draw speed–torque and horse power–efficiency characteristics.
2.	Field Test on DC series machines.
3.	Speed control of DC shunt motor by armature and field control.
4.	Swin burne's Test on DC motor.
5.	Load test on three phase induction motor.
6.	No-load and Blocked rotor test on three phase induction motor to draw (i) equivalent circuit and (ii) circle diagram. Determination of performance parameters at different load conditions.
7.	Load test on induction generator.
8.	Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.
9.	Conduct suitable tests to draw thee equivalent circuit of single phase induction motor and determine performance parameters.
10.	Conduct an experiment to draw v and Inverted V curves of synchronous motor at no load and load conditions.

Course Outcomes:

At the end of the course the student will be able to:

21EEL405.1	Test DC machines to determine their characteristics and also to control the speed of DC motor.
21EEL405.2	Pre-determine the performance characteristics of DC machines by conducting suitable tests
21EEL405.3	Perform load test on single phase and three phase induction motor to assess its performance
21EEL405.4	Conduct test on induction motor to pre-determine the performance characteristics.
21EEL405.5	Conduct test on synchronous motor to draw the performance curves
21EEL405.6	Function effectively as a member of diverse team to demonstrate the knowledge on testing of motors.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electric Machines	D. P. Kothari, I. J. Nagrath	McGraw Hill	4th edition, 2011
2	Theory of Alternating Current Machines	Alexander Langsdorf	McGraw Hill	2nd Edition, 2001
Reference Books				
1	Electric Machines	Ashfaq Hussain	Dhanpat Rai & Co	2nd Edition, 2013
2	Electrical Machines, Drives and Power systems	Theodore Wildi	Pearson	6th Edition, 2014

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
21EEL405.1			2											
21EEL405.2			1											
21EEL405.3						2								
21EEL405.4						1								
21EEL405.5									2					
21EEL405.6									3					

1: Low 2: Medium 3: High

COMPUTATIONAL TOOLS FOR ENGINEERS			
Course Code:	**21CTE408**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03

Course Learning Objectives:

1. Apply modeling and simulation tools for a wide range of engineering problems.
2. Understand the analysis of data in Excel with statistics.
3. Use MATLAB and Simulink to perform engineering system analysis.

The engineering design process heavily relies on modeling and simulation. Modern simulation techniques enable the development of multi-physical, holistic system models that account for all system interactions. These digital models speed up the design and testing processes, saving time and money.

Module 1 **6** Hours

Engineering Design Analysis

Need for engineering design analysis. Product and system design. Introduction to analysis parameters – stress, deformation, acceleration, internal force and stability. Static structural analysis of engineering design using finite element method (case studies). Heat transfer and fluid dynamics modeling and simulation using CFD software (case studies).

Module 2 **4** Hours

Data Analysis with EXCEL

Calculate Mean, Median, Mode, Minimum, Maximum, Quartiles, Variance and Standard Deviation from some numbers. Analyze a population using data samples. Group data, build XY charts, apply Logarithmic Scale and Trend Line on a chart, forecast from some data, and calculate running averages. Normal Distribution, Exponential Distribution, Uniform Probabilities, Binomial Distribution, and Poisson Distribution.

Module 3 **6** Hours

MATLAB and Simulink for Engineers

Applications of MATLAB and Simulink in electrical engineering, electrical machines and power system projects, simulation of rectifiers, inverters, choppers, and cycloconverters

Course Project

Solve complex engineering problems via modeling and simulation. The project work is teamwork of 3-5 students. The goals should be clearly defined, use any software tool, and rigorous validation of the mathematical model should be done (experimental or theoretical).

Course Outcomes: At the end of the course, the student will be able to:	
21CTE408.1	Apply the Finite Element Method to solve engineering problems
21CTE408.2	Solve statistical problems using Excel
21CTE408.3	Perform system-level analysis using MATLAB and Simulink
21CTE408.4	Build mathematical models for any given engineering problem.
21CTE408.5	Demonstrate teamwork and communication skills

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Reference Books				
1	MATLAB and Simulink for Engineers	Agam Kumar Tyagi	Oxford University Press,	2012
2	Practical Finite Element Analysis	Nitin S.Gokhale	Finite To Infinite	2020
3	Excel Crash Course for Engineers	Eklas Hossain	Springer	2021

Course Outcomes (COs)	**Program Outcomes (POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
21CTE408.1	1				1	1								
21CTE408.2		1			2				2					
21CTE408.3		1			2									
21CTE408.4					2	2								
21CTE408.5	1								2					

1: Low 2: Medium 3: High

Industry Oriented Training - Computing Skills			
Course Code	**21IOT409**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	-
Credits	-	Exam Hours	02

Course Learning Objectives:

1. Use logical conditions for problem-solving and also introduce the concepts of arrays
2. Know functions, function calls, and parameter passing
3. Introduce algorithms and appreciate their importance in problem-solving
4. Introduce the core concepts of OOPs
5. Differentiate between front-end & back-end development and recognize the use of database management.

Module-1 Introduction to computing constructs

Logical conditions: For Loops, Nested For Loops, While Loops, Do-While Loops, Nesting and Boxes, and combine/negate several logical conditions using logic operations AND, OR, and NOT.

Arrays & strings: Create arrays of characters (strings), use the null terminator, and manipulate strings

4 Hours

Module-2 Functions & Pointers

Introduction to Functions, Returning Data From a Function, Passing Data Into a Function, Getting Valid User Input, Changing Parameter Values, Pointer Basics, Changing the Pointed to Value, Walking an Array with Pointers, Dynamic Memory Allocation, Getting More Memory, Pointers to Structure

4 Hours

Module-3 Algorithm analysis

Introduction to Algorithm Analysis, Big-O, Big-O Examples, Dynamic Array Operations, Bubble Sort, Selection Sort, Insertion Sort, Recursion, Recursive Binary Search, Merge Sort

4 Hours

Module-4 Object-oriented programming

Designing for Object-Oriented Programming, Core Concepts of OO Programming: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object-oriented programming paradigm.

4 Hours

Module-5 Frontend and backend development

UI, Database management: DBMS overview, Relational Data Model and the CREATE TABLE Statement, Basic Query Formulation with SQL

4 Hours

Course Outcomes:

At the end of the course the student will be able to:

21IOT409.1	Illustrate the use of logical conditions, declare and manipulate data into arrays
21IOT409.2	Implement functions, function calls, and parameter passing
21IOT409.3	Design, implement, and evaluate an algorithm to meet desired needs
21IOT409.4	Describe the core concepts of OOP's
21IOT409.5	Recognize the concepts of front-end development
21IOT409.6	Use the concepts of database management

Sources
1. Computational Thinking with Beginning C Programming Specialization: https://www.coursera.org/learn/simulation-algorithm-analysis-pointers?specialization=computational-thinking-c-programming#syllabus 2. Simulation, Algorithm Analysis, and Pointers: https://www.coursera.org/lecture/simulation-algorithm-analysis-pointers/big-o-examples-pdCan 3. Programming Fundamentals: https://www.coursera.org/learn/programming-fundamentals?specialization=c-programming#syllabus 4. Object-Oriented Programming Concepts: https://www.coursera.org/learn/concepts-of-object-oriented-programming#syllabus 5. Introduction to Back-End Development: https://www.coursera.org/learn/introduction-to-back-end-development

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
21IOT409.1	2	1	1											
21IOT409.2	2	1	1											
21IOT409.3	1	1	2											
21IOT409.4	2		1											
21IOT409.5	2	1	1											
21IOT409.6	2	1	1											

1: Low 2: Medium 3: High

ADDITIONAL MATHEMATICS - II

(A Bridge course for Lateral Entry students BE programmes)

(Common to all Programmes)

Course Code	**21MAL401**	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:1:0)	SEE Marks	50
Credits	**00**	Exam Hours	03

Course Learning Objectives:

1. To familiarize the techniques of differential equations, vector analysis and linear algebra to engineering students.
2. To equip the students with standard concepts and tools that will help them in solving problems in their discipline of engineering.

Module-1 **8 Hours**

Partial Differentiation: Partial derivatives, Problems on Euler's theorem. Total derivative
Partial differential equations: Introduction, Formation of PDE, Solution of PDE by direct integration method.

Module-2 **8 Hours**

First order ordinary differential equations: Introduction**,** Variable Separable, Homogeneous, Linear Exact and reducible to exact, Bernoulli's equations, Orthogonal Trajectories in polar form.

Module-3 **8 Hours**

Linear Ordinary Differential Equations of Higher Order: Standard form of higher order linear differential equation with constant coefficients, Concept of different types of solutions. Solution of homogeneous equations. Non homogeneous equations- Concept of Inverse differential operator
(P.I restricted to R(x) = $e^{ax}, sinax \text{ or } cosax \text{ for } f(D)y = R(x)$.)

Module-4 **8 Hours**

Vector differentiation: Vector functions of a single variable, derivative of a vector function, velocity and acceleration, unit tangent. Scalar and vector functions, gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector

Module-5 **8 Hours**

Numerical Methods: Finite differences. Interpolation using Newton‟s forward and backward difference formulae (Statements only)-problems. Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods (only formulae, Numerical integration: Simpson‟s one third rule and three eighth rule (without proof) Problems.

Course Outcomes:

At the end of the course the student will be able to:

21MAL401.1	Apply Euler's theorem for partial differentiation
21MAL401.2	Compare different methods of forming partial differential equations
21MAL401.3	Classify the given first order differential equations
21MAL401.4	Solve higher order differential equations
21MAL401.5	Differentiate between solenoidal and irrotational vectors.
21MAL401.6	Find root of a transcendental equation

Question paper pattern:
Note: The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. Students will have to answer 5 full questions, selecting one full question from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	Dr B.S. Grewal	Khanna Publishers	44th Edition, 2017
3	Higher Engineering Mathematics	H.K Dass and R Verma	C. Chand and Company	First Edition 2011
Reference Books				
1	Advanced Engineering Mathematics – Volume I	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	10th Edition 2015
2	Advanced Engineering Mathematics – Volume II	E. Kreyszig John Wiley & Sons	Wiley Precise Textbook Series	First Edition, 2014
3	"Higher Engineering Mathematics"	B.V.Ramana	Tata McGraw-Hill,	First Edition 2017

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
21MAL401.1		3	1									
21MAL401.2		3	1									
21MAL401.3	3	1										
21MAL401.4	3		1									
21MAL401.5		3	1									
21MAL401.6		3	1									

1: Low 2: Medium 3: High

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