ಬಿ.ಎಂ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

(ಸ್ವಾಯತ್ತ ವಿದ್ಯಾ ಸಂಸ್ಥೆ)

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Scheme for
III – VIII Semester
Syllabus for
III – IV Semester
For Batch Admitted 2021

ಬಿ.ಎಂ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಬುಲ್ ಟೆಂಪಲ್ ರಸ್ತೆ, ಬೆಂಗಳೂರು–೫೬೦ ೦೧೯

BMS COLLEGE OF ENGINEERING

Bull Temple Road, Bangalore - 560 019

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

INSTITUTE VISION

Promoting Prosperity of mankind by augmenting human resource capital through Quality Technical Education & Training

INSTITUTE MISSION

Accomplish excellence in the field of Technical Education through Education, Research and Service needs of society

DEPARTMENT VISION

Facilitating the development of competent professionals capable of adapting to the constantly changing global scenario in the field of Electrical Sciences.

DEPARTMENT MISSION

- Impart quality technical education and encourage research in the field of Electrical Sciences.
- Empower every individual to develop as a professional with an ability to apply his/her knowledge and skills to adapt to the evolving technological requirements of society.

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Program Educational Objectives (PEOs) describe the professional accomplishments of our graduates about three-five years after having completed the under-graduate program in Electrical and Electronics Engineering. We describe the progress of our graduates through three PEOs.

The first PEO reflects their professional career pursued and their progress through the knowledge acquired over a period of time through higher education, the second PEO is focused on the utilization of their knowledge technical, analytical and managerial skills for societal progress and on updating them from time to time through career development and training programs.

The last PEO focusses on their display of competence, leadership and dedication in their respective areas of work as they move up the ladder of growth in their profession.

The PEOs of the program are as under:

PEO-1	Possess successful careers in Electrical Sciences, and allied areas and pursue higher education with a broad knowledge base in Mathematics and Engineering principles.
PEO-2	Utilize their technical, analytical, communicative and managerial skills and knowledge for societal progress and enrich them to keep in pace with relevant advancements by engaging themselves in lifelong learning
PEO-3	Exhibit professionalism by displaying competence, leadership, dedication and commitment.

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

PROGRAM OUTCOMES (POs)

Program Outcomes (Pos), are attributes acquired by the student at the time of graduation. The POs given in the Table below, are identical to the Graduate Attributes (GAs) specified by National Board of Accreditation (NBA), and are common across all branches of engineering. These attributes are measured at the time of Graduation, and hence computed every year for the outgoing Batch. The POs are addressed and attained through the Course Outcomes (COs) of various courses of the curriculum, and help in the attainment of the PEOs.

PO 1	**Engineering Knowledge:** Apply the knowledge of mathematics and science engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis:** identify, formulate, review research literature, and analyze complex engineering problems reaching substantiate conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO 4	**Conduct investigations of complex problems:** use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
PO 5	**Modern tool usage:** create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6	**The engineer and society:** apply reasoning informed by the contextual knowledge to access societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and sustainability:** understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO 8	**Ethics:** apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO 10	**Communication:** communicate effectively on complex engineering activities with the engineering community and with society at large such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and a leader in a team, to manage projects and in multi-disciplinary environments.
PO12	**Lifelong learning:** recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Program Specific Outcomes (PSOs), are defined by the stakeholders of the program, and describe the skills in addition to the POs (defined by NBA), expected from the Electrical and Electronics Engineering student at the time of graduation. Similar to the POs, they are addressed through the outcomes of the courses, exclusive to the branch. The PSOs are developed through the teaching- learning process of various courses of the curriculum. After series of discussions with the stakeholders of the program, the three PSOs are arrived at. Through these PSOs, we attempt to develop the ability to model develop, analyze and assess the performance of systems in the domain of Power systems and Power Electronics and to control and measure the behavior of electrical quantities associated with constituents of energy or allied systems.

PSO-1	Develop models, analyze and assess the performance of different types of generation, transmission, distribution and protection mechanisms in power systems.
PSO-2	Design, develop, analyze and test electrical and electronics systems; deploy control strategies for power electronics related and other applications.
PSO-3	Measure, analyze, model and control the behavior of electrical quantities associated with constituents of energy or allied systems.

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Distribution of Credits among various Curricular Components

Sem	HS	BS	ES	PC	PE	OE	PW	ISR	AEC	NCMC	Total Credits
I	1	8	10						1	NCMC 1	**20**
II	1	8	10						1	NCMC 2	**20**
III	2	3		16					1	NCMC 3	**22**
IV	2	3	4	11				1	1	NCMC 4	**22**
V	2			16	3		1			NCMC 5	**22**
VI				12	3	3	2	2		NCMC 6	**22**
VII	2	1		5	3	3	2			NCMC 7	**16**
VIII	2				3	3	6	2		NCMC 8	**16**
	12	**23**	**24**	**60**	**12**	**9**	**16**		**4**		**160**

HS- Humanities and Social Science Course
BS-Basic Science Course
ES-Engineering Science course
PC -Professional Core
PE-Professional Elective
OE-Open Elective
PW-Project Work
ISR-Internship Seminar
AEC-Ability Enhancement Course
NC-Non credit mandatory course

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR THIRD SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22MA3BSTFN	Transform Calculus, Fourier Series And Numerical Techniques	BS	2	1	0	3	4	50	50	100
2	22EE3PCECT	Electrical Circuit Theory (*Only for EEE*)	PC	3	0	0	3	3	50	50	100
3	22EE3PCFTH	Field Theory	PC	2	1	0	3	4	50	50	100
4	22ES3PCDCS	Digital Circuits (ML,ETE,EEE,EIE)	PC	3	0	1	4	5	50	50	100
5	22EE3PCTIM	Transformers and Induction Machines	PC	3	0	1	4	5	50	50	100
6	22EE3PCEEM	Electrical and Electronic Measurements	PC	2	0	0	2	2	50	50	100
7	22MA3HSUHV	Universal Human Values	HS	0	1	0	1	2	50	50	100
8	22EE3AEECL	Electrical and Electronics Circuits Lab	AEC	0	0	1	1	2	50	50	100
9	22MA3HSSAK/ 22MA3HSBAK	Samskrutika Kannada / Balake Kannada	HS	1	0	0	1	1	50	50	100
10	22EE3NCCLA	Cultural Activity	NCMC-1	-	-	-	-	PP/NP	-	-	PP/NP
		Total		**16**	**3**	**3**	**22**	**28**	**450**	**450**	**900**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR FOURTH SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22MA4BSCPS	Complex Analysis, Probability And Statistical Methods	BS	2	1	0	3	4	50	50	100
2	22ES4ESCST	Control Systems (EEE/ECE/EIE/ETE)	ES	3	1	0	4	5	50	50	100
3	22EE4PCGTD	Generation, Transmission and Distribution	PC	3	0	0	3	3	50	50	100
4	22EE4PCAEL	Analog Electronic Circuits & LIC	PC	3	0	1	4	5	50	50	100
5	22ES4PCAPP	ARM Processor and Programming (Common for Electrical Cluster)	PC	3	0	1	4	5	50	50	100
6	22EE4SRIN1	Seminar- Internship involving Social Activity	ISR	0	0	1	1	2	50	50	100
7	22MA4AEMP1	Mathematics concepts using Python-1	AEC	0	0	1	1	2	50	50	100
8	22CV4HSEVS	Environmental Studies	HS	1	0	0	1	1	50	50	100
9	22MA4HSCPH	Constitution of India, Professional Ethics and Human Rights	HS	1	0	0	1	1	50	50	100
10	22EE4NCPYA	Physical Activity	NCMC-2	-	-	-	PP/NP	-	-	-	PP/NP
		Total		**16**	**2**	**4**	**22**	**29**	**450**	**450**	**900**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR FIFTH SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22EE5PCPSA	Power System Analysis	PC	2	1	0	3	4	50	50	100
2	22EE5PCMCT	Modern Control Theory	PC	2	1	0	3	4	50	50	100
3	22EE5PCPE1	Power Electronics-1	PC	2	0	0	2	2	50	50	100
4	22EE5PCDSM	DC & Synchronous Machines	PC	3	0	1	4	5	50	50	100
5	22EE5PCPSP	Power System Protection	PC	3	0	1	4	5	50	50	100
6	22EE5PEXXX	Professional Elective –I	PE-1	3	0	0	3	3	50	50	100
7	22EE5PWMP1	Project -1	PW-1	0	0	1	1	2	50	50	100
8	22ES5HSPMF	Project Management and Finance (TCE/EEE/EIE/ECE)	HS	2	0	0	2	2	50	50	100
9	22EE5NCILT	Indian Literature	NCMC-3	-	-	-	PP/NP	-	-	-	PP/NP
		Details of 40 AICTE Activity Points									
		Total		**17**	**2**	**3**	**22**	**27**	**400**	**400**	**800**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR FIFTH SEMESTER

Area/Domain	Course Code	Professional Elective- 1
Advances in Power Engineering	22EE5PEEEM	Electrical Engineering Materials
**Renewable Energy Resources and Electric Vehicle	22EE5PESES	Sustainable Energy Systems
Electronics Engineering	22EE5PEDSD	Digital System Design using Verilog
Computer Engineering	22EE5PECDS	C++ and Data Structures

**This course has a L-T-P of (2-0-1).

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR SIXTH SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22EE6PCCAP	Computer Applications in Power Systems	PC	2	1	0	3	4	50	50	100
2	22EE6PCDSP	Signals and DSP	PC	3	0	1	4	5	50	50	100
3	22EE6PCPE2	Power Electronics-2	PC	3	0	1	4	5	50	50	100
4	22EE6PEXXX	Professional Elective -2	PE-2	3	0	0	3	3	50	50	100
5	22EE6OE1XX	Open Elective -1	OE	3	0	0	3	3	50	50	100
6	22EE6PCPSL	Power System Lab	PC	0	0	1	1	2	50	50	100
7	22EE6PWM2	Project -2	PW-2	0	0	2	2	4	50	50	100
8	22EE6SRIN2	Internship Based Seminar	ISR	0	0	2	2	4	50	50	100
9	22EE6NCPDC	Personality development & communication	NCMC-4	-	-	-	PP/NP	-	-	-	PP/NP
		Details of 20 AICTE Activity Points									
		Total		**14**	**1**	**7**	**22**	**30**	**400**	**400**	**800**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR SIXTH SEMESTER

Area/Domain	Course Code	Professional Elective- 2
Advances in Power Engineering	22EE6PEAIE	AI techniques in electrical power systems
Renewable Energy Resources and Electric Vehicle	22EE6PEEPU	Electrical power Utilization and Traction
Electronics Engineering	22EE6PEFVI	Fundamentals of VLSI
Computer Engineering	22EE6PEITE	IoT and its Applications in Energy Sector

Area/Domain	Course Code	Open Elective- 1
Electrical Engineering	22EE6OERES	*Renewable Energy Resources
Mathematics	22EE6OEAMA	Advanced Mathematics
Computer science	22EE6OEIOT	**Internet of Things

*Excluding those EEE students who have opted Sustainable Energy Systems -22EE5PESES in V-semester

**Except those who have opted IoT and applications

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR SEVENTH SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22ES7BSBFE	Biology for Electrical Engineers	BS	1	0	0	1	1	50	50	100
2	22EE7PCHVE	High Voltage Engineering	PC	2	0	1	3	4	50	50	100
3	22EE7PCPSO	Power System Operation and Control	PC	2	0	0	2	2	50	50	100
4	22EE7PE3XX	Professional Elective -3	PE-3	3	0	0	3	3	50	50	100
5	22EE7PWMP3	Project -3	PW-3	0	0	2	2	4	50	50	100
6	22EE7OE2XX	Open Elective -2	OE-2	3	0	0	3	3	50	50	100
7	22ES7HSIPL	IPR and Cyber Law (EIE&EEE)	HS	2	0	0	2	2	50	50	100
8	22EE7NCMC1	MOOCs Course -1	NCMC-5	-	-	-	PP/NP	-	-	-	PP/NP
		Details of 20 AICTE Activity Points									
		Total		**13**	**0**	**3**	**16**	**19**	**350**	**350**	**700**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR SEVENTH SEMESTER

Area/Domain	Course Code	Professional Elective- 3
Advances in Power Engineering	22EE7PECED	Control of Electric Drives
Renewable Energy Resources and Electric Vehicle	22EE7PEEVT	Electric Vehicle Technology
Electronics Engineering	22EE7PEEMS	Embedded Systems
Computer Engineering	22EE7PEROB	Robotics

Area/Domain	Course Code	Open Elective- 2
Electrical Engineering	22EE7OEHES	Holistic approach to Electrical Safety
Mathematics	22EE7OEOPR	Operations Research
Computer science	22EE7OEBCT	Block chain Technology

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR EIGTH SEMESTER

Sl No.	Code	Course title	Type	Credits				Hours	Marks		
				L	T	P	Total		CIE	SEE	Total
1	22EE8PE4XX	Professional Elective -4	PE-4	3	0	0	3	3	50	50	100
2	22EE8PWMP4	Project -4	PW-4	0	0	6	6	12	50	50	100
3	22EE8OE3XX	Open Elective -3	OE-3	3	0	0	3	3	50	50	100
4	22ES8HSIFE	Innovation for Entrepreneurship	HS	2	0	0	2	2	50	50	100
5	22EE8SRIN3	Internship Based Seminar	ISR	0	0	2	2	4	50	50	100
6	22EE8NCMC2	MOOCs Course - 2	NCMC-6	-	-	-	PP/NP	-	-	-	PP/NP
		Details of 20 AICTE Activity Points									
		Total		**8**	**0**	**8**	**16**	**24**	**250**	**250**	**500**

BMS COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

SCHEME FOR EIGTH SEMESTER

Area/Domain	Course Code	Professional Elective- 4
Advances in Power Engineering	22EE8PEEPQ	Electrical power quality
Renewable Energy Resources and Electric Vehicle	22EE8PESME	Smart Grid & Energy Storage System
Electronics Engineering	22EE8PECMS	Communication Systems
Computer Engineering	22EE8PEBDC	Big Data & Cloud computing

Area/Domain	Course Code	Open Elective- 3
Electrical Engineering	22EE8OEEEC	Electrical Energy conservation and auditing
Mathematics	22EE8OEEVT	*Electric Vehicle Technology
Computer science	22EE8OECBS	Cyber Security

*Excluding those EEE students who have opted for Electric Vehicle Technology as Program Elective-22EE7PEEVT in VII- Semester

Engineering Tools		
Semester	**Course**	**The Engineering Tool**
III	21XX4AEXXX	Sci-Lab
IV	21MA4AEMP1	Python-1
VI	21EE6CCDSP	DSP toolbox and Matlab/simulink
VI	21EE6PCPS2	Matlab

Seminars		
Semester	**Course**	**Details of the seminar**
IV	21XX4SRIN1	Seminar Internship
VI	21XX6SRIN2	Internship based seminar
VI	PW2	Project based seminar
VIII	21XX8SRIN3	Seminar Internship

Projects		
Semester	**Course**	**Typical projects**
III	21EE3PCFTH	Project based AAT
IV	21EE4PCTND	Project based AAT
V	21EE5PCPS1	Project based AAT
V	PW1	Mini- project-1
VI	21ES6CCDSP	Project based AAT
VI	PW2	Mini- project-2
VII	PW-3	Major- project-1
VIII	PW-4	Major- project-2

Note: Every student is required to complete 12 to 16 weeks of internship (with about 40 hours per week),
during the Summer/Winter semester breaks. The Internships are evaluated through Internship Reports and Seminars during the VI and VIII semesters. The internships can be taken up in an industry, a government organization, a research organization or an academic institution, either in the country or outside the country,that include activities like:

1 Successful completion of Value Added Programs/Training Programs/ workshops organized by academic Institutions and Industries
2 Soft skill training by the Placement Cell of the college
3 Active association with incubation/ innovation /entrepreneurship cell of institute
4 Participation in Inter-Institute innovation related competitions like Hackathons
5 Working for consultancy/ research project within the institutes
6 Participation in activities of Institute's Innovation Council, IPR cell, Leadership Talks, Idea/Design/ Innovation contests
7 Internship with industry/ NGO's/ Government organizations/ Micro/ Small/Medium enterprises
8 Development of a new product/ business plan/ registration of a start-up Long term rural internship

For complete details refer: AICTE Internship Policy: Guidelines and Procedures

III Semester Syllabus

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

THIRD SEMESTER B.E.

Course Name	TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES		
Course Code	22MA3BSTFN	CIE MARKS	50
L–T -P	2:1:0	SEE MARKS	100
Credits	03	EXAM HOURS	03

Course objectives: The purpose of the course is to facilitate the learners to:

- Appreciate the importance of Series, Transforms and Numerical Techniques in Engineering Problems.
- Acquire the knowledge of Series, Transforms and Numerical Techniques to apply them in their core domain.
- Improve their Mathematical thinking and acquire skills required for sustained lifelong learning

TEACHING-LEARNING PROCESS (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Encourage the students for group learning to improve their creative and analytical skills.

UNIT - 1

LAPLACE TRANSFORMS:

Definition and Laplace transforms of elementary functions (statements only). Problems on Laplace transform of $e^{at} f(t)$, $t^n f(t)$, $\frac{f(t)}{t}$ Lapla transforms of derivatives and integrals.

Laplace Transform of periodic functions (statement only) and unit-step function – Problems. Inverse Laplace transforms: definition and problems. solution of differential equations. **08Hrs**

Teaching-Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

FOURIER SERIES:

Introduction to infinite series, convergence and divergence. Periodic functions, Dirichlet's conditions. Fourier series of periodic functions with period 2π and arbitrary period. Complex Fourier series. Practical harmonic analysis. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

FOURIER TRANSFORMS:

Definition and problems on Fourier Transform. Fourier sine and cosine transforms – Problems. Inverse Fourier transform, Inverse Fourier cosine and sine transforms - Problems. Convolution theorem (only statement) – problems. **8Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

NUMERICAL SOLUTION OF PDE:

Classification of second-order partial differential equations, finite difference approximation of derivatives. Solution of one-dimensional heat equation by Schmidt explicit formula and Crank- Nicholson method. Solution of one-dimensional wave equation using explicit three level formula and implicit scheme. **8Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

CALCULUS OF VARIATIONS:

Definition, Variation of a functional, Euler's equation, variational problems.

Applications: Hanging cable problem, Brachistochrone problem.

Z-TRANSFORMS:

Definition, Standard Z-transforms, Damping rule, Shifting rule, Initial value and final value theorems-problems. Inverse Z-transform and applications to solve difference equations. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA3BSTFN	CO 1	Apply the concepts of Transform Techniques, optimization and Finite Difference Methods to solve engineering problems.	1	3
	CO 2	Analyze Engineering Application Problems using the concepts of Transform Techniques, optimization and Finite Difference Methods.	1	1
	CO 3	Demonstrate the importance of Transform Techniques, optimization and Finite Difference Methods in engineering using programing tools.	1 & 5	1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

Two best scores out of the three tests will be considered for CIE.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

SEMESTER END EXAMINATION:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 3 & 4 and two questions each from Unit 1 and Unit 5.

TEXT BOOKS:

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books:

1. B.V. Ramana: "Higher Engineering Mathematics", McGraw-Hill Education, 11th Ed.
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics "Oxford University Press, 3rd Reprint, 2016.
3. N. P Bali and Manish Goyal: "A textbook of Engineering Mathematics", Laxmi Publications.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics", McGraw–Hill Book Co. New York, 6th Edition.
5. Gupta C.B, Sing S. R. and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc- Graw Hill Education (India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", S. Chand Publication (2014).
7. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

WEB LINKS AND VIDEO LECTURES (E-RESOURCES):

1. http://www.class-central.com/subject/math(MOOCs)
2. http://academicearth.org/
3. http://www.bookstreet.in.
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ADDITIONAL MATHEMATICS - I		
Course Code	22MA3IMMAT	CIE MARKS	50
L–T -P	2:1:0		
Credits	00		

Course Objectives: The objective of the course is

- To facilitate the students with a foundation of differential calculus & analytical methods for solving engineering problems.

Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.

UNIT - 1

DIFFERENTIAL AND INTEGRAL CALCULUS:

List of standard derivatives including hyperbolic functions, rules of differentiation. Polar curves, angle between the radius vector and the tangent, angle between two curves (No proof). Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems.List of standard integrals, integration by parts. Definite integrals-problems.**(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

MULTIVARIATE CALCULUS

Partial differentiation, total derivative-differentiation of composite functions. Jacobian and problems. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.**(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

ORDINARY DIFFERENTIAL EQUATIONS (ODE's) OF FIRST ORDER

Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's - Orthogonal trajectories.

Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only. **(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Higher-order linear ODE's with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre homogeneous differential equations. Problems.**(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

PARTIAL DIFFERENTIAL EQUATIONS (PDE's)

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of PDE by the method of separation of variables. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.**(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO
22MA3IMMAT	CO 1	Demonstrate the concepts of differential calculus and Integral Calculus.	1
	CO 2	Apply the concepts of differential calculus to solve ordinary and partial differential equations	1

Assessment Details (CIE)

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Suggested Learning Resources:

Text Books

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. B.V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016.
3. N. P. Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co. Newyork, Latest ed.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc- Graw Hill Education (India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication (2014).
7. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Web links and Video Lectures (e-Resources):

1. http://.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ELECTRICAL CIRCUIT THEORY (*Only for EEE*)		
Course Code	22EE3PCECT	CIE MARKS	50
L–T -P	3:0:0	SEE MARKS	100
Credits	03	EXAM HOURS	03

PRE-REQUISITES: Basic Electrical Engineering and Mathematics – I & II Course objectives:

- To familiarise the basic laws, source transformations, and the different methods of analysing electrical circuits.
- To explain the use of network theorems and the concept of resonance.
- To explain the importance of initial conditions, their evaluation and transient analysis of R-L and R-C circuits.
- To impart basic knowledge on network analysis using Laplace transforms.
- To familiarise the analysis of two port networks and networks with non-sinusoidal inputs.

UNIT - 1

Basic Concepts: Active and passive elements, Concept of ideal and practical sources. Source transformation and Source shifting, Analysis of networks by (I) Network reduction method including star – delta & vice versa transformation (ii) Mesh and Node voltage methods for AC and DC circuits with independent sources only, Concept of Super-Mesh and Super node analysis, problems based on super mesh & super node analysis and Concept of Duality. **08 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Network Theorems: Super Position theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem. Analysis of networks, with AC and DC circuits. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

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 ofcircuit elements under switching action (t=0 and t=∞), Evaluation of initial conditions. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Laplace Transformation: Laplace transformation (LT), LT of Impulse, Step, Ramp,Sinusoidal signals and shifted functions. Waveform synthesis, Initial value and Final value theorems. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Two Port networks: Definition, Open circuit impedance, short circuit admittance and Transmission parameters and their evaluation for simple circuits for independent sources only. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Understand the basic concepts, formulate the equations base on basic laws and analyse the behavior of DC and AC complex electric networks.
CO2	Analyse different theorem based on DC & AC independent sources.
CO3	Apply the knowledge of mathematics and analyse the techniques for resonant circuits and transient behavior of networks.
CO4	Analyse Laplace Transform for different functions and wave synthesis and also model & analysis of two-port networks.

CO-PO mapping

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

UNIT CHOICE: UNIT-1 AND UNIT-3

Note: only independent sources considered and no dependent sources in the entire syllabus.

Textbooks:

S No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Circuit Analysis	William H Hayt et al.	Mc Graw Hill	8th Edition,2014.
2	Network Analysis	U.A. Bakshi & A.V. Bakshi	Technical Publications	Third Revised Edition :2013
3	Fundamentalsof Electric Circuits.	Charles K Alexander Matthew NO Sadiku.	McGraw Hill.	5th Edition,2013.

Reference Books:

1	Network Analysis	Prof. Yoganarashimhan	Shiva book Centre.
2	Networks and Systems	D. Roy Choudhary	New Age International Publishers
3	Networks and Systems	Asfaq Hussain	Khanna Publishing House, Delhi

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Name	FIELD THEORY		
Course Code	22EE3PCFTH	CIE MARKS	50
L–T -P	2:1:0	SEE MARKS	100
Credits	03	EXAM HOURS	03

Course objectives:

- To introduce the basic mathematical concepts related to electromagnetic vector fields.
- To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.
- To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.
- To impart knowledge on the concepts of Faraday 's law, induced emf and Maxwell 's equations
- To impart knowledge on the concepts of Concepts of electromagnetic waves and Transmission lines.

UNIT - 1

Introduction to Electrostatics: Introduction to Line Integral, Surface Integral, Volume Integral of Vectors, Coulomb's Law (Vector Form), Electric Field Intensity (EFI) (Vector Form), EFI Due to Different Types of Charge Distributions. Electric Flux Density (EFD), Gauss' Law, Divergence: Electric Flux Density (EFD), Gauss's Law, Application, Divergence and Divergence Theorem. **(6L+2T)** **08Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 2

Energy and Potential: Energy Spent in Moving Charge, Definition of Potential Difference (PD), PD Due to Point Charge and System of Charge, Energy Density. Current and Current Density: Current and Current Density, Continuity of Current, Conductor, Properties, and Boundary Conditions. **(6L+3T)** **09Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 3

Dielectric: Dielectric Materials, Boundary Conditions, Poisson's and Laplace's Equations: Derivations of Poisson's and Laplace's Equations, Solution of Poisson's and Laplace for Single Variables, Capacitance of Different Configurations using Laplace's Equation. **(4L+2T)** **06Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 4

Steady Magnetic Field: Biot-Savart Law, Ampere's Circuital Law, Curl, Magnetic Flux, Flux Density, Scalar and Vector Magnetic Potentials, Force on a Moving Charge, Force on Different Current Element, Inductance and Mutual Inductance Magnetic Boundary Condition. **(05L+3T)** **08Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 5

Time Varying Fields and Maxwell's Equations: Faraday's Law, Displacement Current, Maxwell's Equations in Point and Integral Form, Uniform Plane Waves, Wave Equations, Solution of Wave Equation, Wave Propagation through Good Dielectric, Good Conductor, Skin Depth, Poynting Theorem. **(7L+2T)** **09Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

Course outcomes (Course Skill Set):

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

CO1	Define, understand, and explain concepts on electrostatics and magnetostatics, time varying fields and Maxwell's equations, EMI and EMC.
CO2	Apply various properties/laws/theorems/Maxwell equations of electrostatics, magnetostatics to solve/derive examples in different media of time varying fields.
CO3	Analyse the given specifications of static and time varying electric and magnetic field
CO4	Make an effective oral presentation on electromagnetic transmission norms, radiation hazards, effect on environment, EMI and EMC.

CO-PO mapping

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

UNIT CHOICE: UNIT-2 AND UNIT-5

Textbooks:

S No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Engineering Electromagnetics	H Hayt, J A Buck, MJaleel Akhtar	Tata McGraw-Hill	8th Edition, 2014.
2	Electromagnetics, Schaum's Outline Series	U.A. Bakshi & A.V. Bakshi	Tata McGraw-Hill	Revised 2nd Edition, 2014

Reference Books:

1	Electromagnetics with Applications	John Krauss and Daniel A Fleisch,	McGraw Hill.	5th Edition, 1999
2	Field and Wave Electromagnetic	David K Chary	Pearson Education Asia	2nd Edition –1989, Indian Reprint – 2013
3	Elements of Electromagnetics,	Mathew N. O. Sadiku	Oxford University	Publication, 2014

E-books

1. http://www.freebookcentre.net › electromagnetics_ebooks
2. https://www.pdfdrive.com › electromagnetic-fields-books
3. https://www.pdfdrive.com › electromagnetic-field-theor...

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	DIGITAL CIRCUITS (MDE,ETE,EEE,EIE)		
Course Code	22ES3PCDCS	CIE MARKS	50
L–T -P	3:0:1	SEE MARKS TOTAL MARKS	50 100
Credits	04	EXAM HOURS	03

PRE-REQUISITES: Basic Electronics

Course objectives:

To impart basic knowledge of digital logic levels and apply the knowledge to understand digital electronic circuits

- To enable the skill to anlayse and design combinational and sequential logic circuits
- To provide the basic language features of Verilog HDL and the role of HDL in digital logic design.
- To provide hands-on experience in digital circuits and verification using Verilog HDL.

UNIT - 1

Introduction: Review of Boolean algebra, logic gates.

Simplification of Boolean functions: Three Variable, Four Variable-K– Maps, The Tabulation Method, Design with Basic gates, NAND gates and NOR gates.

Introduction to Verilog: Structure of Verilog module, Operators, Data Types, Styles of Description. Introduction to test bench **08Hrs**

Teaching - Learning Process	Chalk and Talk, Simulation Tool

UNIT - 2

Arithmetic Circuits: Introduction, Half adder, Half subtractor, Full adder, Full subtractor, Parallel Adders (Carry Look Ahead Adder and Ripple carry adder), Decimal Adder.

Verilog Data flow description: Highlights of Data flow description, Structure of Data flow description. **08Hrs**

Teaching - Learning Process	Chalk and Talk, Simulation Tool

UNIT - 3

Combination Logic Circuits: Code conversion, Magnitude Comparator, Decoders,

Multiplexers, Read Only memories (ROM), Programmable Logic Arrays (PLAs). Modeling using data flow description. **08Hrs**

Teaching - Learning Process	Chalk and Talk, Simulation Tool

UNIT - 4

Sequential Logic Circuits:

The Basic Flip-flop circuit, Clocked Flip-flops, Triggering of Flip-flops: Master Slave Flip-Flops, Edge Triggered Flip Flops, Characteristic Equations, Conversion of flip-flops.

Verilog Behavioral description: Structure, Variable Assignment Statement, Sequential Statements, Loop Statements, Verilog Behavioral Description of Combinational and Sequential Circuits. **08Hrs**

Teaching - Learning Process	Chalk and Talk, Simulation Tool

UNIT - 5

Registers and Counters with Verilog Structural description: Shift Registers, Ripple Counters, Design of Synchronous Counters Highlights of Structural description, Organization of structural description, Structural description of Combinational and Sequential Circuits. **08Hrs**

Teaching - Learning Process	Chalk and Talk, Simulation Tool

Course outcomes (Course Skill Set):

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

CO1	Apply the knowledge of simplification and optimization of digital concepts.
CO2	Investigate and analyze digital circuits for given specification and reach substantiated conclusions.
CO3	Design and simulate digital circuits that meet specified needs with appropriate consideration.
CO4	Engage students individually/ in a team to demonstrate open ended experiments and document the same.
CO5	Conduct experiments using digital IC and simulation tools for a given application/problem statement.

CO-PO mapping

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

LIST OF LABORATORY EXPERIMENTS

Sl.no	Experiments	
1.	Applications of IC 7483 (Adders, Subtractors and Comparators)	All experiments to be conducted using digital IC trainer and simulator
2.	Multiplexers (using Gates and IC) and their applications.	
3.	Decoders/DeMultiplexers (using Gates and IC) and their applications.	
4.	BCD to Decimal decoder using 7-segment display.	
5.	Verification of MSJK Flip-flop (using Gates and IC 7476).	
6.	Asynchronous counters (using ICs 7476,7490,7493).	
7.	Synchronous Counters (using ICs 7476, 74190/74192).	
8.	Shift registers and their applications (using ICs7476, 7495).	

Online Courses:

1. https://nptel.ac.in/courses/108105113/
2. https://nptel.ac.in/courses/Verilog fundamentals

E-Books:

1. http://www.panstanford.com/pdf/9789814364591fm.pdf
2. https://easyengineering.net/digital-logic-and-computer-design-by-morris-mano/
3. https://www.sciencedirect.com/book/9780750645829/digital-logic-design
4. https://easyengineering.net/fundamentals-of-digital-circuits-by-anand-kumar/

UNIT CHOICE: UNIT-4 AND UNIT -5

Textbooks:

S No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Digital Logic and Computer Design-	M. Morris Mano,	Prentice Hall – Pearson Education	6th
2	Verilog HDL –	Samir Palnitkar	Sunsoft Press	1st
3	Digital Principles and Design	Donald Givone,	Tata Mc Graw Hill	

Reference Books:

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Digital Design- Principles and Practices	John.F.Wakerly	Pearson Education	4th Ed
2	Fundamentals of Logic Design	Charles Roth Jr Larry L Kinney	Thomas Learning	7th Ed
3	Digital Logic Applications & Principles	John Yarbrough	Cengage Learning	1st Ed
4	HDL Programming in VHDL and Verilog.	Nazeih M Botros,	Dreamtech press	Reprint in 2009

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	TRANSFORMERS AND INDUCTION MACHINES		
Course Code	22EE3PCTIM	CIE MARKS	50
L–T -P	3:0:1	SEE MARKS TOTAL MARKS	50 100
Credits	04	EXAM HOURS	03

PRE-REQUISITES: Basic Electrical Engineering, High School Geometry, Vector Algebra

Course objectives:

1. Understand the construction and operation of 1-phase, 3-Phase transformers, and Autotransformers.
2. Analyze the performance of transformers by polarity test, O.C. and S.C. Test, Back to Back test, phase conversion, 3-phase connection, and parallel operation.
3. Understand the construction and working of three phase induction machines as motor and generator.
4. Analyze the performance of three phase induction motor by no load and blocked rotor tests develop equivalent circuit and construct circle diagram.
5. Understand the construction and operation of single-phase induction motors by applying double revolving field theory and develop equivalent circuit.
6. Understand different starting methods of single-phase induction motors.

UNIT - 1

Single phase Transformers: Ideal and practical Transformer, Operation of practical transformers under no-load and on-load with phasor diagrams, Losses in a transformer, Polarity Test, Open circuit and Short circuit tests, Back to Back Test, Calculation of equivalent circuit parameters and Predetermination of efficiency, Voltage regulation and its significance.

Auto transformers and Tap changing of transformers: Introduction to autotransformer, step down and step up configurations, VA ratings and copper economy in comparison with a two-winding transformer, applications, and drawbacks. Tap changing of transformers- no load and on load. **08Hrs**

Teaching - Learning Process	1. Chalk and Talk OR Power Point Presentation. 2. Practical Based Learning

UNIT - 2

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

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

08Hrs

Teaching - Learning Process	1. Chalk and Talk OR Power Point Presentation. 2. Practical Based Learning

UNIT - 3

Three Phase Induction Motors:

Principle of operation, slip, frequency of rotor current/EMF, speed of rotor field, rotor EMF, rotor current and power factor. Rotor Torque - Expression for rotor torque, Torque - slip curve, starting torque, full load torque, pull out torque. Effect of parameter variation on torque speed characteristics (Variation of stator voltage, frequency and rotor resistance).

Losses and power flow in three phase Induction motor-relation between rotor input and rotor –cu-losses and rotor power developed, rotor output and motor torque, shaft torque, Analogy between three phase IM and Transformer, Electrical equivalent of mechanical load, Equivalent circuit referred to stator, Performance of induction motor from equivalent circuit (Maximum Torque, Maximum Power output) High Torque motors, cogging and crawling in three phase induction motors.

Induction generator: working, applications, advantages and disadvantages. **08Hrs**

Teaching - Learning Process	1. Chalk and Talk OR Power Point Presentation. 2. Practical Based Learning

UNIT - 4

Testing and Circle Diagram of Induction Motors:

No load and blocked rotor tests, stator resistance test, determination of equivalent circuit

parameters, construction of circle diagram, definition of synchronous watt, evaluation of performance from circle diagram, maximum quantities.

Starters for three phase induction motor: Direct on line starting, Necessity of starters, types of starters and their working - resistance, reactance, auto transformer, star-delta and rotor resistance starters.

Methods of Speed control of three phase Induction motors: control by changing the applied voltage, control by changing the supply frequency, control by changing the number of poles, Control by changing the rotor resistance, injecting slip frequency EMF to the rotor, control by cascade connection (Qualitative Analysis only). **08Hrs**

Teaching - Learning Process	1. Chalk and Talk OR Power Point Presentation. 2. Practical Based Learning

UNIT - 5

Single Phase Induction Motors: General introduction to single phase motors, Types of Single-phase motors, construction and working of single-phase induction motors, double revolving field theory, equivalent circuit of single-phase induction motor based on double revolving field theory, tests for determining parameters of equivalent circuit and performance of single-phase induction motors from the equivalent circuit.

Types of Single-Phase Induction Motors: construction and working of Split phase motors- resistance start, capacitor start, single value capacitor and two value capacitor motors. Construction and working of shaded pole induction motor, construction and working of reluctance start induction motor, construction and working of repulsion start induction motor. Applications, advantages and disadvantages of single-phase induction motors. **08Hrs**

Teaching - Learning Process	1. Chalk and Talk OR Power Point Presentation. 2. Practical Based Learning

Course outcomes (Course Skill Set):

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

CO1	To analyze the behavior and characteristics of thetransformers and estimate its performance under steadystate operating conditions.
CO2	To suggest a suitable three phase transformer connection for a particular application.

CO3	To analyze the behavior and characteristics of three phase induction machine as a motor and generator and estimate performance of three phase induction motor under steady state operating conditions.
CO4	To analyze the behavior, characteristics and starting methods of single -phase induction motor and estimate its performance under steady state operating conditions.
CO5	To conduct laboratory experiments on transformers and induction machines and interpret results and write report.

CO-PO mapping

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

UNIT CHOICE: UNIT-II AND UNIT -IV

Textbooks:

1. ELECTRICAL MACHINES in SI units by Er. R.K. Rajput, sixth edition, Laxmi Publications,2016, ISBN-13 978-8131804469
2. THEORY AND PERFORMANCE OF ELECTRICAL MACHINES by J. B. Gupta, S.K. Kataria and sons, 2013 , ISBN-10 9350142775
3. Electrical Machinary, by Dr. P.S. Bimbhra, Khanna Publishers, 2015, 7 th Edition, ASIN : B01BJYF23A

Reference Books:

1. Electric Machinery Fundamentals by Stephen J Chapman, Fourth Edition**,** Indian Edition, Mc Graw Hill Education India, ISBN: 9780071070522.
2. Electrical Machines by Ashfaq Hussain, third edition**,** Dhanpat Rai and Co. **,** 2017, ISBN-13978-8173617089

Web Resources:
NOC: Electrical Machines-NPTEL YouTube videos

LIST OF LABORATORY EXPERIMENTS

Sl.no	Experiments
1.	OC and SC Tests on a single-phase Transformer- Predetermination of efficiency, voltage regulation and equivalent circuit parameters.
2.	Back to Back test on two single phase transformers.
3.	Parallel operation of two single phase transformers - determine load sharing.
4.	Verification of Three Phase Transformer Connections.
5.	Verification of Three Phase to two Phase conversion using two transformers.
6.	Load test on single phase induction motor - determine performance.
7.	Load test on three phase induction motor – determine performance.
8.	No load and blocked rotor test on three phase induction motor-circle diagram and equivalent circuit
9.	Experiment on three phase induction motor starters
10.	Experiment on speed control of three phase induction motor
11.	Experiment on three phase induction generator- operation and characteristics
12.	Experiment on study of effect of change in parameters on performance three phase induction motor.

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ELECTRICAL AND ELECTRONIC MEASUREMENTS		
Course Code	22EE3PCEEM	CIE MARKS	50
L–T -P	2:0:0	SEE MARKS	100
Credits	02	EXAM HOURS	03

PRE-REQUISITES: Fundamentals of Basic Electrical Engineering.

Course objectives:

This course covers description of different types of bridges used for measurement of resistance, inductance and capacitance, instruments used for the measurement of power, energy and power factor, instrument transformers used in ac measurement, construction, operation and applications of Crompton's dc potentiometer, operation of digital instruments and usage of oscilloscopes for the measurement of electrical quantities, selection of transducers based on the application.

UNIT - 1

Measurement of Resistance: Wheatstone's bridge, bridge sensitivity, limitations. Kelvin's double bridge, Problems.

Measurement of Inductance and Capacitance: Sources and detectors, Maxwell's LC bridge, Hay's bridge, Desauty's bridge ,Schering bridge, Problems. **05Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Measurement of Power, Energy and Power factor: Construction and working of dynamometer wattmeter, errors, LPF watt meters. Block diagram and working of Electronic energy meter. Construction and operation of single-phase dynamometer type power factor meter. Problems. **05Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Extension of Instrument Ranges: Construction and theory of current transformers. Expression for ratio error and phase angle error in CT. Turns compensation, Problems.

DC Potentiometer: Construction and operation of Crompton's dc potentiometer. Applications of dc potentiometer. Problems **05Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Electronic and digital Instruments: Advantages of Digital instruments. Digital multimeter. Block diagram and working of Ramp type DVM, Resolution and sensitivity. Block diagram and working of Digital LCR meter.

Oscilloscope: Block diagram and working of DSO, Measurement of voltage, frequency and phase using CRO **05Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Transducers: Classification of transducers, selection factors, Operation of Hall effect transducer, LVDT, Strain gauges, RTDs, Thermistors, Thermocouples, Piezoelectric transducers. Problems. **05Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Understand the basic principles of various instruments to measure electrical parameters and quantities.
CO2	Apply the basic principles of electrical engineering to understand the working of bridges, measuring instruments and Transducers.
CO3	Analyze the operation and working of bridges, range extension Instruments, digital instruments and transducers.

CO4	Select and Justify the choice of suitable bridges, measuring instruments and transducers for various applications.
CO5	Able to engage as individual /team work to make effective technical presentations on the concept of electrical and electronic measurement.

CO-PO mapping

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

UNIT CHOICE: UNIT-1 AND UNIT-3
Textbooks:

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Modern Electronic instrumentation & measurement Techniques.	William. D. Cooper & A.D. Helfrick	Pearson Education	First edition 2015
2	A Course in Electrical & Electronic measurements & instrumentation.	A.K. Sawhney	Dhanpat Rai and company (Pvt) limited, New –Delhi.	Nineteenth Revised edition 2011. Reprint 2022

Reference Books:

1	Electronic instrumentation.	H. S. Kalsi	TMH Education Private limited, New –Delhi	3rd edition, 2012
2	Electronic instrumentation & measurements.	David. A. Bell	Oxford University.	3rd edition, 2013

E-books:

1. http://www.free-engineering-books.com/2013/05/electronic-instrumentation-and.html

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	UNIVERSAL HUMAN VALUES		
Course Code	22MA3HSUHV/ 22MA4HSUHV	CIE MARKS	50
L–T -P	0:1:0	SEE MARKS	50
Credits	01	EXAM HOURS	01
Total Number of hours :	15		

Course objectives:

To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.

UNIT - 1

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking **03 HRS**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Understanding Harmony in the Human Being - Harmony in Myself!

1. Understanding human being as a co-existence of the sentient 'I' and the material

'Body'

2. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
4. Understanding the characteristics and activities of 'I' and harmony in 'I'
5. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
6. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease **03 HRS**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

1. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
2. Understanding the meaning of Trust; Difference between intention and competence
3. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
4. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
5. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education

etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives **03 HRS**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

1. Understanding the harmony in the Nature
2. Holistic perception of harmony at all levels of existence. **03 HRS**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Implications of the above Holistic Understanding of Harmony on Professional Ethics

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc. **03 HRS**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Conduct self-exploration and distinguish between values and skills, happiness and accumulation of physical facilities, the self and the body, Intension and Competence of an individual
CO2	Analyze the value of harmonious relationship based on trust and respect in personal and professional life
CO3	Examine the role of a human being in ensuring harmony in society and nature
CO4	Apply the understanding of ethics in life and profession

Textbooks:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

REFERENCE MATERIAL:

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.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ELECTRICAL AND ELECTRONICS CIRCUITS LAB		
Course Code	22EE3AEECL	CIE MARKS	50
L–T -P	0:0:1	SEE MARKS	50
Credits	01	EXAM HOURS	03

PRE-REQUISITES: Basic Electrical Engineering and Basic Electronics Engineering

Course objectives:

To impart knowledge on the usage of Sci Lab for solving various circuits.

LIST OF EXPERIMENTS

Sl. No.	Experiments
1.	Implement a half wave rectifier on Sci Lab and obtain the plot of the output wave.
2.	Implement a Full wave rectifier on Sci Lab and obtain the plot of the output wave.
3.	Develop a model in Sci Lab to obtain the time response for a series RL Circuit.
4.	Write a code to realize 2:1 MUX. Develop a model for the same on Sci Lab.
5.	Develop a model to realize a full adder using two half adders on Sci Lab.
6.	Write a code to realize a Full adder and a Full Subtractor on Sci Lab.
7.	Develop a mathematical model for a DC motor and obtain the speed V/s time plot for a step change in the load condition after a time of 100 simulation time units from the start time.
8.	Determine the mesh currents for a given network on Sci Lab.
9.	Write a function to generate three phase sine wave of frequency 60Hz and amplitude 10V and a triangular wave of frequency 1kHz and amplitude 15V.
10.	Reduce the given function using K-Map technique and write a Script file to implement the given expression thus obtained.

11.	Demonstrate circuit theorems (Thevenin's Theorem, Superposition Theorem and Maximum Power Transfer Theorem) as applied to the given electrical network and verify the results using Sci Lab.
12.	Verify the voltage and current relationships in a 3 – Ø Star connected AC system using Sci Lab for the given load conditions.
13.	Verify the voltage and current relationships in a 3 – Ø Delta connected AC system using Sci Lab for the given load conditions.
14.	Open-Circuit Test on Single Phase Transformer.
15.	Short- Circuit Test on Single Phase Transformer.

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)
SYLLABUS(2022-2023)

(Course Name)	**ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**		
ವಿಷಯ ಸಂಕೇತ (Course Code)	22MA3HSSAK/ 22MA4HSSAK	**ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯ ಮಾಪನ ಅಂಕಗಳು.**	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / week (L:T:P:S)	1-0-0	**ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು**	**50**
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	**15 ಗಂಟೆಗಳು**	**ಒಟ್ಟು ಅಂಕಗಳು**	**100**
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	**01**		

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪತ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು :

1. ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸಿ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
3. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು ಕನ್ನಡ ಶಬ್ದಸಂಪತ್ತಿನ ಪರಿಚಯ.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching – Learning Process – General Instructions):

These are sample Strategies; which teacher can use to accelerate the attainment of the course outcomes.

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇವತ್ತಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಂದರೆ ಕವಿ – ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು. ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶನಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸುವುದು.

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

ಘಟಕ – 1 **3 Hours**

ಲೇಖನಗಳು:

1. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ – ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ.
2. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ.

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ – 2 **4 Hours**

ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ:

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕ ಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಜೇಡರದಾಸಿಮಯ್ಯ , ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ – ಕನಕದಾಸರು

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ – 3 **3 Hours**

ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ:

1. ಕುರುಡು ಕಾಂಚಾಣ : ಧ. ರಾ. ಬೇಂದ್ರೆ
2. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು.

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ – 4 **3 Hours**

ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ – ಎ ಎನ್ ಮೂರ್ತಿರಾವ್
ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ ಚಿ ಬೋರಲಿಂಗಯ್ಯ

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಘಟಕ – 5 **2 Hours**

1. ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ: ಕನ್ನಡ – ಕಂಪ್ಯೂಟರ್ ಶಬ್ದಕೋಶ

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (course Outcomes):

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOMES (CO)	PO	Strength
22MA3HSSAK 22MA4HSSAK	CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ.	PO10	3
	CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಆಸಕ್ತಿ ಮೂಡುತ್ತದೆ.	PO10	3
	CO3	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ, ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗು ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯವಾಗುತ್ತದೆ.	PO9	1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT 1	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions). The time allotted 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ: ಡಾ. ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

(Course Name)	**ಬಳಕೆ ಕನ್ನಡ**		
ವಿಷಯ ಸಂಕೇತ (Course Code)	22MA3HSBAK/ 22MA4HSBAK	**ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯ ಮಾಪನ ಅಂಕಗಳು.**	**50**
ಒಂದು ವಾರಕ್ಕೆ ಬೋಧನಾ ಅವಧಿ (Teaching Hours / week (L:T:P:S)	1-0-0	**ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯ ಅಂಕಗಳು**	**50**
ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ Total Hours of Pedagogy	**15 ಗಂಟೆಗಳು**	**ಒಟ್ಟು ಅಂಕಗಳು**	**100**
ಕ್ರೆಡಿಟ್ಸ್ (Credits)	**01**		

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching – Learning Process – General Instructions):

These are sample Strategies; which teacher can use to accelerate the attainment of the course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿ ಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧ ಪಟ್ಟ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚಿಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮ ಕೈಗೊಳ್ಳುವುದು . ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯ ಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

UNIT – 1 **2 Hours**

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities
2. Key to Transcription.
3. ವ್ಯಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯ ಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು – Personal Pronouns, Possessive Forms, Interrogative words

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

UNIT – 2 **3 Hours**

1. ಗುಣ ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣ ಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು
   Qualitative, quantitative and colour adjectives, numerals.
2. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) predictive forms, locative case.

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

UNIT – 3 **3 Hours**

1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative cases, and numerals.
2. ಸಂಖ್ಯಾವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers.

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

UNIT – 4 **3 Hours**

1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು. Permission, Commands, encouraging and Urging words (Imperative words and sentences)

2. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯ ಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು. – Helping verbs "iru and iralla", corresponding Future and negation verbs.

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

UNIT – 5 **4 Hours**

1. ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮತ್ತು ರಾಜ್ಯದ ಬಗ್ಗೆ ಕುರಿತಾದ ಇತರ ಮಾಹಿತಿಗಳು. Karnataka State and General Information about the State.
2. ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ. Kannada Language and History.
3. Kannada Language Script Part – 1

ಬೋದನೆ ಮತ್ತು ಕಲಿಕಾ ವಿಧಾನ	ಪುಸ್ತಕ ಆಧಾರಿತ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನ, ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ಬಳಸುವುದು, ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ವೀಡಿಯೋಗಳನ್ನು ಬಳಸುವುದು, ವಿದ್ಯಾರ್ಥಿಗಳೊಂದಿಗೆ ಚಟುವಟಿಕೆಗಳ ಮುಖಾಂತರ ಚರ್ಚಿಸುವುದು.

ಬಳಕೆ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA3HSBAK/ 22MA4HSBAK	**CO 1**	To create an awareness regarding the necessity of learning local language for a comfortable living and to know more about Kannada culture and literature.	PO10	3
	CO 2	To develop proper speaking, reading and writing skills in Kannada.	PO10	3
	CO 3	To engage as a member of a team and enhance the skill in group communication and presentation.	PO9	1

BMS COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT 1	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions). The time allotted 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ: ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ, ಬಳಕೆ ಕನ್ನಡ, ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

IV Semester Syllabus

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS		
Course Code	22MA4BSCPS	CIE MARKS	50
L–T -P	2:1:0	SEE MARKS	100
Credits	03	EXAM HOURS	03

COURSE OBJECTIVES: The goal of the course is to

- Appreciate the importance of Complex Analysis, Special Functions, Probability and Statistics in Engineering.
- Acquire the knowledge of Complex Analysis, Special Functions, Probability and Statistics applied in their core domain.
- Improve their Mathematical thinking and acquire skills required for sustained lifelong learning.

TEACHING-LEARNING PROCESS (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples. Encourage the students for group learning to improve their creative and analytical skill.
3. Encourage the students for group learning to improve their creative and analytical skill.

UNIT - 1

COMPLEX ANALYSIS

Review of a function of a complex variable, limits, continuity and differentiability.

Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms and consequences. Construction of analytic functions by Milne-Thomson method, Problems.Conformal mapping: $w=z^2$ and $w=z+\frac{k^2}{z}\ (z\neq 0)$

Complex integration: Line integral of a complex function, Cauchy's theorem and Cauchy's integral formula and problems. **(RBT Levels: L1, L2 and L3)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

SPECIAL FUNCTIONS

Introduction, Ordinary and Singular Points, Series solution of Bessel's differential equation leading to $J_n(x)$ Bessel's function of the first kind, Properties, generating function for $J_n(x)$, Series solution of Legendre's differential equation leading to $P_n(x)$, generating function for $P_n(x)$. Legendre polynomials, Rodrigue's formula (without proof) - Problems. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

STATISTICAL METHODS

Correlation and regression - Karl Pearson's coefficient of correlation and rank correlation, problems. Regression analysis: lines of regression, angle between two regression lines - problems.

Curve Fitting: Fitting the straight line, parabola and geometric curve ($Y=ax^b$) by the method of least squares. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

PROBABILITY DISTRIBUTIONS

Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Poisson and normal distributions- problems (derivations for mean and standard deviation for Poisson distribution only)-Illustrative examples.

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

STATISTICAL INFERENCE

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and

Type-II errors. Test of hypothesis for means (single mean and difference between two means), student's t-distribution (single mean and difference between two means), Chi-square distribution as a test of goodness of fit. **(RBT Levels: L1, L2 and L3)** **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set): After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA4BSCPS	**CO 1**	Apply the concepts of complex variables, special functions, probability and statistics to solve engineering problems.	1	3
	CO 2	Analyze the engineering data/ problems using special functions,complex variables and statistical methods.	1	1
	CO 3	Demonstrate the importance of complex variables, special functions and statistical methods using programing tools.	5 & 9, 10	1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

Two best scores out of the three tests will be considered for CIE.

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

SEMESTER END EXAMINATION:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 2, 3, 4 and two questions each from Unit 1 and Unit 5.

SUGGESTED LEARNING RESOURCES:

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal Khanna Publishers 44th Edition, 2017.
2. Advanced Engineering Mathematics, E. Kreyszig: John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books:

1. Advanced Engineering Mathematics C. Ray Wylie, Louis C.Barrett McGraw-Hill 6th Edition 1995.
2. Higher Engineering Mathematics B. V. Ramana McGraw-Hill 11th Edition,2010.
3. A Text-Book of Engineering Mathematics N. P. Bali and Manish Goyal Laxmi Publications 2014.
4. Advanced Engineering Mathematics Chandrika Prasad and Reena Garg Khanna Publishing, 2018.

WEB LINKS AND VIDEO LECTURES (E-RESOURCES):

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. http://www.bookstreet.in.
5. VTU EDUSAT PROGRAMME – 20
6. VTU e-Shikshana Program

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ADDITIONAL MATHEMATICS - II		
Course Code	22MA4IMMAT	CIE MARKS	50
L–T -P	2:1:0		
Credits	00		

Course Objectives: The objective of the course is

- To facilitate the students with a foundation of integral calculus.
- To facilitate the students with a foundation of vector calculus, linear algebra and numerical techniques

Teaching-Learning Process (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples

UNIT - 1

NUMERICAL METHODS – 1

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations; Gauss-elimination method and Approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

NUMERICAL METHODS -2

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae and Lagrange's interpolation formula (without proof). Problems.

Numerical integration: Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules(without proof): Problems.

08Hrs

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

NUMERICAL METHODS -3

Numerical Solution of Ordinary Differential Equations (ODE's):

Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth-order, Milne's predictor-corrector formula (No derivations of formulae). Problems. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

INTEGRAL CALCULUS

Multiple Integrals: Evaluation of double integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Evaluation of triple integrals. Problems. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

BETA-GAMMA FUNCTIONS AND VECTOR INTEGRATION

Beta and Gamma functions: Definitions, properties, the relation between Beta and Gamma functions.

Vector Integration: Line integral, Green's theorem and Stokes' theorem **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics.

Course Code	CO	COURSE OUTCOME (CO)	PO
22MA4IMMAT	CO 1	Apply the concepts of linear algebra and numerical methods	1
	CO 2	Apply the concepts of integral calculus	1

Assessment Details (CIE)

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Theory	Quiz	10	100	5	50
	AAT	10		5	
	Test 1	40		20	
	Test 2	40		20	

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Suggested Learning Resources:

Text Books

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. B.V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016.
3. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co. New York, Latest ed.
5. Gupta C. B, Sing S. R. and Mukesh Kumar: "Engineering Mathematic for Semester I

and II", Mc- Graw Hill Education (India) Pvt. Ltd 2015.

6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication (2014).

7. **James Stewart: "**Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Web links and Video Lectures (e-Resources):

1. http://.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Name	CONTROL SYSTEMS (EEE, ECE, EIE, ETE)		
Course Code	22ES4ESCST	CIE MARKS	50
L–T -P	3:1:0	SEE MARKS	50
Credits	04	EXAM HOURS	03

PRE-REQUISITES: Linear Circuit Analysis, Engineering Mathematics I & II, Advanced Mathematics preferred.

UNIT - 1

Introduction: Examples of Control Systems, open loop vs Closed loop Systems. Mathematical Modelling of Linear Systems: Transfer functions, Mechanical Systems, Analogous Systems, Block diagram, Signal Flow graph, Transfer Functions of Lag & Lead Compensators. **11Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Controllers & Time Response Analysis: Step response of first order, second order systems, response specification, steady state error and error constants. Effect of PI, PD and PID controllers on the time response of the system. **10Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Stability Analysis: Concept of stability, RH criterion, applications of RH criterion with limitations. Root locus technique: Introduction to root locus concepts, Construction rules, Analysis of stability by root locus plot **10Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Frequency Response Analysis: Frequency domain specification, Polar plots, Nyquist plot, Stability Analysis using Nyquist criterion, Bode plots, GM and PM, Relative stability **11Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

State Variable Analysis: Concept of state variables, physical variable model, phase variable model, canonical model, obtaining transfer function from state model. **10Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT CHOICE: UNIT-1 AND UNIT-4

Course outcomes (Course Skill Set):

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

CO1	Understand the basic concepts related to control systems.
CO2	Apply the knowledge of engineering fundamentals to obtain transfer function of a system
CO3	Analyse the behaviour of a given LTI system
CO4	Investigate the stability and/or design a given system using time/ frequency domain techniques.
CO5	Interpret the response of a linear system using modern tools and communicate effectively.

CO-PO mapping

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

Textbooks:

1. Control Engineering - Nagrath & Gopal, New Age International Publishers
2. Engineering control systems – Norman S. Nise, John WILEY & sons, fifth Edition

Reference Books:

1. Modern control Engineering- Ogata, Prentice Hall
2. Automatic Control Systems -B.C Kuo, John Wiley and Sons

E-References:

1. http://en.wikibooks.org/wiki/Control_Systems
2. http://www.electrical4u.com/control-system-closed-loop-open-loop-control-system/#practical-examples-of-open-loop-control-system
3. http://www.facstaff.bucknell.edu/mastascu/eControlHTML/CourseIndex.html

e–Learning :

1. https://swayam.gov.in/
2. https://www.edx.org/course/

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	GENERATION, TRANSMISSION AND DISTRIBUTION		
Course Code	22EE4PCGTD	CIE MARKS	50
L–T -P	3:0:0	SEE MARKS	100
Credits	03	EXAM HOURS	03

PRE-REQUISITES: Knowledge of Basic Electrical Engineering, Field Theory and Circuit Analysis

Course objectives:

- To study the overview of conventional & non-conventional source, economics of generation and transmission & distribution scheme
- To understand the mechanical design of transmission lines and to analyse the voltage distribution in insulator strings to improve the efficiency
- To study the Insulated cables including the grading and calculation of capacitances in single core and three core cables.
- To study the Fundamental concepts and detailed calculations of line parameters and
- To develop expressions for the computation of transmission line parameters and to determine voltage regulation and efficiency.
- To study about distribution systems, types of substations, methods of grounding, HVAC, HVDC

UNIT - 1

Generation of Electric Power: Overview of Conventional (Hydro, Thermal and Nuclear) and Non-Conventional Sources (Solar and Wind) (Block Diagram and Brief Description Only). Standard Voltages for Generation, Transmission and Distribution. Economics of Generation: Demand Factor, Load Factor, Diversity Factor, Load Curve (Brief Description Only). Methods of Power Factor Improvement, Numerical Problems.

Transmission and Distribution Systems Scheme: Comparison between AC & DC Transmission, Advantages of High Voltage Transmission. Mechanical Design of Transmission Lines: Types of Conductors, Conductor Materials. Calculation of Sag in Conductors: At Equal Supports and at Different Level Supports, Effect of Ice Covering and Wind Pressure, Factors Affecting Sag. **10Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 2

Overhead Line Insulators: Brief Introduction to Types of Insulators, Material Used, Potential Distribution over a String of Suspension Insulators. String Efficiency, Methods of Increasing String Efficiency.

Line Parameters: Introduction to Line Parameters, Inductance and Capacitance of Single Phase and Three Phase Lines with Equilateral Spacing and Unsymmetrical Spacing, Inductance and Capacitance of Composite Conductors, Geometric Mean Radius (GMR) and Geometric Mean Distance (GMD). Comparison between Single Circuit, Double Circuit and Transposed Lines. **10Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 3

Performance of Transmission Lines: Classification of Lines: Short, Medium and Long, ABCD Constants in All Cases, Current and Voltage Relations, Line Regulation and Ferranti Effect in Short, Medium (Nominal T and Π Circuits), and Long Lines. Equivalent Circuit and Hyperbolic Form Equations of Long Line. **06Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 4

Corona: Phenomena, Disruptive and Visual Critical Voltages, Corona Loss. Advantages and Disadvantages of Corona. Factors Affecting Corona and Methods of Reducing Corona.

Under Ground Cables: General Construction of Cable, Types of Cables, Material Used, Expression for Insulation Resistance, Dielectric Stress, Power Factor, Capacitance, Charging Current of a Single Core Power Cable, Grading of Cables, Capacitance Grading and Inter Sheath Grading. Measurement of Capacitance of Single Core and Three Core Cable, Maximum Current Carrying Capacity of Cables. **06Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

UNIT - 5

Distribution Network: Classification, Radial Distribution Systems, Ring Distribution

System, DC Distribution System with Concentrated Loads and Uniform Loading, AC Distribution.

Sub Station: Classification of Substations: Indoor and Outdoor, Selection of Site for Substation, Busbar Arrangement Schemes and Single Line Diagrams of Substations.

Earthing: Basic Terms of Earthing, Effect and Methods of Neutral Grounding. **08Hrs**

Teaching - Learning Process	Chalk and Talk, Problem based learning

Course outcomes (Course Skill Set):

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

CO1	Understand the fundamental of generation, transmission and distribution in electrical power system.
CO2	Analyze various transmission and distribution system to pologies as well as line parameters, overhead lines,underground cables, corona, and earthing.
CO3	Apply the knowledge of electrical power system to determine its design parameters.
CO4	Develop mathematical/ network models of transmission lines with different configurations and assess their performance.
CO5	Ability to engage in independent learning to make an effective presentation on technological advances and applications of generation, transmission, and distribution systems.

CO-PO mapping

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

CO4						3						
CO5						1			1	1	1	

UNIT CHOICE: UNIT-1 AND UNIT-5

Textbooks:

S No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Electrical Power Transmission and Distribution	S. Sivanagaraju and S. Satyanarayana,	Pearson Education	2009
2	Transmission and Distribution of Electrical Power,	J.B. Gupta	S.K. Kataria and Sons	10th Edition,2012.

Reference Books:

1	Elements of Power System Analysis	W.D. Stevenson	McGraw Hill Comp. Ltd.	1994.
2	Electric Power Generation Transmission & Distribution	S.N. Singh	PHI Learning Pvt. Ltd.,	2nd Edition, 2010.
3	Electrical Power Systems	C.L. Wadhwa	New Age International Publishers,	6th Edition, 2013.
4	Electrical Power	S.L. Uppal	Khanna Publication.	

E-books

NPTEL Courses in Electrical Engineering: Power System Generation, Transmission & Distribution: Video Lecture Numbers: 10, 11, 12, 13, 18, 19, 20, 23 by Prof. D.P. Kothari, Centre for Energy Studies, IIT New Delhi.

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Name	ANALOG ELECTRONIC CIRCUITS & LIC		
Course Code	22EE4PCAEL	CIE MARKS	50
L–T -P	3:0:1	SEE MARKS	50
Credits	04	EXAM HOURS	03

PRE-REQUISITES: Basic Electrical Engineering, Engineering Mathematics – I & II, Basic Electronics

Course objectives:

- Provide the knowledge for the analysis of diode and transistor circuits.
- Develop skills to design electronic circuits using transistors and Op-amps.
- To design amplifiers ,voltage regulators and signal generators using transistors and Op-amps.

UNIT - 1

Diode Circuits: Introduction, Load Line Analysis, Series diode configurations, Parallel and Series – Parallel configurations, Diode Clipping, and Clamping circuits.

Bipolar Junction Transistor (BJTs): DC biasing – Introduction, Operating point, voltage divider bias circuit, stability factor.

Transistor at Low Frequencies: BJT transistor modelling- voltage divider bias circuit, analysis using $r_e$model. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Multistage Amplifiers: Transistor Amplifiers, Cascade and Cascode connections, Darlington circuits, analysis and design.

Feedback Amplifiers: Feedback concept, different types, practical feedback circuits, analysis and design of feedback circuits. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Power Amplifiers: Introduction – Definitions and Amplifier types, Amplifier Efficiency,

Series fed Class A Amplifier – Directly Coupled and Transformer Coupled, Class B-Complementary Symmetry and Push Pull.

FETs: Construction, working and characteristics of JFETs and MOSFETs. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Op-Amp Applications: Summing, scaling & averaging amplifier, inverting and non-inverting configuration, Instrumentation amplifier.

Active Filters: First & Second order high pass & low pass Butterworth filters. Band pass filters, all pass filters.

DC Voltage Regulators: Voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

OP –Amp Signal Generators: Integrator and Differentiator circuits, Triangular / rectangular wave generator, phase shift oscillator, saw tooth generator.

OP –Amp Comparators and 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. **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Illustrate the concepts of diode, transistor and op-amp circuits
CO2	Apply the concepts of diode, transistors and op-amp to various wave shaping and amplifier circuits
CO3	Analyse amplifier circuits with transistors and op-amps

CO4	Identify and develop electronics circuits for a given application
CO5	Build simulation and hardware electronics circuits based on the application

CO-PO mapping

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

LIST OF LABORATORY EXPERIMENTS

1. Experiments on clippers and clampers..
2. Determination of gain, input and output impedance of BJT Darlington emitter follower with and without bootstrapping.
3. Design and realize to analyse the frequency response of an op – amp amplifier under inverting and non - inverting configuration for a given gain.
4. Design and realize Schmitt trigger circuit using an op – amp for desired upper trip point (UTP) and lower trip point (LTP).
5. Verify the operation of an op – amp as (a) voltage comparator circuit and (b) zero crossing detector
6. Design and verify the operation of op – amp as an (a) adder (b) subtractor (c) integrator and (d) differentiator.
7. Design and realize an op – amp based first order Butterworth (a) low pass (b) high pass and (c) band pass filters for a given cut off frequency/frequencies to verify the frequency response characteristic.

UNIT CHOICE: UNIT-1 AND UNIT -4

Textbooks:

S No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Electronic Devices and Circuit Theory	Robert L Boylestad Louis Nashelsky	Pearson	11th Edition, 2015
2	Linear Integrated Circuits	S. Slivahanan and V. S. Kanchana Bhaskaran	Mc Graw hill	
3	Linear Integrated Circuits	D Roy Choudhury and Shail B Jain	New Age publication	

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ARM PROCESSOR AND PROGRAMMING(Common for Electrical Cluster)		
Course Code	22ES4PCAPP	CIE MARKS	50
L–T -P	3:0:1	SEE MARKS	50
Credits	04	EXAM HOURS	03

UNIT - 1

Overview of computin systems: Basic structure of computers- function modules of a computer, bus structure, performance of the processor, memory location and addresses, memory and I/O systems, basic processing module, pipelining, computer peripherals

08Hrs

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

ARM Processor fundamentals -RISC and ARM Design philosophy, ARM core Dataflow model, programming model, processor states and operating modes, exceptions and interrupts, ARM pipeline, ARM instruction set, Assembler rules and Directives, load/store architecture, ARM-THUMB interworking, programming **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Embedded C codes- Overview of C compiler and optimization, Basic C data types, Local variable types, C looping and structures, Registrar allocation, function calls, pointer aliasing, Writing and optimizing assembly codes, mixing C and Assembly, programming, instruction scheduling **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Subroutines and stacks-Introduction, stack, subroutines, passing parameters to Subroutines, Exception and interrupt handling- Vector Table, Exception priorities, link register offsets, interrupts. Interrupt handling schemes **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Application of ARM controller LPC 2148/1768: Memory map, memory and I/O mapped peripherals- ADC, DAC and UART, firmware and boot loader, introduction to Embedded Operating System **08Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Apply the knowledge of combinational, sequential, and timing circuits in recognizing functional blocks of computers and their working mechanisms.
CO2	Analyse the Architectural features of 32-bit microprocessor with necessary Input/output and memory operations to build an Embedded Controller
CO3	Design simple programming modules in machine and higher- level programming language using simulators to develop logical skills and testing skills
CO4	Select and implement appropriate Structured and modular programming using techniques such as subroutines,data stores, interrupt service routines and exception handling mechanisms
CO5	Build simple Embedded Applications using input and output devices with ARM core and a controller
CO6	Engage in independent study to learn applications based on Microprocessor architecture

CO-PO mapping

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

CO4				2								
CO5			2		3							
CO6									2	2		2

LIST OF LABORATORY EXPERIMENTS

Sl.no	Experiments
1.	Divide an 8-bit variable into two 4 bit nibbles and store one nibble in each byte of a 16 bit variable. Store the disassembled byte in memory location (pointed by result)
2.	Compare 2 values stored in memory location and store the higher value in a memory location (pointed by result)
3.	Write a program to add two 64-bit numbers and store the result in a memory location.
4.	Add a series of 16-bit numbers stored in sequential location in memory (called Table) and store the result in memory
5.	Find the factorial of a given number
6.	Write an assembly language program using the ARM instruction set to find the largest in a series of numbers stored in memory. Store the largest number in a memory location
7.	ALP to multiply two 16 bit binary numbers.
8.	ALP to find the sum of first 10 integer numbers.
9.	Write a program in C for the ARM processor to read data from the 8-bit on board DIP switch and display the value on the 8 LEDs
10.	Write a program in C for the ARM processor to use the built in DAC to generate the following waveforms - square, ramp, triangle and sine
11.	Write a program in C for the ARM processor to rotate the stepper motor in both directions.

12.	Establish serial communication between the ARM kit and the PCand do the following: Send a character from the ARM kit to the serial terminal on the PC Send a character from the PC to the ARM Kit and display it on the LED, Send a character from the PC to the ARM Kit. The program on the ARM processor should add 2 to it and send it back to the PC

UNIT CHOICE: UNIT-2 AND UNIT -4

Textbooks:

1. Computer Organization and Architecture, Carl Hamacher, Zvonko Vranesic, McGraw-Hill,2001

2. ARM System Developer's Guide, Sloss, Symes, WrightMorgan Kaufmann Publishers, Elsevier,2005

3. ARM Assembly Language- Fundamentals and Techniques, William Hohl, CRC press, Taylor and Frncis,2009

Reference books:

1. Computer Organisation & Architecture , William Stallings, PHI , 2010

2. ARM System –on-Chip Architecture , Steve Furber, Second Edition, Pearson, 2010

3. D. V. Hall, "Microprocessors & Interfacing", McGraw Hill Higher Education, 1991

E- References:

1. https://www.pdfdrive.com/embedded-systems-introduction-to-arm-cortextm-m- microcontrollers-e176014882.html

2. https://www.pdfdrive.com/arm-microprocessor-systems-cortex-m-architecture-programming-and-interfacing-e157100364.html

e–Learning :

1. https://onlinecourses.nptel.ac.in/noc20_cs15

2. https://nptel.ac.in/courses/117106111

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	ENGINEERING MATHEMATICS USING PYTHON PROGRAMMING		
Course Code	22MA4AEMP1	CIE MARKS	50
L–T -P	0:0:1	SEE MARKS	50
Credits	01	EXAM HOURS	02

UNIT - 1

Getting Started With Python: General Information, Core Python, Variables, Expressions, Statements and Functions, Logical Operators and Controls statements, Data Types, Strings, Lists Dictionaries, Files and Regular Expressions**.** **4Hrs (2 Labs)**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Python Libraries and Scripts: Mathematics Modules, numpy Module, sympy Module, Scipy Module Plotting with matplotlib.pyplot, Scoping of Variables, Writing and Running Programs.

Calculus: Differentiation, Integration, Taylor Series, Fourier Series and Integral Transforms **4Hrs (2 labs)**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Linear Algebra: Matrix Operations and Finding inverse of given matrix Solving linear System of equations - Gauss Elimination Method (With and without pivoting), LU Decomposition Methods, Solving linear System of equations -Gauss Seidel, Gauss Jacobi method Finding eigen values and eigen vectors, Finding dominant and least eigen value and eigen vectors **4Hrs (2 labs)**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Modelling of an electrical circuit using Python program: Introduction to modified nodal analysis, Application of MNA, DC circuit solver, Frequency domain solver, Time domain solver. **4Hrs(2 labs)**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Modeling, Simulation and Control using Python: Calculation of Force, Electric field and Potential at a given point using Python commands. Obtain the response of a Second-order system (Time-response, Root locus, Bode plot) **4Hrs (2 labs)**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

After successfully completing the course, the student will be able to understand the topics:

CO1	Develop programs with different data types such as lists, tuples and strings.
CO2	Evaluate the electrostatic field parameters using Python.
CO3	Determine the Electrical/ Electronic network parameters using Python.

Assessment Details(both CIE and SEE):

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
CIE – Lab	CIE –1	25	50	25	50
	CIE –2	25		25	
SEE-Lab	End Exam	50		50	

CO-PO mapping

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

CIE methods/question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

SEMESTER END EXAMINATION:

- Part-A will be given 30% weightage in Both CIE and SEE
- Part-B will be given 30% weightage in Both CIE and SEE

Textbooks:

1. Python for Everybody: Exploring Data Using Python 3, Charles R. Severance, 1st edition, University of Michigan, 2016.
2. Numerical Methods in Engineering with Python 3, Jaan Kiusalaas, cambridge university press, 2013.

Reference books:

1. Programming Python, Mark Lutz, 4th edition, O'Reilly Media, 2010.
2. Learning to Program using Python, Cody Jackson, 2nd edition, Packt Publishing, 2018.
3. Modeling and Python Simulation of Magnetics for Power Electronics Applications, Shivkumar V. Iyer, 1st edition, Springer.

Course Name	ENVIRONMENTAL STUDIES		
Course Code	22CV4HSEVS	CIE MARKS	50
L–T -P	1:0:0	SEE MARKS	50
Credits	01	EXAM HOURS	1hr 30 min.

Course Objective: The students will be able to develop a sense of responsibility about the environment, natural resources, their conservation and Understand the concept, structure and function of different ecosystems and the ill effects of environmental pollution and other environmental issues like population growth, Acid rain, global warming etc.,

UNIT - 1

Introduction to Environment

- Definition, about the Earth, Earth's Structure i.e. Atmosphere and its parts, Hydrosphere, Lithosphere and Biosphere.
- Ecology & Ecosystem, Balanced ecosystem, types of Ecosystem. **03 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Human Activities on Environment

- Human activities - Food, Shelter, Economic and Social Security.
- Effects of Human activities on Environment:
  - I) Agriculture,
  - ii) Housing,
  - iii) Industries,
  - iv) Mining and
  - v) Transportation activities.
- Environmental Impact Assessment (E I A)
- Sustainable development **03 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Natural Resources

- Definition, Renewable and Non-Renewable sources.
- Major Natural Resources are -
  - Water resources, its availability, quality, water borne & water induced diseases,
  - Mineral resources, classification, uses in various Industries as byproducts.
  - Forest resources – causes & consequences of deforestation, various afforestation programs.
- Conventional and Non-conventional energy resources –
  - Hydroelectric, Wind power, Solar, Biogas, geothermal energy.
  - Fossil fuel based energy resources – Coal, Oil & Gas, Nuclear power
  - Hydrogen as an alternate future sources of energy. **03 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Environmental pollution

Introduction, following are few types of pollutions to study –

- Water pollution - definition, types, sources, effects and control of water pollution.
- Land pollution - definition, types, sources, effects, Solid waste management.
- Noise pollution - definition, sources, effects & control of noise pollution.
- Air pollution - definition, sources, effects & control of air pollution. **03 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Current environmental issues & importance

- Population growth, effects & Control, Climatic changes,
- Global warming, Acid rain, Ozone layer depletion and its effects.
- Environmental protection – initiatives by Government and non–Govt. Organizations (NGO's), Role of Legal aspects.
- Environmental Education, Women education. **03 Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skill Set):

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

CO1	Discuss the components and impacts of human activities on environment.
CO2	Apply the environmental concepts for conservation and protection of natural resources
CO3	Identify and establish relationship between social, economic and ethical values from environmental perspectives.

CO-PO mapping

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

Total contact hours = 15 (Weekly 1 Hr.)

C I E Marks: Conduct 3 Tests, considering best of 2. The pattern of Test paper consists of two parts. Part-A consists of 20 MCQs for 1 mark each; Part-B consists of 3 descriptive questions, 10 marks each. Student should answer 2 full questions from part-B. Two quizzes, each quiz is for 5 marks covering full syllabus. **TOTAL C I E MARKS:**

20+20+10=50 MARKS

SEE QUESTION PAPER PATTERN

PART-A

- 20 Multiple Choice Questions Covering full syllabus
- 1 Mark each, students have to attend all questions

PART-B

- Consist of 4 main questions. It may be subdivisions of 3 or 4.
- Each question consists of 10 marks, covering full syllabus
- Student should Answer only 3 full questions. 30 marks

SEE TOTAL MARKS : 20+30=50 MARKS

TEXT BOOKS:

1. Environmental studies by - Dr. Geetha Balakrishana (Revised Edition-Sun star publication)
2. Ecology by – Subramanyam (Tata McGraw Hill Publication)
3. Environmental studies by – Dr. J.P.Sharma (Fourth edition)
4. Environmental studies by – Smriti Srivastav (Published by Kataria & Sons)

REFERENCES:

1. Environmental studies by – Benny Joseph
2. Environmental studies by – Dr. D.L.Manjunath

LEARNING RESOURCES:

1. NPTEL (Open Sources / power point and visuals)
2. Ecological studies / IITR / Open Sources
3. Ministry of Environment and forest & wildlife.

MOOCs: MOOCS – https://www.coursera.org / course / sustain

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B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19

(Autonomous College under VTU)

Course Name	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND HUMAN RIGHTS		
Course Code	22MA3HSCPH /22MA4HSCPH	CIE MARKS	50
L–T -P	1:0:0	SEE MARKS	50
Credits	01	EXAM HOURS	01

Course Objectives:

The objectives of the course are:

- To educate students about the country's highest law.
- To respect human dignity and protect people's rights from discrimination.
- To discuss about risk management, workplace safety, and increase understanding of concerns pertaining to the profession.

Teaching-Learning Process (General Instructions):

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

- Innovative lecture methodologies to be adapted to improve the teaching and learning process.
- Short videos for better understanding and group discussion.
- Encourage collaborative (Group Learning) learning in the class.
- Ask Higher Order Thinking (HOT) questions in the class, which promotes critical thinking
- Classroom discussions focused on case studies to help students strengthen their analytical skills and thinking abilities, such as the capacity to assess, generalise, and analyse knowledge rather than just recollect it.

UNIT - 1

Introduction to Indian Constitution

Framing of the Indian constitution: Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India, Fundamental Rights and its limitations. Fundamental Duties and their significance. Directive Principles of State Policy: Importance and its relevance. Case Studies. **03Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 2

Union Executive and State Executive

The Union Executive – The President and the Vice President, the Prime Minister and The Council of Ministers. The Union Parliament – Lok Sabha & Rajya Sabha.

The Supreme Court of India.

State Executive – The Governors, the Chief Ministers and the Council of Ministers. TheState Legislature – Legislative Assembly and Legislative Council. State High Courts. **03Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 3

Election Commission of India, Amendments and Emergency Provisions Election Commission of India – Powers & Functions – Electoral Process in India.

Methods of Constitutional Amendments and their Limitations. Important Constitutional Amendments – 42nd, 44th, 61st, 74th, 76th, 77th, 86th and 91st.Emergency Provisions. Case Studies. **03Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 4

Human Rights

Human Rights – Meaning and significance, Types Human Rights, Powers and Functions of National and State Human Rights Commission of India. Human rights in constitution of India. **03Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

UNIT - 5

Professional Ethics

Scope and Aims of Engineering Ethics, Responsibilities of Engineers and impediments to Responsibilities. Honesty, Integrity and Reliability; Risks – Safety and Liability in Engineering. Case Studies. **03Hrs**

Teaching - Learning Process	Chalk and talk method / Power Point Presentation

Course Outcomes:

At the end of the course, the student will have the ability to

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA3HSCPH / 22MA4HSCPH	**CO 1**	Recognize the significance of the Indian Constitution as the supreme legal authority.	PO6, PO12	3
	CO 2	Analyse human rights theories and concepts.	PO6, PO12	3
	CO 3	Apply the principles of moral obligations and duties to safeguard the public's welfare and safety.	PO8, PO12	2

Text Books:

1. "An Introduction to Constitution of India and Professional Ethics" by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
2. "Constitution of India & Professional Ethics & Human Rights" by Phaneesh K. R., Sudha Publications, 10th edition, 2016.

Reference Books:

1. "V.N. Shukla's Constitution of India" by Prof (Dr.) Mahendra Pal Singh (Revised), Eastern Book Company, Edition: 13th Edition, 2017, Reprint 2019.
2. "Ethics in Engineering" by Martin, W. Mike., Schinzinger, Roland., McGraw-Hill Education; 4th edition (February 6, 2004).

E-Books and online course materials:

1. https://www.smartzworld.com/notes/constitution-of-india-and-professional-ethics-notes-vtu-cip-pdf/
2. https://legalstudymaterial.com/constitution-of-india/

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total
CIE – Theory	AAT	10	100
	Test 1	40	
SEE	End Exam	50	

Only one CIE shall be conducted after CIE2 and before CIE 3. SEE paper shall be set for 50 Questions, each of the 01 marks. The pattern of the Question paper is MCQ (Multiple Choice Questions).
The time allotted 01 hour.

SEE Exam Question paper format

SEE	Online Examination	
Pattern	50 Multiple Choice Questions	Total Marks 50X2=100