1.4.2 How the feedback obtained is being analysed and utilized for overall development of the institution?

Collected curriculum feedback is represented through the Board of Studies Members (BOS) and syllabus framing committee members. Based on the Institutional Hierarchical Framework, Feedback can be broadly classified in to two levels

- The department level feedback that are discussed in the department meeting and necessary initiatives and measures that are taken with the consent of the principal.
- The college level feedback analyzed by the Academic Council Members (ACM) headed by the principal. On a regular basis our Institute connects with all its stake holders to collect feedback to utilize them for overall development of the institution.

Different types of Feedback taken throughout the Academic Year with Stakeholders given as follows: Feedback is collected from the following groups identified as stakeholders

1. Current students
2. Alumni
3. Faculty
4. Parents
5. Employers

Based on the inputs taken from the Stake holders, the data is processed. Below is the action taken on the feedback for the Academic year **2018-19**

S.no	Stakeholder	Feedback	Action taken	Page No
1	**Student**	Requested to change the Electrical Circuits syllabus as per the gate point of view	Electrical Circuit Analysis - 50 % of the syllabus modified (merged EC-1 & 2) Resonance, Network Synthesis , Fourier series concepts are removed and concepts of polyphase circuits are reduced. So as to avoid the repetition in other courses.	4-12
	Teacher	Suggested to remove resonance, Network Synthesis, Fourier series concepts from Electrical circuits -I & Electrical Circuits-II courses.		
	Alumni	Insisted to remove some topics from Electrical circuits -I & Electrical Circuits-II		
2	**Teacher**	Insisted to remove the topics related to BJT,FET, Feedback amplifiers and to add MOSFET's, OPAMP's	All suggestion from the stake holders are incorporated in Analog Electronics circuits of III sem in R-18 scheme	13-18

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	Alumni	Requested to modify Electronics Engineering course as per the gate syllabus		
3	**Teacher**	Insisted to modify Linear Integrated Circuits lab that contains only experiments related to designing of Sequential and Combinational circuits	Introduced a new for Digital Electronics in place of Linear Integrated Circuits lab	19-24
	Employer	Suggested to Digital Electronics lab to get the knowledge on designing of the chips		
	Alumni	Requested to have dedicated experiments in designing of Logical Circuits		
4	**Teacher**	Suggested to add experiments on various relays as hardware experiments	Power System simulation lab(R-16) name is changed to Power Systems-ii(R-18) lab with the inclusion of hard ware experiments in R-18 scheme	25-28
5	**Teacher**	Insisted to add A/D and D/A converters to the Digital Electronics course	After the suggestions taken form the corresponding teachers and with recommendations from the CEG members in Digital Electronics course and lab course- A/D and D/A converters are included.	29-34
6	**Employer**	Recommended to add the latest developments such as Permanent Magnet Axial flow machines in special Electrical machines	With the recommendations from the employers, latest development such as Permanent Magnet Axial flow machines is added in Special Electrical Machines for the regulation R-18	35-38
7	**Employer**	Suggested to introduce the Smart Grid course to the final year students.	Suggestions from the employers insisted to make the Smart Grid course a mandatory course in VII semester of R-18 scheme.	39-40
8	**Employer**	Suggested to add a course to get the knowledge on the mathematical modelling and designing of the Electrical Machines	With the inputs from employer a new course named Electrical Machines Design is added to R-16 syllabus to meet the requirements of the industry	41-42

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9	**Employer**	Suggested to add a course that will give a brief idea of Industrial Systems, Process and Equipment.	Based on the suggestions from the employer, to get students the basic idea on Components, Equipment and Designing of the circuits in industries the course Industrial Electrical System is implemented in R-18 scheme	43-45
10	**Employer**	Insisted to add various transducers in Electrical Measurements & Instrumentation course.	Transducers are included in Electrical Measurements and Instrumentation in R-18 scheme	46-51
11	**Employer**	Suggested to add hardware experiments in the Power Systems lab	Power System Simulation lab(R-16) name is changed to power systems-II (R-18) lab with the inclusion of hard ware experiments in R-18 scheme	52-55

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System

B.E (Electrical and Electronics Engineering)

SEMESTER – III

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C05	Engineering Mathematics-III	3	-	3	30	70	3
2	16EE C02	Electrical Circuits-I	3	-	3	30	70	3
3	16EE C03	Electrical Measurements and Instruments	3	-	3	30	70	3
4	16EC C16	Electronics Engineering	4	-	3	30	70	4
5	16ME C11	Prime Movers and Pumps	3	-	3	30	70	3
6	16MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
PRACTICALS								
6	16EE C04	Circuits and Measurements Lab	0/1	2	3	25	50	2
7	16EC C17	Electronics Engineering Lab	-	3	3	25	50	2
8	16ME C12	Prime Movers and Pumps Lab	0/1	2	3	35	50	2
Total			**21**	**7**	**-**	**255**	**570**	**25**

L: Lecture T: Tutorial P: Practical D: Drawing

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EE C02

ELECTRICAL CIRCUITS – I

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the nature of different circuit elements, fundamental circuit laws and network theorems.
2. To be acquainted with electrical circuit analysis, which is the foundation for all subjects of the Electrical Engineering discipline.
3. To Study transient response of circuits with initial conditions & forcing functions and also basics of network topology.
4. To understand poly-phase circuits and measurement of three phase power.

Course Outcomes: The student will be able to

1. Acquire concepts of the nature of different circuit elements, network theorems and electrical circuit analysis.
2. Analyze R-L-C circuits under steady state condition.
3. Analyze the behavior of circuits under transient conditions.
4. Analyze balanced and unbalanced 3-phase AC circuits.
5. Acquire the knowledge of resonance, coupled circuits and network topology.
6. Acquire knowledge to apply the Electrical Circuits concepts to Electrical Engineering.

UNIT –I

Circuit Analysis: Loop, mesh, supermesh analysis, node, supernode analysis with DC and AC excitations.

UNIT – II

Network Theorems: Superposition, Thevenin's, Norton's, Maximum Power Transfer, Reciprocity, Milliman's and Tellegen's Theorems.

UNIT – III

Resonance: Definitions and computations of series and parallel resonance, Bandwidth and Q-factor; Locus diagrams; Coupled circuits. Analysis of circuits with mutual inductance, Linear anc

Network Topology: Network Graph co
Branch, Complete incidence matrix, Tree a

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set, Fundamental tie-set matrix, Cut-set, Fundamental cut-set matrix; Duality.

UNIT – IV

Transient Response: Initial Conditions in zero-input response of RC, RL and RLC networks, Definitions of Unit Impulse, Unit Step and Ramp functions; Zero state response with Impulse and Step inputs; Complete response of circuits with initial conditions and forcing functions such as Step and Sinusoidal functions.

UNIT – V

Poly Phase Circuits: 3-phase circuit analysis, Star and delta connected systems, Calculations of voltage, current and power in 3-phase circuits with star and delta connected loads and generator, Balanced and unbalanced loads. Measurements of 3-phase power by two wattmeter method.

Text Books:

1. M. E. Van Valkenburg, Network Analysis, Prentice Hall of India Publications, 3rd Edition, 1995.
2. W. H. Hayt, J .E. Kemmerly, Engineering Circuit Analysis, McGraw Hill Publications, 8th Edition, 2013.
3. Charles K. Alexander & Matthew N. O. Sadiku, Fundamentals of Electric Circuits, TMH Publications, 5th Edition, 2013.

Suggested Reading:

1. A. Sudhakar & Shyammohan Palli, Network Analysis, Tata McGraw-Hill Publications, 4th Edition, 2010.
2. N.C. Jagan & C. Lakshminarayana, Network Analysis, B. S. Publications, 3rd Edition, 2014.
3. Roy Chowdary, Networks & Systems, Newage Publications, 2nd Edition, 2010.
4. M Nahvi, Joseph Edminister, K. Uma rao, Electric Circuits, Schaum's Outline Series, Tata Mc-Graw Hill Publications, 5th Edition, 2010.

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Choice Based Credit System
B.E (Electrical and Electronics Engineering)

SEMESTER - IV

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16EEC06	Electrical Circuits -II	3	-	3	30	70	3
2	16EE C07	Electrical Machinery - I	3	-	3	30	70	3
3	16EE C08	Power Systems - I	3	-	3	30	70	3
4	16EE C09	Electromagnetic Theory	3/1	-	3	30	70	4
5	16EE C10	Digital Elctronics and Logic Design	3	-	3	30	70	3
6	16EE C11	Linear Integrated Circuits	3	-	3	30	70	3
PRACTICALS								
6	16EE C12	Electrical Machinery - I Lab	0/1	2	3	25	50	2
7	16EE C13	Linear Integrated Circuits Lab	0/1	2	3	25	50	2
8	16EG C03	Soft Skills and Employability Enhancement Lab	-	2	2	15	35	1
Total			**21**	**6**	**-**	**245**	**555**	**24**

L: Lecture T: Tutorial P: Practical D: Drawing
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EE C06

ELECTRICAL CIRCUITS - II

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the application of Laplace Transforms for analysis of Electrical Circuits.
2. To comprehend the application of Fourier series and Fourier transform representation of periodic signals.
3. To study the analysis of two port networks.
4. To study the aspects of network synthesis.

Course Outcomes: The student will be able to

1. Apply Laplace transform for circuit analysis and also able to draw the pole zero plots.
2. Find network functions and two port parameters and transform.
3. Acquire the knowledge to find the Fourier series of given function.
4. Acquire the knowledge synthesize the RL and RC circuits.
5. Design of the different types of filters.
6. Acquire knowledge to design of filters in mitigating harmonics.

UNIT- I

Circuit Analysis in S-Domain: Review of Laplace Transform, Initial and final value theorems, Application of Laplace transform for circuit analysis, Concept of transfer function, Pole, Zero plots.

UNIT-II

Two port Networks: Z, Y, ABCD and h-parameters, their interrelationships; series, parallel and cascade connection of two port networks, image & iterative impedances, terminated two port networks.

UNIT- III

Fourier Series: Representation of periodic functions using both trigonometric and exponential functions; Symmetry conditions, Fourier transform representation of a periodic signals, Symmetry properties; Power and bandwidth concepts; System function and its application in determining steady- state response.

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UNIT-IV

Network Synthesis: Hurwitz polynomials and their properties, Positive Real functions and their properties, Synthesis of reactive network (one port) by Foster method, pole-zero interpretations of elements of Foster form, Cauer form of reactive networks, RL network synthesis by Foster and Cauer form of representation, RC network synthesis by Foster and Cauer method.

UNIT-V

Passive Filters: Classification and General Relations in filters, Constant-K low pass, high pass, band pass and band elimination filters; M-derived low pass, high pass, band pass and band elimination filters.

Text Books:

1. M.E. Van Valkenburg, Network Analysis, Prentice Hall of India Publications, 3rd Edition, 1995.
2. W.H.Hayt, J.E.Kimmerly, Engineering Circuit Analysis, McGraw Hill, 8th Edition, 2013.
3. Gopal. G. Bhise, Prem Chadha and Kulashetra, Network Analysis and Filter Design, Umesh Publications, 2000.
4. M Nahvi, Joseph Edminister and K Uma Rao, Electric Circuits, Schaum's Outline Series, Tata Mc-Graw Hill Publications, 5th Edition, 2010.

Suggested Reading:

1. Franklin F. Kuo, Network Analysis And Synthesis, Wiley Publications, 2nd Edition 2009.
2. A. Sudhakar, Shyammohan Palli, Network Analysis, Tata Mc-Graw Hill Publications, 4th Edition, 2010.
3. T.K. Nagsarkar, Sukhija, Circuits & Networks, Oxford University Press, 2nd Edition, 2010.

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B.E. (EEE)

SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1.	18MT C07	Applied mathematics	3	1	-	3	30	70	4
2.	18EE C03	Analog Electronic Circuits	3	1	-	3	30	70	4
3.	18EE C04	Electrical Measurements and Instrumentation	3	-	-	3	30	70	3
4.	18EE C05	Electromagnetic Fields	3	1	-	3	30	70	4
5.	18EE C06	Electrical Circuit Analysis	3	1	-	3	30	70	4
6.	18EG M 01	Indian constitution	2	-	-	2	-	50	-
7.	18EE M01	Indian Traditional Knowledge	2	-	-	2	-	50	-
PRACTICALS									
8.	18EE C07	Analog Electronic Circuits Lab	-	-	2	2	15	35	1
9.	18EE C08	Electrical Measurements and Instrumentation Lab	-	-	2	2	15	35	1
		Total	19	4	4	-	180	520	21

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Core Courses offered to other Departments:

SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1	18EE C01	Basic Electrical and Electronics Engineering	3	1	-	3	30	70	4
PRACTICALS									
2	18EE C02	Basic Electrical and Electronics Engineering Lab	-	-	2	2	15	35	1

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18MT C07

APPLIED MATHEMATICS
(For ECE/EEE)

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To form PDE and solve Linear and Non-Linear equations.
2. To learn the Laplace, Inverse Laplace Transform and Z-Transforms.
3. To find roots of equations, interpolation and Numerical differentiation.
4. To learn Numerical solution of ODE and Engineering problems.
5. To learn fitting of distribution and predicting the future values.

Course outcomes: After completion of this course, students will be able to:

1. Understand the methods to find solution of linear and non-linear PDE and solution of wave equation.
2. Find Laplace, Inverse Laplace and Z-Transforms and solution of engineering problems.
3. Solve Non-Linear algebraic and transcendental equations to find interpolations when tabular values are given.
4. Find solution of initial value problems of ODE.
5. Understand the Methods for analysing the random fluctuations using probability distribution and also identify the importance of principle of Least squares approximations for predictions.

UNIT-I

Partial Differential Equations: Formation of Partial Differential Equations, Solution of Linear (Lagrange's) and Non-linear PDE of First order standard forms and Charpit's Method, Solutions of PDE by method of separation of variables, solution of one dimensional wave equation and its applications.

UNIT-II

Transform Theory: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by partial fractions and residue method, solving ODEs by Laplace Transform method.Z-transforms and its basic properties, inverse Z-transform and solutions of difference equation by Z-transform.

time, boundary conditions, Poisson's and Laplace's equations, Uniqueness theorem.

UNIT-III

Magneto Static Fields: Biot-Savart's law, Ampere's law, Displacement current, Magnetic scalar and Vector Potentials, boundary conditions, Forces in Magnetic fields, Lorentz force equation, Force between parallel conductors, Inductance Calculations (Solenoid, Toroid), Mutual Inductance.

UNIT-IV

Time Varying Electromagnetic Fields: Faraday's laws of electromagnetic induction, Final forms of Maxwell's Equations, Power and Poynting theorem, Time-Harmonic Electromagnetic fields, Wave equations (One dimension), Plane Wave, Propagation in perfect and lossy-dielectrics.

UNIT-V

Electromagnetic Interference and Compatibility (Theoretical Aspects only): Introduction to Electromagnetic Interference and Electromagnetic Compatibility (EMI & EMC)- Sources and Characteristics of EMI, Control Techniques of EMI, Grounding, Shielding, Filtering. Introduction to numerical electromagnetic.

Text Books:

1. Hayt, W.H and J.A Buck, Engineering Electromagnetics, Tata McGraw Hill, 8th Edition, 2014.
2. Sadiku, M.N.O,S.V. Kulkarni, Principles of Electromagnetics, Oxford University press, 6th Edition, 2015.

Suggested Readings:

1. S. P. Seth, Elements of Electromagnetic Fields, Danpat Rai& Co, 2011.
2. David K. Cheng, Field and Wave Electromagnetics, Pearson Education. 2nd Edition 2014.
3. Ashutosh Pramanik, Electromagnetism Theory and Applications, PHI Pvt. Ltd., 3rd Edition, 2014.

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18EE C06

ELECTRICAL CIRCUIT ANALYSIS

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand the nature of different circuit elements, laws and network theorems.
2. To study transient response of circuits with initial conditions & forcing functions and also basics of network topology.
3. To understand the Laplace transforms and two-port networks.

Course Outcomes: After completion of this course, students will be able to:

1. Apply network theorems for the analysis of electrical circuits.
2. Understand the circuit analysis using graph theory &Coupled circuits.
3. Obtain the transient and steady-state response of electrical circuits.
4. Analyze circuits using Laplace transformations.
5. Analyze behavior of two port networks.

UNITI

Sinusoidal steady state analysis: Review of AC fundamentals, effective or RMS values, Steady state response of RLC networks with sinusoidal excitations, average power and complex power, series and parallel resonance, Three phase circuits with balanced & unbalanced loads, Displacement neutral, Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer.

UNITII

Network Theorems: Node and Mesh Analysis, Analysis with dependent current and voltage sources, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation and Milliman's theorems.

UNITIII

Graph Theory: Formation of Incident, fundamental Tie-set and Cut-set matrices, Concept of duality and dual networks.

Solution of First and Second order networks: Review of solution of first and second order differential equations for Series and parallel RL, RC, RLC circuits,

initial and final conditions in network elements, forced and force-free responses, time constant, steady state and transient state responses.

UNITIV

Electrical Circuit Analysis Using Laplace Transforms: Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots),

UNITV

Two Port Networks: Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

Text Books:

1. M. E. Van Valkenburg, "Network Analysis", 3rd Edition, Prentice Hall, 2015.
2. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits",6th Edition, McGraw Hill Education, 2019.
3. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education2013.

Suggested Reading:

1. D. Roy Choudhury, "Networks and Systems", 2nd Edition, New Age International, 2010.
2. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 2002.

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18EG M 01

INDIAN CONSTITUTION

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks

Course Objectives: The course will introduce the students to :

1. The history of Indian Constitution and how it reflects the social, political and economic perspectives of the Indian society.
2. Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. Have knowledge of the various Organs of Governance and Local Administration.

Course Outcomes : After successful completion of the course the students will be able to :

1. Understand the making of the Indian Constitution and its features.
2. Have an insight into various Organs of Governance - composition and functions.
3. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies.
4. Be aware of the Emergency Provisions in India.
5. Understand the Right To equality, the Right To freedom and the Right To Liberty.

Unit-I

Constitution of India - Introduction and salient features . Constitutional history. Directive Principles of State Policy - Its importance and implementation.

Unit II

Union Government and its Administration - Structure of the Indian Union: Federalism, distribution of legislative and financial powers between the Union and the States.
Parliamentary form of government in India. President: role, power and position.

Unit III

Emergency Provisions in India - National emergency, President rule, Financial emergency

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Choice Based Credit System

B.E (Electrical and Electronics Engineering)

SEMESTER – III

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C05	Engineering Mathematics-III	3	-	3	30	70	3
2	16EE C02	Electrical Circuits-I	3	-	3	30	70	3
3	16EE C03	Electrical Measurements and Instruments	3	-	3	30	70	3
4	16EC C16	Electronics Engineering	4	-	3	30	70	4
5	16ME C11	Prime Movers and Pumps	3	-	3	30	70	3
6	16MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
PRACTICALS								
6	16EE C04	Circuits and Measurements Lab	0/1	2	3	25	50	2
7	16EC C17	Electronics Engineering Lab	-	3	3	25	50	2
8	16ME C12	Prime Movers and Pumps Lab	0/1	2	3	35	50	2
Total			**21**	**7**	**-**	**255**	**570**	**25**

L: Lecture T: Tutorial P: Practical D: Drawing

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EC C16

ELECTRONIC ENGINEERING

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course objectives:

Student will be able to understand:

1. The various diodes and transistors.
2. The design and analysis of various rectifiers with filters.
3. The behavioral characteristics of BJT in various configurations.
4. The design and analysis of amplifiers.
5. The behavioral characteristics of JFET and MOSFET.
6. The effect of negative feedback amplifiers and its performance.

Course Outcomes: Student will be able

1. To understand semiconductor devices such as PN junction Diodes, BJT, JFET and MOSFET.
2. To analyze application of diodes.
3. To study V-I characteristics BJT, JFET and MOSFET.
4. To study the switching behavior of BJT, JFET, MOSFET.
5. To study the equivalent model of PN junction diode, BJT, JFET and MOSFET.
6. To analyze transistor amplifier with and without feedback in various configurations - BJT, JFET.

UNIT - I

Diode and its Applications: The p-n junction formation, Diode current components, The Volt-ampere characteristic of p-n diode, Diode as a circuit element, small signal diode models, Breakdown mechanisms of diode - Zener and Avalanche, Zener voltage regulator. Half wave, Full wave and Bridge Rectifiers with and without filters, their operation, performance characteristics.

UNIT - II

BJT Characteristics: The junction transistor, operation of NPN and PNP transistor, current components and current flow in BJT, Modes of transistor operation, Early effect, BJT input and output characteristics - CB, CE CC configuration, h-parameters, BJT as a Switch; BJT biasing techniques, stability factors, Bias compensation techniques, Thermal runway, Thermal stability.

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UNIT - III

BJT Amplifiers: BJT as an amplifier, Equivalent model of BJT, Single Stage Amplifiers (CB,CE,CC), exact and approximate analysis, Frequency response, Bandwidth and Multi Stage Amplifiers (CE-CE, CE-CB & CC-CC),Power Amplifiers-Class A, Class B, Efficiency, power dissipation.

UNIT - IV

Field Effect Transistors: The Junction Field Effect Transistor operation, The Pinch-off Voltage VP, V-I characteristics of JFET. JFET biasing-zero current drift biasing, FET as a switch. FET amplifiers(CS,CD,CG Amplifiers) MOSFETs: types of MOSFETs, V-I characteristics.

UNIT - V

Feedback Amplifiers: The feedback concept, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, Voltage and current, series and shunt feedbacks. Stability considerations.

Text Books:

1. Jacob Millman, Christos C. Halkias, Integrated electronics: analog and digital circuits and systems, 2nd Ed, McGraw-Hill, 2010.
2. Robert L. Boylestad, Louis Nashelsky Electronic Devices and Circuit Theory, 10th Edition, PHI, 2009.

Suggested Reading:

1. David Bell, Fundamentals of Electronic Devices and Circuits, 5th Edition, Oxford University Press 2008.
2. Ben G Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6th Edition, Pearson Education, 2005.
3. Millman and Halkias, Electronic devices and circuits, 2nd Edition, McGraw Hill Publication, 2007.

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SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1.	18MT C07	Applied mathematics	3	1	-	3	30	70	4
2.	18EE C03	Analog Electronic Circuits	3	1	-	3	30	70	4
3.	18EE C04	Electrical Measurements and Instrumentation	3	-	-	3	30	70	3
4.	18EE C05	Electromagnetic Fields	3	1	-	3	30	70	4
5.	18EE C06	Electrical Circuit Analysis	3	1	-	3	30	70	4
6.	18EG M 01	Indian constitution	2	-	-	2	-	50	-
7.	18EE M01	Indian Traditional Knowledge	2	-	-	2	-	50	-
PRACTICALS									
8.	18EE C07	Analog Electronic Circuits Lab	-	-	2	2	15	35	1
9.	18EE C08	Electrical Measurements and Instrumentation Lab	-	-	2	2	15	35	1
		Total	19	4	4	-	180	520	21

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Core Courses offered to other Departments:

SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1	18EE C01	Basic Electrical and Electronics Engineering	3	1	-	3	30	70	4
PRACTICALS									
2	18EE C02	Basic Electrical and Electronics Engineering Lab	-	-	2	2	15	35	1

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18MT C07

APPLIED MATHEMATICS
(For ECE/EEE)

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To form PDE and solve Linear and Non-Linear equations.
2. To learn the Laplace, Inverse Laplace Transform and Z-Transforms.
3. To find roots of equations, interpolation and Numerical differentiation.
4. To learn Numerical solution of ODE and Engineering problems.
5. To learn fitting of distribution and predicting the future values.

Course outcomes: After completion of this course, students will be able to:

1. Understand the methods to find solution of linear and non-linear PDE and solution of wave equation.
2. Find Laplace, Inverse Laplace and Z-Transforms and solution of engineering problems.
3. Solve Non-Linear algebraic and transcendental equations to find interpolations when tabular values are given.
4. Find solution of initial value problems of ODE.
5. Understand the Methods for analysing the random fluctuations using probability distribution and also identify the importance of principle of Least squares approximations for predictions.

UNIT-I

Partial Differential Equations: Formation of Partial Differential Equations, Solution of Linear (Lagrange's) and Non-linear PDE of First order standard forms and Charpit's Method, Solutions of PDE by method of separation of variables, solution of one dimensional wave equation and its applications.

UNIT-II

Transform Theory: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by partial fractions and residue method, solving ODEs by Laplace Transform method.Z-transforms and its basic properties, inverse Z-transform and solutions of difference equation by Z-transform.

UNIT-III

Numerical Analysis: Solution of Algebraic and transcendental equations by Bisection method, Newton-Raphson method and Regula-Falsi method. Interpolation, Newton's forward and backward difference formulae.Newton's divided difference and Lagrange'sformulae.Numerical Differentiation.

UNIT-IV

Numerical Solutions of ODE: Solutions of First Order Ordinary differential equations, Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator corrector methods.

UNIT-V

Basic Statistics: Measures of Central tendency for continuous random variable, Moments, skewness and Kurtosis, Probability distributions: Normal (Gaussian),Rayleigh, Exponential and uniform distributions Correlation and regression. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas.

Text Books:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, "Numerical Methods", S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, "Introductory methods of numerical analysis", PHI, 4th Edition, 2005.
3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 35th Edition, 2010.
4. Sheldon Ross, "A First Course in Probability", 9th Edition, Pearson publications, 2014.

Suggested Reading:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2008.
3. S.C.Gupta, V.K.Kappoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 2014.

***Education** is the process of imparting knowledge, values, skills and attitudes, which can be beneficial to an individual. On the contrary, **Learning** is the process of adopting knowledge, values and skills.*
Concept-Based Curriculum and Instruction

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18EE C03

ANALOG ELECTRONIC CIRCUITS

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand the characteristics of diodes, BJTs, MOSFETS and the biasing techniques of transistors.
2. To understand the functioning, DC characteristics of operational amplifiers and also different linear applications of operational amplifiers
3. Study the different non-linear applications of operational amplifiers

Course Outcomes: After completion of this course, students will be able to:

1. Analyze the characteristics of Diodes ,transistors and MOFETS.
2. Understand biasing techniques of transistor and its application as differential and multi stage amplifier
3. Understand the basic characteristics of op-amps and their significance.
4. Analyze different linear application circuits of operational amplifiers
5. Analyze different non-linear application circuits of operational amplifiers

UNIT-I

Diode circuits and BJT Circuits: P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes. Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits.

UNIT-II

MOSFET Circuits: MOSFET structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers, small signal equivalent circuits, gain, input and output impedances, trans-conductance.

UNIT-III

Differential, multi-stage and operational amplifiers: Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational

amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT-IV

Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers, Series voltage regulator , oscillators (Wein bridge and phase shift).

UNIT-V

Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot. clamping and clipping circuits

Text Books:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. Analog Electronics, A.K. Maini, Khanna Publishing House

Suggested Readings:

1. Millman and Halkias, " Electronic Devices and Circuits" 2nd Edition, McGraw Hill Publication 2007.
2. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009
3. D.Roy Choudhury, Linear Integrated Circuits, Shail B.Jain, , New Age Intern.(P) Ltd., 3rd Edition 2007.
4. Gayakwad R.A. Op-Amps and Linear Integrated Circuits, PHI, 4th Edition, 2002.
5. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.

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18EE C04

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the principle behind various instruments.
2. To know the various bridges for measurement of R, L and C.
3. To measure various magnetic and electric parameters.

Course Outcomes: After completion this course, students will be able to:

1. Identify a suitable instrument to measure a given parameter.
2. Analyze the need of CT/PT for a given system.
3. Illustrate the concept of the instrument with relevant examples and proper justification.
4. Distinguish between electrical and magnetic measurements and their instruments.
5. Specify the right transducer for a given requirement.

UNIT-I

Introduction to Measurements: Objectives of measurement, static and dynamic characteristics, errors and their classification.

Introduction to Instruments-1: Types of instruments, classification of instruments based on type of measurement and principle of working (PMMC, MI, Dynamometer, Induction and Electrostatic), types of torques (torque equations for MC, MI and dynamometer type instruments).

UNIT-II

Introduction to Instruments-2: Single phase Induction type energy meter, concept of driving torque & braking torque equations, (no derivation) ; Errors and their Compensation, Single phase Dynamometer type Power factor meter, Weston type frequency meter. Construction & theory of Instrument Transformers, Equations for ratio and phase angle error of C.T & P.T (Elementary treatment only).

UNIT-III

Resistance, Inductance and Capacitance parameters: Classification of resistance measuring methods Kelvin's double bridge, Wheatstone bridge and meggar.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E (Electrical and Electronics Engineering)

SEMESTER - IV

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16EEC06	Electrical Circuits -II	3	-	3	30	70	3
2	16EE C07	Electrical Machinery - I	3	-	3	30	70	3
3	16EE C08	Power Systems - I	3	-	3	30	70	3
4	16EE C09	Electromagnetic Theory	3/1	-	3	30	70	4
5	16EE C10	Digital Elctronics and Logic Design	3	-	3	30	70	3
6	16EE C11	Linear Integrated Circuits	3	-	3	30	70	3
PRACTICALS								
6	16EE C12	Electrical Machinery - I Lab	0/1	2	3	25	50	2
7	16EE C13	Linear Integrated Circuits Lab	0/1	2	3	25	50	2
8	16EG C03	Soft Skills and Employability Enhancement Lab	-	2	2	15	35	1
Total			**21**	**6**	**-**	**245**	**555**	**24**

L: Lecture T: Tutorial P: Practical D: Drawing
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EE C10

DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the basics of Boolean algebra and Minimization Techniques.
2. To know the basics of Digital logic family.
3. To study binary arithmetic & its circuits and code converters.
4. To understand the Design of synchronous sequential circuits.
5. To know design of sequence detector and generators and programmable logic circuits.

Course Outcomes: The student will be able to

1. Apply Boolean algebra rules, K-maps, Tabulation methods to minimize Boolean algebraic expressions.
2. Classify, describe and compare the characteristics of various digital logic families.
3. Acquire the knowledge to build the combinational logic circuits.
4. Acquire the knowledge to build the sequential logic circuits.
5. Design the counters.
6. Acquire the knowledge to synthesize the digital circuits using D, JK & T Flip-flops.

UNIT- I

Number Systems: Introduction to number systems and their codes, Number complements: One's &Two's complement arithmetic, BCD and Excess-3 arithmetic.

Boolean Algebra: Review of Basics and laws of Boolean algebra, Minimization of Boolean expressions, Truth tables and maps, Sum of products and product of sums.

UNIT-II

Simplification of Boolean Functions: K-Map method of reduction, Incompletely specified functions, multiple output minimization, Tabular minimization.

Digital logic families and IC's: Characteristics of Digital IC's, Introduction to RTL, DTL, TTL, CMOS, ECL families, C

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UNIT-III

Binary Arithmetic and Circuits: Half and Full adder, Subtractor and Magnitude comparator, Carry look ahead adder.

Combinational Circuits: Multiplexer and de-multiplexer, Encoder and decoder, Code converters, Implementation of combinational logic using standard logic gates and multiplexers.

UNIT- IV

Sequential Logic: Basic latch circuit - Debouncing switch, Flip-flops: SR, JK, D and T, Truth table and excitation tables.

Registers & Counters: Registers, Shift registers, Applications of registers, Ripple & Synchronous counters- up/down counter, BCD counter, Counter decoding,, Ring counters.

UNIT-V

Design of Digital Systems: Concept of state, State diagram, Design of counters, Sequence detector and generators, Synthesis using D, JK, T flip-flops, Programmable Logic devices: Introduction, PROM, PLA, PAL.

Text Books:

1. Morris Mano M., Digital Design, Prentice Hall of India, 3rd Edition, 2002.
2. Donald Pleach, Albert Paul Malvino, Goutamsaba Digital Principles and Applications, McGraw- Hill, 6th Edition, 2006.

Suggested Reading:

1. Tocci, Widmer, Moss, Digital Systems, Principles and Applications, Pearson Education, 10th Edition, 2016.
2. B. Somnath Nair, Digital Electronics and Logic Design, Prentice Hall of India, Eastern Economy, Edition, 2006.

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CHAITANYABHARATHIINSTITUTEOFTECHNOLOGY(A)
SCHEMEOFINSTRUCTIONANDEXAMINATION
B.E/B.Tech under AICTE Model Curriculum
B.E. (EEE)

SEMESTER-IV

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1.	18CS C05	Basics of Data Structures	2	-	-	3	30	70	2
2.	18EE C09	Digital Electronics	3	-	-	3	30	70	3
3.	18EE C10	Electrical Machines-1	3	1	-	3	30	70	4
4.	18EE C11	Power Systems-I	3	-	-	3	30	70	3
5.	18ME C09	Principles of Management	3	-	-	3	30	70	3
6.	18CE M01	Environmental Science	2	-	-	2	-	50	-
PRACTICALS									
7.	18CS C06	Basics of Data Structures lab	-	-	2	2	15	35	1
8.	18EE C12	Digital Electronics Lab	-	-	2	2	15	35	1
9.	18EE C13	Electrical Machines-1 Lab	-	-	2	2	15	35	1
10.	18EG C03	Soft Skills Lab	-	-	2	2	15	35	1
		Total	**16**	**1**	**8**		**210**	**540**	**19**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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18CS C05

BASICS OF DATA STRUCTURES
(Common for other Programmes)

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	2

Pre-requisites: Basic knowledge of programming language such as C or C++ is preferred (but not mandatory) and some mathematical maturity also will be expected.

Course Objectives:

1. To basic linear and non-linear data structures.
2. To analyzing the performance of operations on data structures.
3. To different sorting and searching techniques and their complexities.

Course Outcomes: After completion of this course, students will be able to:

1. Understand the basic concepts of data structures.
2. Understand the notations used to analyze the performance of algorithms.
3. Choose and apply an appropriate data structure for a specified application.
4. Understand the concepts of recursion and its applications in problem solving.
5. Demonstrate a thorough understanding of searching and sorting algorithms.

UNIT-I

Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff.
Recursion: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

UNIT-II

Linked Lists: Introduction, Linked lists and types, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

UNIT-III

Stacks and Queues: Introduction to stacks, applications of stacks, implementation and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

UNIT-IV

Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

UNIT-V

Graphs: Introduction, Applications of graphs, Graph representations, graph traversals, Minimal Spanning Trees.

Searching and Sorting: Linear searching, binary Searching, sorting algorithms-bubble sort, selection sort, quick sort, heap sort.

Text Books:

1. Narasimhaarumanchi, Data Structures and Algorithms Made Easy, CareerMonk Publications, 2017
2. S. Sahni and Susan Anderson-Freed, Fundamentals of Data structures in C,E.Horowitz, Universities Press, 2nd Edition.
3. ReemaThareja, Data Structures using C, Oxford University Press.

Suggested Reading:

1. D.S.Kushwaha and A.K.Misra, Data structures A Programming Approach with C, PHI.
2. Seymour Lipschutz, Data Structures with C, Schaums Outlines, Kindle Edition

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18EE C09

DIGITAL ELECTRONICS

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the working of logic families and logic gates
2. To know the design and implementation of combinational and sequential logic circuits.
3. To Understand the process of A/D and D/A conversions and PLD's in implementing the given logical problems.

Course Outcomes: After completion of this course, students will be able to:

1. Understand working of logic families and logic gates.
2. Design and implement combinational digital circuits.
3. Design and implement Sequential logic circuits
4. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
5. Be able to use PLD's to implement the given logical problems.

UNIT–I

Fundamentals of Digital Systems and Logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri – state logic.

UNIT–II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, digital comparator, parity checker/generator, code converters, priority encoders, decoders/Seven segment display device, Q-M method of function realization.

UNIT–III

Sequential circuits and systems: A 1-bit memory, the circuit properties of bi-stable latch, the clocked SR flip flop, J- K-T and D-types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, applications of counters.

UNIT–IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/ converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage of frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT–V

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic.

Text Books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

Suggested Readings:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. S. Salivahanan " Digital circuits and design", 4th edition, Vikas Publishing house, 2010.

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18EE C10

ELECTRICAL MACHINES-I

Instruction	3L + 1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To Inculcate the principles of Electromechanical Energy Conversions.
2. To analyze the performance aspects of DC Machines.
3. To Impart knowledge of poly phase transformer.

Course Outcomes: After completion of this course, students will able to:-

1. To understand the concepts of electromechanical energy conversion.
2. Acquire the knowledge of Construction, operation characteristics of DC generators.
3. Evaluate performance characteristics, testing and applications of DC Motors.
4. Describe operation, regulation and efficiency of single phase transformer.
5. Analyze the three phase transformer connections and cooling methods.

UNIT-I

Electromechanical energy conversion: Forces and torques in magnetic field system, energy balance, singly excited and multiple excited magnetic systems, co energy. MMF, flux, reluctance, series and parallel magnetic circuits, B-H curve of magnetic materials.

UNIT-II

DC Generators: Constructional features of a DC machine, Principle of operation, armature windings diagram (Lap and Wave winding), EMF equation of a DC generator, Armature reaction and its effects, process of commutation, methods of improving commutation, methods of excitation and classification of DC generators, voltage build-up in a shunt generator, critical field resistance and critical speed, generator characteristics, losses and efficiency, parallel operation and applications of DC generators.

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SCHEME OF INSTRUCTION AND EXAMINATION
VII-Semester of B.E/B.Tech under CBCS
B.E.(EEE)

SEMESTER-VII

S. No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			
			Hours per week		Duration in Hours	Maximum Marks		Credits
			L/T	P/D		CIE	SEE	
THEORY								
1.	**16EE C31**	Power System Operation and Control	4	-	3	30	70	4
2.	**16EE C32**	Utilization of Electrical Energy	3	-	3	30	70	3
3.	**16EE C33**	DSP and Embedded Systems	4	-	3	30	70	4
4.	**16EE EXX**	Program Specific Elective- 4	3	-	3	30	70	3
5.	**16XX OYY**	Open Elective-I	3	-	3	30	70	3
PRACTICALS								
6.	**16EE C34**	Power Systems Simulation Lab	0/1	2	3	25	50	2
7.	**16EE C35**	Digital Signal Processor and Embedded Systems Lab`	0/1	2	3	25	50	2
8.	**16EE C36**	Project Seminar	0	3	-	50	-	2
			19	**07**	**-**	**250**	**450**	**23**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Program Specific Elective-4
16EEE14	Basic VLSI Design
16EEE15	Computer Methods in Power Systems(CMPS)
16EEE16	Power Quality Engineering(PQE)
16EEE17	Special Electrical Machines(SEM)

Course Code	Open Elective-I
16PY O01	History of Science and Technology
16EG O02	Gender Sensitization
16CE O02	Disaster Mitigation and Management (DMM)
16CS O10	Machine Learning Using Phyton
16ME O01	Entrepreneurship

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16EE C31

POWER SYSTEM OPERATION AND CONTROL

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand the formulation of Load-Flow problems applying different methods and economic operation of power systems
2. To understand the importance of Load Frequency Control and stability of power systems.
3. To study the reactive power control and basic FACTS controllers

Course Outcomes: After completion of this course, students will be able to:

1. Acquire knowledge in assessing the importance of load flow studies in power system operation. Carryout Load-Flow studies with different methods compare and interpret the results.
2. Acquire knowledge in conducting Economic operation of power system without and with losses
3. Acquire knowledge in conducting Load Frequency Control for single and two area systems and also distinguish between different control methods.
4. Acquire knowledge in analyzing the Stability aspects of power system.
5. Acquire knowledge in assessing the system improvement through reactive power control and FACTS controllers.

UNIT-I

Load Flow Studies: Formulation of Y bus for a system, modeling of tap changing and phase shifting transformer, Formulation of load flow problem, Solution of load flow by Gauss Seidel, Newton- Raphson, Decoupled and Fast Decoupled methods, comparison of different load flow methods.

UNIT-II

Economic Operation of Power System: Input-Output curves, Heat rates and incremental cost curves, Equal Incremental cost criterion Neglecting transmission losses with and without generator limits, B_{mn} Coefficients, Economic operation including transmission losses.

architecture, Address generation unit, speed issues, fixed point DSPs - Architecture of TMS 320C 54X Processor , addressing modes, on-chip peripherals, Real Time operating constraints

UNIT-IV

Real-Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, Shared Data, Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. Semaphores and Queues, Hard Real-TimeScheduling Considerations, Host and Target machines, Linker/Locators for Embedded Software.

UNIT-V

Advanced architectures: ARM Processor, memory organization and Instruction level parallelism, Net advanced embedded systems: Bus protocols, 12C bus and CAN bus, Internet- Enabled Systems

Text Books:

1. Avatar Singh and S. Srinivasan, " Digital Signal Processing Implementations Using DSP Microprocessors", Thomson Brooks, 2004.
2. Wayne Wolf, "Computers as Components - Principles of Embedded Computer System Design", Morgan Kaufmann Publisher, 2006.

Suggested Reading:

1. B. Ventakaramani, M. Bhaskar, "Digital Signal Processes, Architecture Processing and Applications", Tata McGraw Hill, 2002.
2. David E-Simon, "An Embedded Software Primer", Pearson Education, 2007.
3. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech press, 2005.

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16EE C34

POWER SYSTMES SIMULATION LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To understand the load flows, transient stability studies, economic load dispatch and load frequency control in power system
2. To understand the time and frequency response of the system
3. To Simulate and compare the output of converters with different loads

Course Outcomes: After completion of this course, students will be able to:

1. Acquire knowledge about Load frequency control
2. Analyse Load flow studies and economic load dispatch
3. Acquire knowledge about transient stability studies
4. Analyse semi, full and buck & boost converters
5. Acquire knowledge about time and frequency response of the system

List of Experiments:

1. Determination of power angle diagram for Salient and Non-salient pole synchronous machine.
2. Frequency response characteristics using Bode plot
3. Root Locus & Nyquist method
4. Design of lag, lead and lag-lead compensator
5. Computation of line parameters
6. Modeling of Transmission Lines
7. Load Flow Studies.
8. Fault Analysis.
9. Transient stability studies.
10. Economic load dispatch.
11. Load Frequency control of single-area and two-area systems
12. Single-phase semi-converter with R and RL loads
13. Single-phase full-converter with R and RL loads
14. Analysis of Buck and Buck-Boost converter

Note: At least **TEN** experiments should be conducted in the Semester

With effect from the academic year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-VII

Sl. No.	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1	**18EEC25**	Power System Protection	3	-	-	3	30	70	3
2	**18EEC26**	Electrical Drives	3	-	-	3	30	70	3
3	**18EEC27**	Signals & Systems	3	-	-	3	30	70	3
4	**18EEEXX**	Core Elective-5	3	-	-	3	30	70	3
5	**18XXOYY**	Open Elective-2	3	-	-	3	30	70	3
PRACTICALS									
6	**18EEC28**	Power Systems-II Lab	-	-	3	3	25	35	1.5
7	**18EEC29**	Electrical Drives Lab	-	-	3	3	25	35	1.5
8	**18EEC30**	Project: Part-1	-	-	4	-	50		2
		Total	**15**	**-**	**10**	**21**	**250**	**420**	**20**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Core Elective-5
18EEE17	Power System Dynamics and Control
18EEE18	Switch Mode Power Converters
18EEE19	Electrical Machine Design
18EEE20	High Voltage Engineering

Course Code	Open Elective-2
18MEO03	Research Methodologies
18MEO04	Entrepreneurship
18EGO01	Technical Writing Skills
18CSO04	Basics of Data Science using R
18CSO07	Basics of Cyber Security

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With effect from the academic year 2021-22

18EEC28 **POWER SYSTEMS-II LAB**

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	1.5

Course Objectives:

1. To simulate and understand the load flows, Fault Analysis of power system.
2. To understand the transient stability studies, Economic power scheduling and Load frequency control in power system.
3. To understand the importance of protective relay kits and also study the various components in substations

Course Outcomes: After completion of this course, students will be able to:

1. Apply the load flow studies for any given power system.
2. Analyze the fault in the real time power system.
3. Estimate the consequences of transient stability, economic power scheduling and load frequency control.
4. Examine function of different types of relays for different power system applications.
5. Illustrate the functionality of each component in the substation.

List of Experiments

1. Simulation of Load Flow Studies
2. Simulation of Fault Analysis.
3. Simulation of Transient stability studies.
4. Simulation of Economic power scheduling.
5. Simulation of Load Frequency control of one area system.
6. IDMT characteristics of Over-current relay.
7. Differential protection of 1-phase transformer.
8. Draw the Characteristics of Static relays.
9. Operation of relays in long transmission line.
10. Over Current & Earth Fault Relay Testing Kit (Static Type)
11. Study of Universal Relay Testing Kit
12. Generator Differential Protection Study Unit
13. Study of Distance Relay Testing Kit / Impedance Relay kit
14. Visiting nearby substation and submitting the report.

Note: At least **TEN** experiments should be conducted in the semester.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System
B.E (Electrical and Electronics Engineering)

SEMESTER - IV

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16EEC06	Electrical Circuits -II	3	-	3	30	70	3
2	16EE C07	Electrical Machinery - I	3	-	3	30	70	3
3	16EE C08	Power Systems - I	3	-	3	30	70	3
4	16EE C09	Electromagnetic Theory	3/1	-	3	30	70	4
5	16EE C10	Digital Elctronics and Logic Design	3	-	3	30	70	3
6	16EE C11	Linear Integrated Circuits	3	-	3	30	70	3
PRACTICALS								
6	16EE C12	Electrical Machinery - I Lab	0/1	2	3	25	50	2
7	16EE C13	Linear Integrated Circuits Lab	0/1	2	3	25	50	2
8	16EG C03	Soft Skills and Employability Enhancement Lab	-	2	2	15	35	1
Total			**21**	**6**	**-**	**245**	**555**	**24**

L: Lecture T: Tutorial P: Practical D: Drawing
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EE C10

DIGITAL ELECTRONICS AND LOGIC DESIGN

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the basics of Boolean algebra and Minimization Techniques.
2. To know the basics of Digital logic family.
3. To study binary arithmetic & its circuits and code converters.
4. To understand the Design of synchronous sequential circuits.
5. To know design of sequence detector and generators and programmable logic circuits.

Course Outcomes: The student will be able to

1. Apply Boolean algebra rules, K-maps, Tabulation methods to minimize Boolean algebraic expressions.
2. Classify, describe and compare the characteristics of various digital logic families.
3. Acquire the knowledge to build the combinational logic circuits.
4. Acquire the knowledge to build the sequential logic circuits.
5. Design the counters.
6. Acquire the knowledge to synthesize the digital circuits using D, JK & T Flip-flops.

UNIT- I

Number Systems: Introduction to number systems and their codes, Number complements: One's &Two's complement arithmetic, BCD and Excess-3 arithmetic.

Boolean Algebra: Review of Basics and laws of Boolean algebra, Minimization of Boolean expressions, Truth tables and maps, Sum of products and product of sums.

UNIT-II

Simplification of Boolean Functions: K-Map method of reduction, Incompletely specified functions, multiple output minimization, Tabular minimization.

Digital logic families and IC's: Characteristics of Digital IC's, Introduction to RTL, DTL, TTL, CMOS, ECL families, Comparison of performance.

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UNIT-III

Binary Arithmetic and Circuits: Half and Full adder, Subtractor and Magnitude comparator, Carry look ahead adder.

Combinational Circuits: Multiplexer and de-multiplexer, Encoder and decoder, Code converters, Implementation of combinational logic using standard logic gates and multiplexers.

UNIT- IV

Sequential Logic: Basic latch circuit - Debouncing switch, Flip-flops: SR, JK, D and T, Truth table and excitation tables.

Registers & Counters: Registers, Shift registers, Applications of registers, Ripple & Synchronous counters- up/down counter, BCD counter, Counter decoding,, Ring counters.

UNIT-V

Design of Digital Systems: Concept of state, State diagram, Design of counters, Sequence detector and generators, Synthesis using D, JK, T flip-flops, Programmable Logic devices: Introduction, PROM, PLA, PAL.

Text Books:

1. Morris Mano M., Digital Design, Prentice Hall of India, 3rd Edition, 2002.
2. Donald Pleach, Albert Paul Malvino, Goutamsaba Digital Principles and Applications, McGraw- Hill, 6th Edition, 2006.

Suggested Reading:

1. Tocci, Widmer, Moss, Digital Systems, Principles and Applications, Pearson Education, 10th Edition, 2016.
2. B. Somnath Nair, Digital Electronics and Logic Design, Prentice Hall of India, Eastern Economy, Edition, 2006.

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CHAITANYABHARATHIINSTITUTEOFTECHNOLOGY(A)
SCHEMEOFINSTRUCTIONANDEXAMINATION
B.E/B.Tech under AICTE Model Curriculum
B.E. (EEE)

SEMESTER-IV

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1.	18CS C05	Basics of Data Structures	2	-	-	3	30	70	2
2.	18EE C09	Digital Electronics	3	-	-	3	30	70	3
3.	18EE C10	Electrical Machines-1	3	1	-	3	30	70	4
4.	18EE C11	Power Systems-I	3	-	-	3	30	70	3
5.	18ME C09	Principles of Management	3	-	-	3	30	70	3
6.	18CE M01	Environmental Science	2	-	-	2	-	50	-
PRACTICALS									
7.	18CS C06	Basics of Data Structures lab	-	-	2	2	15	35	1
8.	18EE C12	Digital Electronics Lab	-	-	2	2	15	35	1
9.	18EE C13	Electrical Machines-1 Lab	-	-	2	2	15	35	1
10.	18EG C03	Soft Skills Lab	-	-	2	2	15	35	1
		Total	**16**	**1**	**8**		**210**	**540**	**19**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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18CS C05

BASICS OF DATA STRUCTURES
(Common for other Programmes)

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	2

Pre-requisites: Basic knowledge of programming language such as C or C++ is preferred (but not mandatory) and some mathematical maturity also will be expected.

Course Objectives:

1. To basic linear and non-linear data structures.
2. To analyzing the performance of operations on data structures.
3. To different sorting and searching techniques and their complexities.

Course Outcomes: After completion of this course, students will be able to:

1. Understand the basic concepts of data structures.
2. Understand the notations used to analyze the performance of algorithms.
3. Choose and apply an appropriate data structure for a specified application.
4. Understand the concepts of recursion and its applications in problem solving.
5. Demonstrate a thorough understanding of searching and sorting algorithms.

UNIT-I

Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff.
Recursion: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

UNIT-II

Linked Lists: Introduction, Linked lists and types, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

UNIT-III

Stacks and Queues: Introduction to stacks, applications of stacks, implementation and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

UNIT-IV

Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

UNIT-V

Graphs: Introduction, Applications of graphs, Graph representations, graph traversals, Minimal Spanning Trees.

Searching and Sorting: Linear searching, binary Searching, sorting algorithms-bubble sort, selection sort, quick sort, heap sort.

Text Books:

1. Narasimhaarumanchi, Data Structures and Algorithms Made Easy, CareerMonk Publications, 2017
2. S. Sahni and Susan Anderson-Freed, Fundamentals of Data structures in C,E.Horowitz, Universities Press, 2nd Edition.
3. ReemaThareja, Data Structures using C, Oxford University Press.

Suggested Reading:

1. D.S.Kushwaha and A.K.Misra, Data structures A Programming Approach with C, PHI.
2. Seymour Lipschutz, Data Structures with C, Schaums Outlines, Kindle Edition

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18EE C09

DIGITAL ELECTRONICS

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the working of logic families and logic gates
2. To know the design and implementation of combinational and sequential logic circuits.
3. To Understand the process of A/D and D/A conversions and PLD's in implementing the given logical problems.

Course Outcomes: After completion of this course, students will be able to:

1. Understand working of logic families and logic gates.
2. Design and implement combinational digital circuits.
3. Design and implement Sequential logic circuits
4. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
5. Be able to use PLD's to implement the given logical problems.

UNIT–I

Fundamentals of Digital Systems and Logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri – state logic.

UNIT–II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, digital comparator, parity checker/generator, code converters, priority encoders, decoders/Seven segment display device, Q-M method of function realization.

UNIT–III

Sequential circuits and systems: A 1-bit memory, the circuit properties of bi-stable latch, the clocked SR flip flop, J- K-T and D-types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, applications of counters.

UNIT–IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/ converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage of frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.

UNIT–V

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic.

Text Books:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.

Suggested Readings:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
2. S. Salivahanan " Digital circuits and design", 4th edition, Vikas Publishing house, 2010.

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18EE C10

ELECTRICAL MACHINES-I

Instruction	3L + 1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To Inculcate the principles of Electromechanical Energy Conversions.
2. To analyze the performance aspects of DC Machines.
3. To Impart knowledge of poly phase transformer.

Course Outcomes: After completion of this course, students will able to:-

1. To understand the concepts of electromechanical energy conversion.
2. Acquire the knowledge of Construction, operation characteristics of DC generators.
3. Evaluate performance characteristics, testing and applications of DC Motors.
4. Describe operation, regulation and efficiency of single phase transformer.
5. Analyze the three phase transformer connections and cooling methods.

UNIT-I

Electromechanical energy conversion: Forces and torques in magnetic field system, energy balance, singly excited and multiple excited magnetic systems, co energy. MMF, flux, reluctance, series and parallel magnetic circuits, B-H curve of magnetic materials.

UNIT-II

DC Generators: Constructional features of a DC machine, Principle of operation, armature windings diagram (Lap and Wave winding), EMF equation of a DC generator, Armature reaction and its effects, process of commutation, methods of improving commutation, methods of excitation and classification of DC generators, voltage build-up in a shunt generator, critical field resistance and critical speed, generator characteristics, losses and efficiency, parallel operation and applications of DC generators.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
SCHEME OF INSTRUCTION AND EXAMINATION
VII-Semester of B.E/B.Tech under CBCS
B.E.(EEE)

SEMESTER-VII

S. No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			
			Hours per week		Duration in Hours	Maximum Marks		Credits
			L/T	P/D		CIE	SEE	
THEORY								
1.	**16EE C31**	Power System Operation and Control	4	-	3	30	70	4
2.	**16EE C32**	Utilization of Electrical Energy	3	-	3	30	70	3
3.	**16EE C33**	DSP and Embedded Systems	4	-	3	30	70	4
4.	**16EE EXX**	Program Specific Elective- 4	3	-	3	30	70	3
5.	**16XX OYY**	Open Elective-I	3	-	3	30	70	3
PRACTICALS								
6.	**16EE C34**	Power Systems Simulation Lab	0/1	2	3	25	50	2
7.	**16EE C35**	Digital Signal Processor and Embedded Systems Lab`	0/1	2	3	25	50	2
8.	**16EE C36**	Project Seminar	0	3	-	50	-	2
			19	**07**	**-**	**250**	**450**	**23**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Program Specific Elective-4
16EEE14	Basic VLSI Design
16EEE15	Computer Methods in Power Systems(CMPS)
16EEE16	Power Quality Engineering(PQE)
16EEE17	Special Electrical Machines(SEM)

Course Code	Open Elective-I
16PY O01	History of Science and Technology
16EG O02	Gender Sensitization
16CE O02	Disaster Mitigation and Management (DMM)
16CS O10	Machine Learning Using Phyton
16ME O01	Entrepreneurship

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16EE C31

POWER SYSTEM OPERATION AND CONTROL

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand the formulation of Load-Flow problems applying different methods and economic operation of power systems
2. To understand the importance of Load Frequency Control and stability of power systems.
3. To study the reactive power control and basic FACTS controllers

Course Outcomes: After completion of this course, students will be able to:

1. Acquire knowledge in assessing the importance of load flow studies in power system operation. Carryout Load-Flow studies with different methods compare and interpret the results.
2. Acquire knowledge in conducting Economic operation of power system without and with losses
3. Acquire knowledge in conducting Load Frequency Control for single and two area systems and also distinguish between different control methods.
4. Acquire knowledge in analyzing the Stability aspects of power system.
5. Acquire knowledge in assessing the system improvement through reactive power control and FACTS controllers.

UNIT-I

Load Flow Studies: Formulation of Y bus for a system, modeling of tap changing and phase shifting transformer, Formulation of load flow problem, Solution of load flow by Gauss Seidel, Newton- Raphson, Decoupled and Fast Decoupled methods, comparison of different load flow methods.

UNIT-II

Economic Operation of Power System: Input-Output curves, Heat rates and incremental cost curves, Equal Incremental cost criterion Neglecting transmission losses with and without generator limits, B_{mn} Coefficients, Economic operation including transmission losses.

16EE E17

SPECIAL ELECTRICAL MACHINES

Instruction	3 Hours per week
Duration of Semester Examination	3 Hours
Semester End Examination	70 Marks
Sessional	30 Marks
Credits	3

Course Objectives:

1. To study the operating principles different special machines
2. To make the learner to be aware of latest special machines which are in vogue.
3. To be familiar with design features of special electrical machines

Course Outcomes: After completion of this course, students will be able to:

1. Identify appropriate machine for a specific application.
2. Recognize the principle of operation and characteristics of the given special machine.
3. Familiar with driver circuit used for special machines
4. Develop equivalent circuit of a given special electrical machine
5. Distinguish the special machine with the obtained characteristics

UNIT-I

Stepper Motors and its Mathematical Analysis: Introduction, Synchronous Induction (or Hybrid) Stepper Motor, Hybrid stepping motor: Construction, Principle of operation, energisation with two phase at a time, An Open -Loop Controller for a 2-Phase Stepper Motor, Variable Reluctance (VR) Stepping Motor, Open -Loop Control of 3-Phase VR Step Motor, Voltage current relation and torque expression, Transformation of equation into d-q reference frame, Normalization of d-q axis.

UNIT-II

Switched reluctance motor : Introduction , Improvements in the design of conventional reluctance motors, Some distinctive difference between SR and conventional reluctance motor, Principle of operation of SRM, Some design aspects of stator and rotor pole arcs, Power converter for SR motor, A numerical example, Derivation of torque expression, General -Linear case.

UNIT-III

Permanent magnet materials and motors: Introduction, Minor hysteresis loops and recoil line, Stator frame (pole and yoke part) of conventional PMDC motors,

Equivalent circuit of PM, Development of electronically commutated DC motor from conventional DC motor.

UNIT-IV

BLDC motors: Types of construction, Principle of operation, Sensing and switching logic scheme, Drive and power circuits, Theoretical Analysis and Performance prediction.

UNIT-V

Linear induction motor: Development of double sided LIM from rotary type IM, A schematic of LIM drive from electric traction, Field analysis of a DSLIM, Fundamental assumption, Transverse edge (or finite width) effects in LIM, Solution for current distribution in rotor, Force calculation on rotor of finite width : estimation of resistivity factor.

Text Books:

1. K. Venkatarathnam, "Special Electrical Machines", Universities Press(India) Pvt. Ltd., 2013
2. E.G. Janardhan, "Special Electrical Machines", Prentice Hall India, 2014

Suggested Reading:

1. H. Bülent Ertan, M. Yildirim Üçtug, Ron Colyer, Alfio Consoli, "Modern Electrical Dives" Springer Science+Bussiness Media, 2000

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With effect from the academic year 2020-21

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-VI

Sl. No.	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1	**18EEC20**	Control Systems	3	-	-	3	30	70	3
2	**18EEC21**	Microprocessors and Microcontrollers	3	-	-	3	30	70	3
3	**18EEC22**	Power Systems Operation and Control	3	-	-	3	30	70	3
4	**18EEEXX**	Core Elective-3	3	-	-	3	30	70	3
5	**18EEEXX**	Core Elective-4	3	-	-	3	30	70	3
6	**18XXOYY**	Open Elective-1	3	-	-	3	30	70	3
PRACTICALS									
7	**18EEC23**	Control Systems Lab	-	-	2	2	15	35	1
8	**18EEC24**	Microprocessors Lab	-	-	2	2	15	35	1
		Total	**18**	**-**	**4**	**22**	**210**	**490**	**20**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Core Elective-3
18EEE09	Power Quality
18EEE10	Advanced Power Converters
18EEE11	Electrical Distribution Systems
18EEE12	HVDC Transmission Systems

Course Code	Core Elective-4
18EEE13	AI Techniques In Electrical Engineering
18EEE14	Electric Hybrid Vehicles
18EEE15	FACTS
18EEE16	Special Electrical Machines

Course Code	Open Elective-1
18ECO06	Principles of Embedded Systems (PES)
18CSO07	Basics of Cyber Security (BCS)
18BTO01	Basics of Biology
18PYO01	History of Science and Technology

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With effect from the academic year 2020-21

18EEE16 **SPECIAL ELECTRICAL MACHINES (Core Elective -4)**

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To study the operating principles different special machines
2. To make the learner to be aware of latest special machines which are in vogue.
3. To be familiar with salient features of special electrical machines

Course Outcomes: After the completion of this course, students will be able to:

1. Recognize application specific special electrical machines
2. Explain the working principle of various special electrical machines.
3. Develop equivalent circuit of a given special electrical machine.
4. Classify the special electrical machine based on construction
5. Choose the type of armature winding suitable for a given SEM.
6. Analyse the various control methods of a given Special Electric machine.

UNIT-I

Stepper Motors: Introduction, classification, single phase, Disc Magnet and Claw-tooth stepper motors, inference from Torque equation, (no derivation) static and dynamic characteristics, open loop and closed loop control, concepts of Microprocessor based control, comparison of conventional stepper motors with permanent magnet stepper motor, VR Stepper motor and Hybrid stepper motor and applications

UNIT-II

Switched Reluctance Motor (SRM):

Construction, Principle of working, constraints on pole arc and tooth arc, Inference from torque equation and Characteristics, Control of SRM, features of Microprocessor based control of SRM, Introduction to Synchronous Reluctance Motor (Sy R M)

UNIT-III

PMDC and BLDC motor: PMDC Motor: Construction, Principle of working Minor hysteresis loops and recoil line, Equivalent circuit of PM, Inference from Torque equation, performance Characteristics, moving coil motors Printed Circuit Motor

BLDC Motor: Construction, principle of working, types, and control types and differences among various controls such as Microprocessor based, DSP- based control and sensor less control,

UNIT-IV

Linear Electric Machines: Construction, equivalent circuit, characteristics, design aspects and control, Types such as – linear synchronous motor, DC Linear motor, Linear Reluctance motor and Linear Levitation Machines (elementary treatment only)

UNIT-V

Permanent Magnet Axial Flux (PMAF) Machines: Construction, Armature windings – Toroidal stator, Trapezoidal stator, Rhomboidal Stator winding, salient features of torque equation, EMF equations and Output equation [No derivations], Phasor diagram, Applications; **Introduction to Permanent Magnet Synchronous Motor,**

Textbooks:

1. E.G. Janardhan, "Special Electrical Machines", Prentice Hall India, 2014.
2. K. Venkatarathnam, "Special Electrical Machines", Universities Press (India) Pvt. Ltd., 2013

Suggested Reading:

1. H. Bülent Ertan, M. Yildirim Üçtug, Ron Colyer, Alfio Consoli, "Modern Electrical Drives" Springer Science+Bussiness Media, 2000

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-VIII

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1.	**18EEEXX**	Core Elective-6	3	-	-	3	30	70	3
2.		Open Elective-3	3	-	-	3	30	70	3
PRACTICALS									
3.	**18EEC31**	Technical Seminar	-	-	2	-	50	-	1
4.	**18EEC32**	Project: Part-2	-	-	20	Viva voce	100	100	10
		Total	**6**		**22**		**210**	**240**	**17**

L: Lecture T: Tutorial P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Core Elective-6
18EEE21	Advanced Electric Drives
18EEE22	Digital Signal Processing
18EEE23	Smart Grid
18EEE24	Digital Control System

Course Code	Open Elective-3
18MEO07	Intellectual Property Rights (IPR)
18CEO02	Disaster Mitigation and Management (DMM)
18ITO02	Python Programming
18EGO02	Gender Sensitization
18PY O01	History of Science and Technology

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With effect from the academic year 2021-22

18EEE23 **SMART GRID**

(Core Elective – 6)

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To study the importance of smart grid and components of smart grid
2. To understand the communication technologies, infrastructure required for smart metering
3. To know various functions of distribution automation and operation of micro grid

Course outcomes: At the end of this course, students will be able to:

1. Discuss the components and operation of Smart Grid at transmission and distribution level
2. Select the communication technology required for smart grid applications
3. Illustrate components and operation of smart metering and implementation of demand side integration
4. Analyze the different types of micro grid, storage systems and communication infrastructure
5. Explain the equipment used in distribution automation and implement the distribution management system functions

UNIT-I

Introduction to smart grid: Today's Grid versus the Smart Grid, drivers of smart grid, functionalities and key components of smart grid, smart grid components for transmission system, smart grid functionalities at distribution level, smart grid vision and road map to India, policies, standards, regulations, national smart grid mission framework,

UNIT-II

Communication Technologies: Dedicated and shared communication channels, switching techniques, communication channels: wired communication, twisted pair, optical fiber, radio communication, Ethernet, wireless LAN, Bluetooth, WiMAX, standards for information exchange

UNIT-III

Smart Metering Infrastructure: Evolution of electricity metering, benefits of smart metering, components of smart metering, hardware requirements, communication infrastructure and protocols for smart metering: Home area network, neighborhood area network, data concentrator, meter data management system, Demand side integration(DSI): services, implementation of DSI, hardware support

UNIT-IV

Micro Grids: Introduction, mini/micro grids, architecture of micro grid, types of micro grid, Dc micro grid, ac micro grid, AC. DC micro grid, Protocols and standards, communication to monitor real time network status, energy storage in micro grids, benefits of distributed generation and energy storage in micro grid systems

UNIT-V:

Distribution Automation: Substation automation equipment: current transformers, voltage transformers, relay IED, faults in distribution system: components for fault isolation and restoration, voltage regulation, Distribution Management systems: Data sources and associated external systems, modelling and analysis tools, Applications: Network reconfiguration, volt/var control, outage management system, operation of DER, fault diagnosis and location

Text Books:

1. Janaka Ekanayake, Liyanage, Wu, Akihiko Yokoyama, Jenkins, Smart Grid, Wiley Publications, 2012
2. Stuart Borlas'e, "Smart Grid: Infrastructure, Technology and solutions" CRC Press

Suggested Reading:

1. James Momoh, "Smart Grid Fundamentals of Design and Analysis" IEEE Press, Wiley Publications, 2012
2. Smart grid Hand Book for Regulators and policy makers, Nov 2017 published by India Smart Grid Forum
3. Bharat Modi, Anuprakash, Yogesh Kumar, "Fundamentals of Smart grid Technology", Katson publishers, 2015

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Gandipet, Hyderabad - 75

With effect from the academic year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-VII

Sl. No.	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1	**18EEC25**	Power System Protection	3	-	-	3	30	70	3
2	**18EEC26**	Electrical Drives	3	-	-	3	30	70	3
3	**18EEC27**	Signals & Systems	3	-	-	3	30	70	3
4	**18EEEXX**	Core Elective-5	3	-	-	3	30	70	3
5	**18XXOYY**	Open Elective-2	3	-	-	3	30	70	3
PRACTICALS									
6	**18EEC28**	Power Systems-II Lab	-	-	3	3	25	35	1.5
7	**18EEC29**	Electrical Drives Lab	-	-	3	3	25	35	1.5
8	**18EEC30**	Project: Part-1	-	-	4	-	50		2
		Total	**15**	**-**	**10**	**21**	**250**	**420**	**20**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Core Elective-5
18EEE17	Power System Dynamics and Control
18EEE18	Switch Mode Power Converters
18EEE19	Electrical Machine Design
18EEE20	High Voltage Engineering

Course Code	Open Elective-2
18MEO03	Research Methodologies
18MEO04	Entrepreneurship
18EGO01	Technical Writing Skills
18CSO04	Basics of Data Science using R
18CSO07	Basics of Cyber Security

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With effect from the academic year 2021-22

18EEE19 **ELECTRICAL MACHINE DESIGN**

(Core Elective-5)

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the design parameters of various electrical machines.
2. To analyze the electrical and mechanical characteristics of electrical machines.
3. To become familiar with CAD usage.

Course Outcomes: After completion of this course, students will be able to:

1. Recognize the various parameters required for machine design.
2. Interpret the electrical machines based on different design constraints.
3. Assess the size of a machine with the given data.
4. Describe the various computational methods applicable in machine design.
5. Design an electric machine with the given conditions.

UNIT-I

Basics of Machine design aspects: Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

UNIT-II

Design of Transformers: Output equations of single and three-phase transformers, Sizing of a transformer, main dimensions, window space factor, overall dimensions, design of cooling tank, methods for cooling of transformers.

UNIT-III

Design of Induction Motors: Output equation, Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, magnetic leakage calculations, leakage reactance of poly phase machines, magnetizing current, short circuit current.

UNIT-IV

Design of Synchronous Machines: Output equation, Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, estimation of air gap length, design of rotor, design of damper winding, determination of full load field mmf, design of turbo alternators, Cooling of alternators.

UNIT-V

Computer aided Design (CAD): Limitations (assumptions) of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design.

Text Books:

1. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. K. M. V. Murthy, "Computer Aided Design of Electrical Machines", B.S. Publications, 2008.

Suggested Reading:

1. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.
2. V. N. Mittal and Arvind Mittal "Design of Electrical Machines" Standard Publishers Distributors, New Delhi, 2009.

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AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-V

Sl. No.	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1	**18EEC14**	Electrical Machines-II	3	-	-	3	30	70	3
2	**18EEC15**	Power Systems-II	3	-	-	3	30	70	3
3	**18EEC16**	Power Electronics	3	-	-	3	30	70	3
4	**18EEEXX**	Core Elective -1	3	-	-	3	30	70	3
5	**18EEEXX**	Core Elective -2	3	-	-	3	30	70	3
6	**18MBC01**	Engineering Economics and Accountant	3	-	-	3	30	70	3
PRACTICALS									
7	**18EEC17**	Electrical Machines-II Lab	-	-	2	2	15	35	1
8	**18EEC18**	Power Systems-I Lab	-	-	2	2	15	35	1
9	**18EEC19**	Power Electronics Lab	-	-	2	2	15	35	1
		Total	**18**	**-**	**6**	**-**	**225**	**525**	**21**

L: Lecture **T: Tutorial** **P: Practical**

CIE - Continuous Internal Evaluation **SEE - Semester End Examination**

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Course Code	Core Elective-1
18EEE01	Wind and Solar Energy
18EEE02	Optimization Techniques
18EEE03	Electrical Engineering Materials
18EEE04	Electronic Instrumentation

Course Code	Core Elective-2
18EEE05	Simulation Techniques in Electrical Engineering
18EEE06	Energy Conservation & Auditing
18EEE07	Industrial Electrical Systems
18EEE08	Electrical Estimation & Costing

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With effect from the academic year 2020-21

18EEE07 **INDUSTRIAL ELECTRICAL SYSTEMS (Core Elective-2)**

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. Understand various components of industrial electrical systems and analyze and select the proper size of various electrical system components.
2. Understand the electrical wiring systems for residential and commercial consumers and analyze and select the proper size of various electrical system components.
3. Understand necessity of illumination for specified requirement

Course Outcomes: After completion of this course, students will able to:

1. Understand various components of industrial electrical systems
2. Apply residential and commercial electrical wiring rules and guidelines for installation of electrical systems
3. Design various Illumination schemes and lighting systems
4. Understand HT connection, Industrial loads and LT panel components
5. Select the proper size of various electrical system components

UNIT-I

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, single line diagram (SLD) of a wiring system, Electric shock and Electrical safety practices (Elementary treatment only)

UNIT-II

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components. (Elementary treatment only)

UNIT-III

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting. (Elementary treatment only)

UNIT-IV

Industrial Electrical Systems I: HT connection, industrial substation, Transformer selection, Industrial loads, Earthing design, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components. (Elementary treatment only)

UNIT-V

Industrial Electrical Systems II: DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS & Battery Banks. (Elementary treatment only)

Text Books:

1. S. L. Uppal and G. C. Garg, “Electrical Wiring, Estimating & Costing”, Khanna publishers, 2008.
2. K. B. Raina, “Electrical Design, Estimating & Costing”, New age International, 2007.

Suggested Readings:

1. S. Singh and R. D. Singh, “Electrical estimating and costing”, Dhanpat Rai and Co., 1997.
2. H. Joshi, “Residential Commercial and Industrial Systems”, McGraw Hill Education, 2008.
3. Hemant Joshi "Residential, Commercial and Industrial Electrical Systems: Equipment and selection Volume 1 of Residential, Commercial and Industrial Electrical Systems", Tata McGraw-Hill Education, 2008

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Choice Based Credit System

B.E (Electrical and Electronics Engineering)

SEMESTER – III

S.No.	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	16MT C05	Engineering Mathematics-III	3	-	3	30	70	3
2	16EE C02	Electrical Circuits-I	3	-	3	30	70	3
3	16EE C03	Electrical Measurements and Instruments	3	-	3	30	70	3
4	16EC C16	Electronics Engineering	4	-	3	30	70	4
5	16ME C11	Prime Movers and Pumps	3	-	3	30	70	3
6	16MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
PRACTICALS								
6	16EE C04	Circuits and Measurements Lab	0/1	2	3	25	50	2
7	16EC C17	Electronics Engineering Lab	-	3	3	25	50	2
8	16ME C12	Prime Movers and Pumps Lab	0/1	2	3	35	50	2
Total			**21**	**7**	**-**	**255**	**570**	**25**

L: Lecture T: Tutorial P: Practical D: Drawing

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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16EE C03

ELECTRICAL MEASUREMENTS AND INSTRUMENTS

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the principle behind various instruments.
2. To comprehend the torque equations of instruments.
3. To know the various bridges for measurement of R, L and C.
4. To calibrate the instruments.

Course Outcomes: The student will be able to

1. Identify a suitable instrument to measure a given parameter.
2. Analyze the need of CT/PT for a given system.
3. Illustrate the concept of the instrument with relevant examples and proper justification.
4. Distinguish between electrical and magnetic measurements and their instruments.
5. Recognize the appropriate bridge method of measurement for a given parameter.
6. Specify the right digital instrument for a given requirement.

UNIT- I

Introduction to Measurements: Objectives of measurement, static and dynamic characteristics, errors and their classification.

Introduction to Instruments-1: Types of instruments, classification of instruments based on type of measurement and principle of working (PMMC, MI, Dynamometer, Induction and Electrostatic), types of torques (torque equations for MC, MI and dynamometer type instruments).

UNIT- II

Introduction to Instruments-2: Single phase Induction type energy meter, Driving torque & Braking torque equations, errors and their compensation, Single phase Dynamometer type Power factor meter, Weston type frequency meter. Construction & theory of Instrument Transformers, Equations for ratio and phase angle error of C.T & P.T (Elementary treatment only).

UNIT- III

Resistance, Inductance and Capacitance parameters: Classification of resistance measuring methods Kelvin's dou
and meggar. Measurement of inductance

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bridge, Maxwell's Inductance - Capacitance Bridge and Anderson's bridge. Measurement of capacitance using De-Sauty's bridge and Schering bridge. Derivation of bridge balance conditions, merits and demerits, applications and related numerical problems.

UNIT- IV

Measurements of Magnetic and Electric Parameters: Ballistic galvanometer- Principle of operation, construction and applications of Ballistic galvanometer, flux meter its construction and principle of operation. Determination of B-H curve using method of reversals, Epstein square bridge for measuring Iron losses. Potentiometers, Classification - Crompton DC&AC polar type, Applications. Calibration of ammeter, voltmeter & wattmeter.

UNIT-V

Introduction to Digital Instruments (DVM and Transducers): Introduction to digital Instruments, Digital Voltmeters (DVM), Speed reading, Range selection, Over ranging, Common mode rejection, Digital Multi meters, bidirectional meters.

Transducers: Objectives, Introduction, Role of Transducers in measurement system, Guidelines for selecting & using transducers. Strain Gauge, Linear variable Differential transformer (LVDT), Temperature transducers, bimetallic strip, Thermocouples, Resistance Temperature Detectors (RTD), Thermostats, Radiation pyrometers.

Text Books:

1. F.W.Golding and Widdis, Electrical Measurements and measuring Instruments, A.H.Wheeler & Co., 5th Edition, 2007.
2. A.K.Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanapat Rai & Sons, NewDelhi, 19th Edition, 2011.
3. CT. Baldwin, Fundamentals of Electrical measurements, Kalyani publications, 2001.

Suggested Reading:

1. Helfrick, Albert D., Cooper, William D., Modern Electronic Instrumentation and Measurement Techniques, PHI Publications, 1990.
2. Stanley Wold, Richard F.M.Smith, Student reference manual for Electronic Instrumentation Laboratories, 2nd Edition, PHI.
3. Alan. S. Morris, Essence of Measurement, PHI, 1996.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
SCHEME OF INSTRUCTION AND EXAMINATION
B.E/B.Tech under AICTE Model Curriculum
B.E. (EEE)

SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1.	18MT C07	Applied mathematics	3	1	-	3	30	70	4
2.	18EE C03	Analog Electronic Circuits	3	1	-	3	30	70	4
3.	18EE C04	Electrical Measurements and Instrumentation	3	-	-	3	30	70	3
4.	18EE C05	Electromagnetic Fields	3	1	-	3	30	70	4
5.	18EE C06	Electrical Circuit Analysis	3	1	-	3	30	70	4
6.	18EG M 01	Indian constitution	2	-	-	2	-	50	-
7.	18EE M01	Indian Traditional Knowledge	2	-	-	2	-	50	-
PRACTICALS									
8.	18EE C07	Analog Electronic Circuits Lab	-	-	2	2	15	35	1
9.	18EE C08	Electrical Measurements and Instrumentation Lab	-	-	2	2	15	35	1
		Total	19	4	4	-	180	520	21

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Core Courses offered to other Departments:

SEMESTER-III

Sl. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration In Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
1	18EE C01	Basic Electrical and Electronics Engineering	3	1	-	3	30	70	4
PRACTICALS									
2	18EE C02	Basic Electrical and Electronics Engineering Lab	-	-	2	2	15	35	1

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18MT C07

APPLIED MATHEMATICS
(For ECE/EEE)

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To form PDE and solve Linear and Non-Linear equations.
2. To learn the Laplace, Inverse Laplace Transform and Z-Transforms.
3. To find roots of equations, interpolation and Numerical differentiation.
4. To learn Numerical solution of ODE and Engineering problems.
5. To learn fitting of distribution and predicting the future values.

Course outcomes: After completion of this course, students will be able to:

1. Understand the methods to find solution of linear and non-linear PDE and solution of wave equation.
2. Find Laplace, Inverse Laplace and Z-Transforms and solution of engineering problems.
3. Solve Non-Linear algebraic and transcendental equations to find interpolations when tabular values are given.
4. Find solution of initial value problems of ODE.
5. Understand the Methods for analysing the random fluctuations using probability distribution and also identify the importance of principle of Least squares approximations for predictions.

UNIT-I

Partial Differential Equations: Formation of Partial Differential Equations, Solution of Linear (Lagrange's) and Non-linear PDE of First order standard forms and Charpit's Method, Solutions of PDE by method of separation of variables, solution of one dimensional wave equation and its applications.

UNIT-II

Transform Theory: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by partial fractions and residue method, solving ODEs by Laplace Transform method.Z-transforms and its basic properties, inverse Z-transform and solutions of difference equation by Z-transform.

amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT-IV

Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers, Series voltage regulator , oscillators (Wein bridge and phase shift).

UNIT-V

Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot. clamping and clipping circuits

Text Books:

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. Analog Electronics, A.K. Maini, Khanna Publishing House

Suggested Readings:

1. Millman and Halkias, " Electronic Devices and Circuits" 2nd Edition, McGraw Hill Publication 2007.
2. Robert L. Boylestad, "Electronic Devices and Circuit Theory", 10th Edition, PHI, 2009
3. D.Roy Choudhury, Linear Integrated Circuits, Shail B.Jain, , New Age Intern.(P) Ltd., 3rd Edition 2007.
4. Gayakwad R.A. Op-Amps and Linear Integrated Circuits, PHI, 4th Edition, 2002.
5. David Bell, "Fundamentals of Electronic Devices and Circuits", 5th Edition, Oxford University Press 2008.

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18EE C04

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To understand the principle behind various instruments.
2. To know the various bridges for measurement of R, L and C.
3. To measure various magnetic and electric parameters.

Course Outcomes: After completion this course, students will be able to:

1. Identify a suitable instrument to measure a given parameter.
2. Analyze the need of CT/PT for a given system.
3. Illustrate the concept of the instrument with relevant examples and proper justification.
4. Distinguish between electrical and magnetic measurements and their instruments.
5. Specify the right transducer for a given requirement.

UNIT-I

Introduction to Measurements: Objectives of measurement, static and dynamic characteristics, errors and their classification.

Introduction to Instruments-1: Types of instruments, classification of instruments based on type of measurement and principle of working (PMMC, MI, Dynamometer, Induction and Electrostatic), types of torques (torque equations for MC, MI and dynamometer type instruments).

UNIT-II

Introduction to Instruments-2: Single phase Induction type energy meter, concept of driving torque & braking torque equations, (no derivation) ; Errors and their Compensation, Single phase Dynamometer type Power factor meter, Weston type frequency meter. Construction & theory of Instrument Transformers, Equations for ratio and phase angle error of C.T & P.T (Elementary treatment only).

UNIT-III

Resistance, Inductance and Capacitance parameters: Classification of resistance measuring methods Kelvin's double bridge, Wheatstone bridge and meggar.

Measurement of inductance using Maxwell's inductance bridge, Anderson's bridge. Measurement of capacitance using De-Sauty's bridge and Schering bridge., merits and demerits, applications and related numerical problems.

UNIT-IV

Measurements of Magnetic and Electric Parameters: Ballistic galvanometer-Principle of operation, construction and applications of Ballistic galvanometer, flux meter its construction and principle of operation. Epstein square bridge for measuring Iron losses. Potentiometers,-Principle - Classification – Salient features related to Practical applicability.

UNIT-V

Introduction to Digital Instruments (DVM and Transducers): Introduction to digital Instruments, Digital Voltmeters (DVM), Speed reading, Range selection, Over ranging, Common mode rejection, Digital Multi meters.

Transducers: Introduction, Role of Transducers in measurement system, Strain Gauge, Linear variable Differential transformer (LVDT), Temperature transducers, bimetallic strip, Thermocouples, Resistance Temperature Detectors (RTD), Thermostats, Radiation pyrometers.

Text Books:

1. F.W.Golding and Widdis, Electrical Measurements and measuring Instruments, A.H.Wheeler & Co., 5th Edition, 2007.
2. A.K.Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanapat Rai & Sons, NewDelhi, 19th Edition, 2011.
3. CT. Baldwin, Fundamentals of Electrical measurements, Kalyani publications, 2001.

Suggested Readings:

1. Helfrick, Albert D., Cooper, William D., Modern Electronic Instrumentation and Measurement Techniques, PHI Publications, 1990.
2. Stanley Wold, Richard F.M.Smith, Student reference manual for Electronic Instrumentation Laboratories, 2nd Edition, PHI.
3. Alan. S. Morris, Essence of Measurement, PHI, 1996.

Teaching with dialogue education involves listening to learners at every level, respecting them as subjects or decision makers of their own learning and evoking their innate power.

Concept-Based Curriculum and Instruction

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18EE C05

ELECTROMAGNETIC FIELDS

Instruction	3L+1T Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand coordinate systems, vector calculus and their applications to electrostatic and magnetic fields.
2. To figure out Maxwell's equations, uniform plane wave and its propagation through different media.
3. To know the sources, effects & control techniques of EMI & EMC.

Course Outcomes: After completion of this course, students will be able to

1. Recognize the importance of different coordinate systems and vector calculus in EM theory.
2. Analyze electric and magnetic field intensity, flux density and potential due to various charge configurations.
3. Differentiate between conduction & convection currents through various materials.
4. Illustrate the Maxwell's equations and EM wave equations in different media.
5. Identify EMI & EMC, the causes and effects, various control methods of EMI.

UNIT-I

Orthogonal Coordinate Systems: Review of Vector Calculus, Rectangular, Cylindrical, Spherical coordinate systems; Line, Surface and Volume integrals; Operator Del, Gradient, Divergence, Curl & Laplacian of a field; Divergence and Stoke theorems.

Electrostatic fields: Various charge configurations, Coulomb's law, Electric field intensity and flux density of different charge distributions, Gauss law, Integral and Point form of Maxwell's Electrostatic Equation.

UNIT-II

Electrostatic Field in Materials: Electrical Potential, Capacitance of Parallel plate capacitor, Equi-potential lines, Properties of materials, convection and conduction currents, conductors, dielectric constant, continuity equation and relaxation

CHAITANYABHARATHI INSTITUTE OF TECHNOLOGY(A)
SCHEME OF INSTRUCTION AND EXAMINATION
VII-Semester of B.E/B.Tech under CBCS
B.E.(EEE)

SEMESTER-VII

S. No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			
			Hours per week		Duration in Hours	Maximum Marks		Credits
			L/T	P/D		CIE	SEE	
THEORY								
1.	**16EE C31**	Power System Operation and Control	4	-	3	30	70	4
2.	**16EE C32**	Utilization of Electrical Energy	3	-	3	30	70	3
3.	**16EE C33**	DSP and Embedded Systems	4	-	3	30	70	4
4.	**16EE EXX**	Program Specific Elective- 4	3	-	3	30	70	3
5.	**16XX OYY**	Open Elective-I	3	-	3	30	70	3
PRACTICALS								
6.	**16EE C34**	Power Systems Simulation Lab	0/1	2	3	25	50	2
7.	**16EE C35**	Digital Signal Processor and Embedded Systems Lab`	0/1	2	3	25	50	2
8.	**16EE C36**	Project Seminar	0	3	-	50	-	2
			19	**07**	**-**	**250**	**450**	**23**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Program Specific Elective-4
16EEE14	Basic VLSI Design
16EEE15	Computer Methods in Power Systems(CMPS)
16EEE16	Power Quality Engineering(PQE)
16EEE17	Special Electrical Machines(SEM)

Course Code	Open Elective-I
16PY O01	History of Science and Technology
16EG O02	Gender Sensitization
16CE O02	Disaster Mitigation and Management (DMM)
16CS O10	Machine Learning Using Phyton
16ME O01	Entrepreneurship

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16EE C31

POWER SYSTEM OPERATION AND CONTROL

Instruction	4 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	70Marks
CIE	30 Marks
Credits	4

Course Objectives:

1. To understand the formulation of Load-Flow problems applying different methods and economic operation of power systems
2. To understand the importance of Load Frequency Control and stability of power systems.
3. To study the reactive power control and basic FACTS controllers

Course Outcomes: After completion of this course, students will be able to:

1. Acquire knowledge in assessing the importance of load flow studies in power system operation. Carryout Load-Flow studies with different methods compare and interpret the results.
2. Acquire knowledge in conducting Economic operation of power system without and with losses
3. Acquire knowledge in conducting Load Frequency Control for single and two area systems and also distinguish between different control methods.
4. Acquire knowledge in analyzing the Stability aspects of power system.
5. Acquire knowledge in assessing the system improvement through reactive power control and FACTS controllers.

UNIT-I

Load Flow Studies: Formulation of Y bus for a system, modeling of tap changing and phase shifting transformer, Formulation of load flow problem, Solution of load flow by Gauss Seidel, Newton- Raphson, Decoupled and Fast Decoupled methods, comparison of different load flow methods.

UNIT-II

Economic Operation of Power System: Input-Output curves, Heat rates and incremental cost curves, Equal Incremental cost criterion Neglecting transmission losses with and without generator limits, B_{mn} Coefficients, Economic operation including transmission losses.

architecture, Address generation unit, speed issues, fixed point DSPs - Architecture of TMS 320C 54X Processor , addressing modes, on-chip peripherals, Real Time operating constraints

UNIT-IV

Real-Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, Shared Data, Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. Semaphores and Queues, Hard Real-TimeScheduling Considerations, Host and Target machines, Linker/Locators for Embedded Software.

UNIT-V

Advanced architectures: ARM Processor, memory organization and Instruction level parallelism, Net advanced embedded systems: Bus protocols, 12C bus and CAN bus, Internet- Enabled Systems

Text Books:

1. Avatar Singh and S. Srinivasan, " Digital Signal Processing Implementations Using DSP Microprocessors", Thomson Brooks, 2004.
2. Wayne Wolf, "Computers as Components - Principles of Embedded Computer System Design", Morgan Kaufmann Publisher, 2006.

Suggested Reading:

1. B. Ventakaramani, M. Bhaskar, "Digital Signal Processes, Architecture Processing and Applications", Tata McGraw Hill, 2002.
2. David E-Simon, "An Embedded Software Primer", Pearson Education, 2007.
3. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech press, 2005.

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16EE C34

POWER SYSTMES SIMULATION LAB

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	2

Course Objectives:

1. To understand the load flows, transient stability studies, economic load dispatch and load frequency control in power system
2. To understand the time and frequency response of the system
3. To Simulate and compare the output of converters with different loads

Course Outcomes: After completion of this course, students will be able to:

1. Acquire knowledge about Load frequency control
2. Analyse Load flow studies and economic load dispatch
3. Acquire knowledge about transient stability studies
4. Analyse semi, full and buck & boost converters
5. Acquire knowledge about time and frequency response of the system

List of Experiments:

1. Determination of power angle diagram for Salient and Non-salient pole synchronous machine.
2. Frequency response characteristics using Bode plot
3. Root Locus & Nyquist method
4. Design of lag, lead and lag-lead compensator
5. Computation of line parameters
6. Modeling of Transmission Lines
7. Load Flow Studies.
8. Fault Analysis.
9. Transient stability studies.
10. Economic load dispatch.
11. Load Frequency control of single-area and two-area systems
12. Single-phase semi-converter with R and RL loads
13. Single-phase full-converter with R and RL loads
14. Analysis of Buck and Buck-Boost converter

Note: At least **TEN** experiments should be conducted in the Semester

With effect from the academic year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

AICTE MODEL CURRICULUM

B.E. (ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER-VII

Sl. No.	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hours	Maximum Marks		Credits
			L	T	P		CIE	SEE	
THEORY									
1	**18EEC25**	Power System Protection	3	-	-	3	30	70	3
2	**18EEC26**	Electrical Drives	3	-	-	3	30	70	3
3	**18EEC27**	Signals & Systems	3	-	-	3	30	70	3
4	**18EEEXX**	Core Elective-5	3	-	-	3	30	70	3
5	**18XXOYY**	Open Elective-2	3	-	-	3	30	70	3
PRACTICALS									
6	**18EEC28**	Power Systems-II Lab	-	-	3	3	25	35	1.5
7	**18EEC29**	Electrical Drives Lab	-	-	3	3	25	35	1.5
8	**18EEC30**	Project: Part-1	-	-	4	-	50		2
		Total	**15**	**-**	**10**	**21**	**250**	**420**	**20**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Core Elective-5
18EEE17	Power System Dynamics and Control
18EEE18	Switch Mode Power Converters
18EEE19	Electrical Machine Design
18EEE20	High Voltage Engineering

Course Code	Open Elective-2
18MEO03	Research Methodologies
18MEO04	Entrepreneurship
18EGO01	Technical Writing Skills
18CSO04	Basics of Data Science using R
18CSO07	Basics of Cyber Security

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18EEC28 **POWER SYSTEMS-II LAB**

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	25 Marks
Credits	1.5

Course Objectives:

1. To simulate and understand the load flows, Fault Analysis of power system.
2. To understand the transient stability studies, Economic power scheduling and Load frequency control in power system.
3. To understand the importance of protective relay kits and also study the various components in substations

Course Outcomes: After completion of this course, students will be able to:

1. Apply the load flow studies for any given power system.
2. Analyze the fault in the real time power system.
3. Estimate the consequences of transient stability, economic power scheduling and load frequency control.
4. Examine function of different types of relays for different power system applications.
5. Illustrate the functionality of each component in the substation.

List of Experiments

1. Simulation of Load Flow Studies
2. Simulation of Fault Analysis.
3. Simulation of Transient stability studies.
4. Simulation of Economic power scheduling.
5. Simulation of Load Frequency control of one area system.
6. IDMT characteristics of Over-current relay.
7. Differential protection of 1-phase transformer.
8. Draw the Characteristics of Static relays.
9. Operation of relays in long transmission line.
10. Over Current & Earth Fault Relay Testing Kit (Static Type)
11. Study of Universal Relay Testing Kit
12. Generator Differential Protection Study Unit
13. Study of Distance Relay Testing Kit / Impedance Relay kit
14. Visiting nearby substation and submitting the report.

Note: At least **TEN** experiments should be conducted in the semester.

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