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 **2020-21**

S.no	Stakeholder	Feedback	Action taken	Page No
1	**Student**	Suggested to reduce the syllabus of Digital Signal Processing & Embedded systems course.	From R-16 syllabus of Digital Signal Processing and Embedded Systems which was a core course was modified as Digital Signal Processing (Elective) with some major changes.	5-9
2	**Student**	Suggested to include GATE syllabus topics in Signals & Systems	Signals and Systems(VII sem R-18) :- syllabus is slightly modified according to match GATE syllabus	10-11
	Alumni	Suggested some minor changes to incorporate GATE syllabus		
3	**Student**	Suggested to add protection of the electrical equipment like Transformer, Busbar	Switch Gear Protection (R-16) course is modified as Power System Protection (R-18)- 80 %	12-16

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	Teacher	Insisted to add Numerical Relays and Distance Relays in Power System Protection	of Switch Gear and Protection and 20 % new syllabus added on Numerical Relays.	
	Alumni	Suggested to add advanced protection topics in Power Systems Protection		
4	**Employer**	Insisted to add Electrical Drives course to get the knowledge on controlling of the Machines	Electrical drives theory course and lab as core courses have been included ,advanced Electrical Drives lab as Elective courses are included in VII sem and VIII sem of R-18 scheme to get students the knowledge on Electrical Drives. In eEectrical Drives lab along with Hardware experiments simulation experiments are also added.	17-19
	Alumni	Suggested to add a course to study the Control techniques of Machines that may be helpful to get a core sector job in Electrical Engineering		
5	**Teacher**	Suggested to change the Smart Grid syllabus as per the latest technologies	Smart Grid elective- core course is been converted to an elective in semester VII of R-18 syllabus. Completely modified as per the present advancements in Smart Grid technologies that too placed in structured manner.	20-21
	Employer	Suggested to include the communication technologies, automation topics in Smart Grid		
6	**Teacher**	Suggested to include the Simulation experiments in Analog Electronics lab	Simulation experiments are included along with active filters to Analog Electronics Circuits lab as per the suggestion from teachers in semester III of R-20 syllabus.	22-26
7	**Teacher**	Suggested to include few topics in Digital Electronics course like state diagram Moore and Mealy Machines.	Impact of number of bits in ADC and State diagram and Moore and Mealy Machines topics are added in the Digital Electronics course in semester iv of R-20 syllabus	27-32
8	**Teacher**	Suggested to include the standard Electrical codes in Electrical Machines syllabus	A revision is been done and the topics of data sheets of Transformer, Motors, standard Electrical codes are included in Electrical Machines-I (IV sem) syllabus of R-20 scheme	33-38
9	**Teacher**	Suggested to remove the outdated topics like Cycloconverters and include trending topics like voltage Source converters, Forward & Fly Back Converters	Thyristor based Inverters, Series & Parallel inverters; Cyclo-Converters are removed from Power Electronics course. Voltage Source Converters, Forward & Fly back Converters are added to	39-43

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			Power Electronics in semester IV of R-20 scheme.	
10	**Teacher**	Suggested to introduce the latest technologies and also to include the rules of the regulated bodies in Power Systems-I syllabus	Power Systems-I topics of HTLs conductor, Polymer insulator & its advantages, present day Tariff system, New polices by Regulated board, Graph meters, Net meters, terms like Ring Main, Radial in Distribution Systems can be circulated in the form of handouts to keep the students updated to latest technologies of Power Systems-I syllabus.	44-49,54
11	**Teacher**	Suggested to include latest Sensors and Digital meters in the Electrical Measurements & Instruments	Electrical Measurements and Instrumentation - inclusion of topics of Hall Effect sensors, Digital meters and Modern Measurement devices to syllabus of Electrical Measurement & Instrumentation	54
	Employer	Requested to add latest modern sensors in the Electrical Measurement & Instruments		
13	**Employer**	Suggested to make the Internships mandatory course to all students to expose the students to the Industry	As per the feedback from Alumni and Students MOOCs/Training/Internships-1, 2, 3 are made mandatory to expose students to the industry in R-20 scheme.	54-55
14	**Employer**	Suggested to introduce an interdisciplinary course to upgrade the present scheme	To get the knowledge of basic IoT Network Architectures, IoT Processing, Connectivity and Communication Technologies a new course named IoT for Electrical Engineering' theory and corresponding lab course are introduced in VI sem of R-20 scheme.	56-58
	Alumni	Suggested to introduce a interdisciplinary course on IoT and Electrical Equipment for controlling of the Electrical equipment.		
15	**Employer**	Suggested to include Designing of the Filter circuits , Transformer and Controlling methods of Inverter circuits	Based on the inputs taken from the Employer , Design of Filter Circuits, Transformers, Controlling method of Inverter circuit to be included in Switch Mode Power Converters Elective Course VII sem of R-18 scheme	59-60

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16	**Teacher**	Suggested to add Circuits lab experiments and to remove the Instrumentation lab experiments.	As per suggestions taken from the Employer and Teacher , Electrical Measurements and Instrumentation is modified to Electrical Circuits and Measurements , Circuits and Measurement Experiments are Combined in R-20 and Experiments related to Instrumentation are deleted which the course offered in R-18 scheme	61-64
	Employer	Suggested to remove the experiments that are not useful to the students in Electrical Measurement and Instrumentation lab		
17	**Employer**	Suggested to modify power systems lab such that to include only hardware experiments by adding experiments on protection by relays.	Power system -II syllabus modified and course name changed in to Power System-II lab implemented in sem VI R-20 scheme, Simulation experiments are deleted from R-18 scheme and modified in to Power system-II lab such that experiments are added to gain Practical Knowledge	65-68
18	**Employer**	Suggested to remove Old Microprocessor experiments in MPPC lab	As per the inputs taken from the employers, MPPC(R-18) lab is changed to Microcontrollers & Applications(R-20) lab in which Microprocessor experiments are removed.	69-72

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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.

Electric Arc welding: Carbon Arc Welding, Submerged Arc Welding, Atomic Hydrogen Welding.
Resistance Welding: Spot Welding, Seam Welding, Projection Welding, Butt Welding, Flash Butt Welding, Upset Welding, Electron Beam Welding, Laser Welding - Numerical Problems

UNIT-III
Illumination: Introduction, Terms used in illumination, laws of illumination, Polar Curves of C.P. Distribution – Determination of M.S.C.P. and M.H.C.P. from Polar Diagrams- Rousseau's construction, Lighting Schemes- Design of Lighting Schemes- Application to factory lighting, Street lighting and Flood lighting - Numerical Problems

Electric Lamps: Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems - Numerical Problems

UNIT-IV
Electric Traction-I: Introduction, Systems of electric traction and track electrification- DC system, single phase and 3-phase low frequency and high frequency system, composite system, kando system, comparison between AC and DC systems- Train Movement-Typical Speed/Time Curve - Factors affecting scheduled speed - Simplified Speed/Time Curve - Average and Schedule Speed - Tractive Effort for Propulsion of a Train - Power Output from Driving Axles - Energy Output from Driving Axles - Numerical Problems.

UNIT-V
Electric Traction-II: Specific Energy Output - Evaluation of Specific Energy Output - Energy Consumption - Specific Energy Consumption - Adhesive Weight - Coefficient of Adhesion - Mechanism of Train Movement - Numerical Problems

Text Books:

1. C L Wadhwa, Generation, Distribution and Utilization of Electrical Energy- 3 rd Edition New age international publishers, 2015.
2. B.L. Theraja, A Textbook of Electrical Technology Volume-III Transmission and Distribution S. Chand Limited, 23rd Edition, 2013.
3. Partab H, Art and Science of Utilization of Electric power, Dhanpatrai & Sons, 2014

Suggested Reading:

1. J.B.GUPTA, Utilization of Electric Power and Electric Traction- S.K.Kataria & Sons, 2013.
2. R K. Rajput, Utilization of Electrical Power-, 2 nd Edition, Laxmi Publications (p) Ltd, 2016.

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16EE C33

DSP & EMBEDDED SYSTEMS

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

Course Objectives:
1. To introduce basic concepts of signals and systems and representation of digital system.
2. To introduce digital signal processor
3. To introduce fundamentals of Real time operation and ARM processor

Course Outcomes: After completion of this course, students will be able to:
1. Identify the digital system and find its response.
2. Design FIR and IIR filter.
3. Be familiar with architecture and features of TMS 320F/2047 DSP.
4. Understand the basic concepts of real time operating systems
5. Be familiar with architecture and features of ARM processor.

UNIT-I
Introduction to signals and systems: Classification of Signals & Systems, Linear shift invariant systems, stability and causality, Sampling of Continuous signals, Signal Reconstruction, quantizing & encoding, linear constant co-efficient difference equations, properties of discrete system- linearity. Analog to digital conversion - Nyquist criteria

UNIT-II
Fourier transforms and filters: Magnitude and phase response discrete time systems - Computation of DFT and IDFT -Properties of Discrete Fourier Transform, - Linear and circular Convolution of sequence using DFT. Fast Fourier transform: Radix-2 decimation in time and decimation in frequency FFT algorithms, Inverse FFT. Introduction to IIR Low pass butter worth & Chebyshev digital filters using impulse invariant and bilinear transformation techniques, FIR Rectangular and Kaiserwindows

UNIT-III
DSP Processors: Differences between DSP and other mp architectures,. Basic architectural features, DSP computational building blocks, Bus and Memory

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

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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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18EEE22 **DIGITAL SIGNAL PROCESSING**

(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 explain mathematical representation of signals in continuous, discrete time and frequency domain.
2. To demonstrate analysis of discrete time systems using Z-transforms, Discrete-Fourier Transform (DFT) and the FFT algorithms
3. To illustrate design of IIR and FIR digital filters for various applications.

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

1. Represent signals mathematically in continuous and discrete-time domain
2. Analyse discrete-time systems using z-transformation
3. Analyse the Discrete-Fourier Transform (DFT) and FFT algorithms
4. Design analog IIR filter and covert into digital IIR filters by using various digitized techniques
5. Design analog FIR filter by using various windowing techniques

UNIT-I

Discrete-time signals and systems: Sequences, representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Sampling and reconstruction of signals, aliasing, Sampling theorem and Nyquist rate.

UNIT-II

Z-transformations: Region of Convergence, Analysis of Linear Shift Invariant systems using z-transform, Properties of Z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.

UNIT-III

Discrete Fourier Transform: Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform (FFT) Algorithm, Parseval's Identity, Implementation of Discrete Time Systems.

UNIT-IV

IIR Filters: Design of Butterworth, Chebyshey filters, IIRfilter design by impulse invariant bilinear transformation, impulse invariance method, step invariance method.

UNIT-V

FIR Filters: Characteristics of FIR Digital Filters. Frequency response, comparison of FIR, IIR filters, Window techniques, Design of these filters using Rectangular, Hamming, Bartlet, Kaiser windows, Architecture and features of TMS 320F/2047 and ADSP signal processing chips, Applications of DSP.

Text Books:

1. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
2. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", Prentice Hall, 1997.
4. P. VenkataRamani, M. Bhaskar, "Digital Signal Processo1; Architecture, Programming & Application", TataMcGrawHill-2004

Suggested Reading:

1. Anandkumar A, Digital Signal Processing, Second edition PHI learning, 2015
2. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall,1992.
3. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
4. D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons,1988

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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

18EEC27 **SIGNALS AND SYSTEMS**

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 introduce the concepts of continuous time and discrete time systems and analyse systems in complex frequency domain.
2. To demonstrate sampling theorem and its applications.
3. To elucidate the techniques of Laplace and Z- transforms and their applications on various systems

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

1. Understand the basics of signals and systems and classify them
2. Analyse systems in complex frequency domain.
3. Understand sampling theorem and its implications.
4. Explore the applications of Laplace transforms to continuous time systems
5. Apply the Z-transform techniques to discrete time systems

UNIT-I

Introduction to Signals and Systems: Signals and systems as seen in everyday life, in various branches of engineering and science, Signal properties: periodicity, absolute integrability, deterministic and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability and their examples.

UNIT-II

Behaviour of continuous and discrete-time LTI systems: Impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems, System representation through differential equations and difference equations, State-space Representation of systems, State-Space Analysis, Multi-input, Multi-output representation, State Transition Matrix and its Role, Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulse response.

UNIT-III

Fourier Transforms: Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients, Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Property of duality in Fourier. The Discrete- Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem.

UNIT-IV

Laplace and z- Transforms: Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behaviour. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis

UNIT-V

Sampling and Reconstruction: The Sampling Theorem and its implications, Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects, Relation between continuous and discrete time systems, Introduction to the applications of signal and system theory- Feedback control systems,

Text Books:

1. A.V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and systems", Prentice Hall India, 1997
2. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", Pearson, 2006.

Suggested Reading:

1. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2010.
2. S. Haykin and B. V. Veen, "Signals and Systems", John Wiley and Sons, 2007.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Choice Based Credit System (with effect from 2018-19)

B.E (Electrical and Electronics Engineering)

SEMESTER-VI

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.	**16EEC23**	Electrical Machinery – III	3/1	-	3	30	70	4
2.	**16EEC24**	Switchgear and Protection	3	-	3	30	70	3
3.	**16EEC25**	Power Semiconductor Drives	3	-	3	30	70	3
4.	**16EEC26**	Microprocessor and Microcontrollers	4	-	3	30	70	4
5.	**16EEEXX**	Program Specific Elective- 2	3	-	3	30	70	3
6.	**16EEEXX**	Program Specific Elective - 3	3	-	3	30	70	3
PRACTICALS								
7.	**16EEC27**	Microprocessor and Microcontrollers Lab	0/1	2	3	25	50	2
8.	**16EEC28**	Power Systems Lab	0/1	2	3	25	50	2
9.	**16EEC29**	Mini Project	-	2	-	50	-	1
10.	**16EEC30**	Industrial Visit	Satisfactory / Unsatisfactory					
			22	**06**	**-**	**280**	**520**	**25**

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

CIE - Continuous Internal Evaluation SEE - Semester End Examination

Course Code	Program Specific Elective-2
16EEE05	High Voltage Engineering (HVE)
16EEE06	Artificial Intelligence Techniques in Electrical Engineering (AITEE)
16EEE07	Switch Mode Power Converters (SMPC)
16EEE08	Optimization Techniques (OT)

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16EEC24

SWITCHGEAR AND PROTECTION

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

Course Objectives: The objective of the course is

1. To know the operation and types of fuses used in power system.
2. To analyze principles of operation of the different types of relays.
3. To comprehend the different principles of protective schemes in power system.
4. To understand the principles of operation of the different types of circuit breakers.
5. To be acquainted with different lightning arrestors and the appropriate circuit for the protection of the various components of power system.
6. To identify the importance of various grounding methods.

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

1. Classify various components used in power system protection.
2. Indicate the relay settings of over current and distance relays.
3. Recognize arc quenching mechanisms used in different circuit breakers.
4. Explain the concept of unit and non-unit protection, and how the various associated parameters affect it.
5. Distinguish types and testing of CBs and their applications
6. Review protection of transmission lines, equipment protection and types of lightening arrestors against over voltages.

Unit-I

Protective Relays: Need for protection, Backup protection, Zones of protection, Definitions of relay pickup, dropout and reset values, Classification of relays, Operating principles and construction of electromagnetic and induction relays, Over current, Over voltage and Power relays, Directional features, Universal relay torque equation. Over current protection for radial feeders and ring mains, Protection of parallel lines, Relay settings for over Current relays, Earth fault and phase fault protection.

Unit-II

Static phase and Amplitude Comparators: Characteristics of Dual input comparators, Distance protection, 3-step Distance relays, Characteristics of distance relays on the RX diagram, static over current relay (Block diagram approach). Basics

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of digital relays. Need of numerical relays, Advantages of numerical relays over solid state relays.

Unit-III

Transformer and Generator Protection: Differential relays, Percentage differential relays, Protection of generator and transformer using percentage differential relays, Split phase, Inter turn protection, Overheating, Loss of excitation, Protection of generators, Buchholz relay, Protection of earthing transformers, Generator transformer unit protection.

Unit-IV

Circuit Breakers: Need for circuit breakers, Arc Properties, Principles of arc quenching theories, Recovery and Restriking voltages, Rated symmetrical, asymmetrical breaking current, Rated making current, Rated capacity, Voltage and Frequency of circuit breakers, Current chopping, Resistance switching, Derivations of RRRV, Types of circuit breakers, Oil, Air, SF6 and Vacuum circuit breakers, Testing of circuit breakers.

Unit-V

Over Voltage Protection: Protection of transmission lines against direct lightening strokes, Ground wires, Protection angle, Protection zones, Height of ground wire, Conductor clearances. Conductor heights, Tower footing resistance and its effects, Equipment protection assuming rod gaps, Arcing horns, Different types of lightening arrestors, construction, Surge absorbers, Peterson coil, Insulation coordination.

Text Books:

1. C.L. Wadhwa, "Electrical Power System", Wiley Eastern Ltd., 2nd Edition, 2013
2. Badriram & Viswakarma, "Power System Protection and Switchgear", Tata McGraw Hill, 2011
3. Sunil S. Rao, " Switchgear and Protection", Khanna Publications, 2008
4. J.B. Gupta, "Switchgear and Protection", S.K. Kataria& Sons, 3rd Edition, 2014.

Suggested Reading:

1. B. Ravindranath, M. Chander , "Power System Protection &Switchgear", New Age International, 2011
2. OZA, "Power System Protection and Switchgear", Tata McGraw Hill, 2010.
3. Y.G. Paithankar, "Power System Protection", PHI, 2nd Edition, 2010.

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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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18EEC25 **POWER SYSTEM PROTECTION**

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 analyze principles of operation of the different Protection Devices.
2. To understand the different protection schemes employed in the protection of power system
3. To acquire knowledge of Numerical Protection Algorithm

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

1. Understand basic terminology of relays and types of over current protection of power system.
2. Distinguish the type of distance protection with principle & their application to three phase transmission lines.
3. Choose suitable differential scheme for the protection of various equipment in electrical power system.
4. Describe the principle of operation, and able to calculate the ratings of circuit breakers.
5. Familiarize with different protection methods against over-voltages.
6. Identify various elements of numerical relays, their functions and different techniques used in their design.

UNIT-I

Introduction to Protection Schemes: Need for protection, Backup protection, Zones of protection, Definitions of relay pickup, dropout and reset values, Classification of relays, Operating principles and construction of electromagnetic and induction relays.

Overcurrent Protection: Time-current characteristics, current settings, time settings, overcurrent protection schemes, direction relay, applications of Definite Time, IDMT and Directional relays distribution feeders, Earth fault and phase fault protection schemes, directional earth fault relay, static over current relay, fuse characteristics, types of fuses

UNIT-II

Distance Protection: Introduction, Impedance relay, reactance relay, MHO relay, effect of arc resistance and Power Swings on the performance of Distance Relaying, Selection of distance relays, Three-stepped Distance protection, Comparison of different distance protection schemes, Distance protection of three-phase lines.

UNIT-III

Differential protection: Introduction, simple differential protection, zone of differential protection, Percentage differential relay, Earth-leakage protection, Percentage Differential Protection of Transformers, Differential protection of transformer against Inrush phenomenon, Inter-turn faults in transformer. Differential protection of Bus-bars, Internal and External faults, Protection of Three-phase bus bars. Introduction to the Basic protection of Generator and Induction Motors

UNIT-IV

Circuit Breakers: Arc interruption, restriking voltage, recovery voltage, RRRV, current chopping, resistance switching, classification of circuit breakers, selection of circuit breakers

Over voltage protection: causes for over voltages, protection of transmission lies against direct lightning strokes, ground wires, arcing horns, lightning arrestors, surge absorbers, Peterson coils, insulation coordination

UNIT-V:

Basics of Numerical Protection: Block diagram of numerical relay, Sampling theorem, Least Error Square Technique, Digital Filtering, Numerical Relaying for overcurrent, Differential and distance protection (Elementary Treatment).

Text Books:

1. Badriram& Viswakarma, "Power System Protection and Switchgear", Tata McGraw Hill, 2011
2. Y.G. Paithankar & S.R. Bhide, "Fundamentals of power system protection", Prentice Hall, India, 2010.

Suggested Readings:

1. T.S.Madhava Raao, Power System Protection: Static Relays, Tata McGraw-Hill Education 1989
2. P.M.Anderson, Power System Protection, John Wiley, 2012
3. Electricity Training Association, Power System Protection. Vol.2.: Systems and Methods, Institute of engineering and Technology, 1995

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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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18EEC26 **ELECTRICAL DRIVES**

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 characteristics of various Electric Drives and its control using different power electronic converter circuits
2. To apply and analyse the concept of speed control DC motor drives with single phase, three phase converters and choppers.
3. To apply and analyse the concept of speed control induction motor by using AC voltage controller, VSI, CSI and cyclo-converter.
4. To apply and analyse the concept of speed control of synchronous motors using VSI, CSI and cyclo-converter.

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

1. Analyze 1-Φ & 3-Φ converters fed DC motors as well as chopper fed DC motors.
2. Understand the operational variance between single and multi-quadrant operation of various Electric Drives.
3. Comprehend the speed control of an AC-AC & DC-AC converter fed induction motor on stator and rotor side.
4. Illustrate the principles of speed control of synchronous motor with VSI, CSI and cyclo-converter.
5. Differentiate the features of closed loop operation of DC and AC electric drive and their controllers

UNIT-I

Electric Drive: Introduction, Block diagram and parts of electric drive

Dynamics of Electrical Drives: Types of Load- Types and Characteristics of load torque – Dynamics of motor-load combination – steady state & transient stability of an electrical drive.

Phase control converters fed DC drivers: Review of speed control techniques of DC motors, Single Phase and Three-phase semi and fully controlled converters connected to DC separately excited and DC series motors– continuous current mode of operation, output voltage and current waveforms, Speed and Torque expressions, Speed- Torque Characteristics. Problems on Converter fed DC motors.

UNIT –II

Four quadrant operation of DC drive: Introduction to four quadrant operation, motoring operation, electric braking – Plugging, Dynamic and regenerative braking operations. Four quadrant operation of D.C motors by dual converters – Closed loop operation of DC motor

UNIT –III

Chopper fed DC drives: Single, two and four quadrant chopper fed dc separately excited and series excited motors– continuous current operation, output voltage and current wave forms, speed torque expressions, speed torque characteristics, Problems on Chopper fed DC Motors, closed loop operation.

UNIT-IV

Induction Motor Drives-1: Variable voltage characteristics–Control of Induction Motor by AC Voltage Controllers – Waveforms –Speed torque characteristics, Variable Voltage Variable Frequency control of induction motor by voltage source inverter (VSI), current source inverter (CSI) and cyclo-converters, Comparison of VSI and CSI, closed loop operation of induction motor drives.

UNIT-V

Induction Motor Drives-2: Static rotor resistance control, closed loop speed control with static rotor resistance control, Slip power recovery schemes–Static Scherbius drive, Static Kramer Drive and their performance, speed torque characteristics.

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18EEC29 **ELECTRICAL DRIVES 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 experiment and analyse the motor performance connected with power semiconductor source.
2. To be familiar with different speed control techniques of Drives.
3. To validate the experimental results with simulations.

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

1. Analyse the control strategies to modify the output parameters of dc and ac drives.
2. Develop, testing and experimental procedures by applying basic knowledge in electrical and electronics.
3. Demonstrate the principle of energy efficient motors by load matching.
4. Interpret the performance of a given drive by suitable experimentation.
5. Investigate the performance of a given drive by using suitable simulation software.

List of experiments:

PART-A

1. Speed control of DC drive using Thyristor controlled rectifier.
2. Speed control of DC drive using DC-DC Chopper.
3. Four-Quadrant Operation of DC drive.
4. Closed loop speed control of dc motor using PID controller.
5. Speed control of single-phase induction motor speed using TRIAC.
6. Speed control of Three-Phase Induction Motor using V/f control.
7. Speed Control of Three-Phase Induction Motor using AC-AC converter.
8. Regenerative/ Dynamic braking operation for AC drive.

PART-B

1. Simulation of Speed control of DC Motor using BJT-H bridge.
2. Simulation of Regenerative/ Dynamic breaking operation of DC motor.
3. Simulation of Step/ Ramp speed response of DC motor.
4. Simulation of VSI-fed 3-Phase Induction Motor drive.
5. Simulation of CSI-fed 3-Phase Induction Motor drive.
6. Simulation of Permanent Magnet synchronous motor drive.

Note: Any **Six** experiments from **Part-A** and **Four** from **Part-B** should be performed.

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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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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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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 Hours per week L	T	P	Duration In Hours	Scheme of Examination Maximum Marks CIE	SEE	Credits
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 Hours per week L	T	P	Duration In Hours	Scheme of Examination Maximum Marks CIE	SEE	Credits
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.

and Technology in India, development of science in ancient, medieval and modern India

UNIT-V

Education system in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Text Books:

1. Kapil Kapoor, Text and Interpretation: The India Tradition,ISBN: 81246033375, 2005
2. Science in Samskrit, Samskrita Bharti Publisher, ISBN-13: 978-8187276333, 2007
3. S. Narain, Examinations in ancient India, Arya Book Depot, 1993
4. Satya Prakash, Founders of Sciences in Ancient India, Vijay Kumar Publisher, 1989
5. M. Hiriyanna, Essentials of Indian Philosophy, Motilal Banarsidass Publishers, ISBN-13: 978-8120810990, 2014

Suggested Reading:

1. Kapil Kapoor, Language, Linguistics and Literature: The Indian Perspective, ISBN-10: 8171880649, 1994.
2. Karan Singh, A Treasury of Indian Wisdom: An Anthology of Spiritual Learn,ISBN: 978-0143426158, 2016.

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18EE C07

ANALOG ELECTRONICS CIRCUTS LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course objectives:

1. The V-I Characteristics of diode, Transistor and MOSFET.
2. The frequency response of BJT and FET amplifiers and the performance analysis of multistage amplifiers.
3. To analyze and design various applications of Op-Amp.

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

1. Verify the working of PN junction diodes, transistors and their characteristic behavior.
2. Design various rectifiers with different filter combinations.
3. Set up bias point in a transistor.
4. Build a multi stage amplifier and find the frequency response of amplifier.
5. Design and analyze circuits for inverting and non-inverting amplifiers, and linear and non linear applications of Op-Amp

LIST OF EXPERIMENTS

Part A

1. V-I characteristics of (Silicon and Germanium) diodes and measurement of static and dynamic resistance.
2. Zener diode characteristics and its application as an voltage regulator.
3. (a) Design, realization and performance evaluation of rectifier circuits with and without filters (C & ð section) Half wave rectifier.
   (b) Design, realization and performance evaluation of rectifier circuits with and without filters (C & ð section) Full wave rectifier.
4. Plotting the characteristics of BJT and MOSFET.
5. Design of Biasing circuits for BJT
6. Design and Frequency response of Common Emitter BJT amplifier and measurement of Gain, Bandwidth, Input and Output impedances.
7. Design and Frequency response of Single stage and Multi stage RC coupled amplifier using BJT.

Part B

1. Measurements of Op Amp parameters:
2. Inverting and Non Inverting Amplifiers
3. Design of integrator and differentiator using Op-Amp.
4. Generation of triangular, sine and square wave using IC's.
5. Peak Clamper using Op-Amps.
6. Clippers using Op-Amps..
7. Schmitt Trigger,

Note: At least **FIVE** experiments from **Part-A** and **FIVE** from **Part-B** should be conducted in the semester.

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18EE C08

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

Instruction	2 Hours per week
Duration of Semester End Exam	2 Hours
Semester End Exam	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To understand the various Electrical Measuring instruments for measuring various electrical quantities.
2. To measure the unknown values of different electrical elements.
3. To become familiar with digital instruments.

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

1. Design and validate DC and AC bridges.
2. Learn about various measurements devices, their characteristics and limitations.
3. Understand the operation of DSO and analyse various signals.
4. Demonstrate the principles of magnetic measurements.
5. Select the right instrument for the given circuit.

LIST OF EXPERIMENTS

1. Calibration of single-phase energy meter with Phantom Loading.
2. Measurement of high resistance and insulation resistance using Megger.
3. Measurement of iron losses using Epstein's square bridge.
4. Measurement of unknown frequency using Lissajous Patterns.
5. Study of Digital Instruments
6. Measurement of bandwidth and sampling rate of a signal using DSO.
7. Usage of DSO to capture transients in RLC circuits.
8. Measurement of unknown resistance using Kelvin's double bridge.
9. Measurement of unknown Inductance using Maxwell's bridge and validating with LCR meter.
10. Measurement of unknown inductance using Anderson's bridge and validating with LCR meter.
11. Measurement of unknown capacitance using Schering bridge and validating with LCR meter.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of III Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20MTC07	Applied Mathematics	3	1	0	3	40	60	4
2	20 CS C06	Basic Data Structures	2	0	0	3	40	60	2
3	20 EE C03	**Core- 1** Electrical Circuit Analysis	3	0	0	3	40	60	3
4	20 EE C04	**Core- 2** Analog Electronic Circuits	3	1	0	3	40	60	4
5	20 EE C05	**Core- 3** Electrical Measurements and Instrumentation	3	0	0	3	40	60	3
6	20 EE C06	**Core- 4** Signals & System	3	0	0	3	40	60	3
7	20 CE M01	Environmental Science	2	0	0	2	----	50	NC
8	20 EE I01	MOOCs/Training/ Internship	2-3 weeks/90 hours				**40**	**60**	2
PRACTICALS									
9	20 EE C 07	Analog Electronic Circuits Lab	0	0	2	3	50	50	1
10	20 EE C08	Electrical Circuits and Measurements Lab	0	0	2	3	50	50	1
11	20 CS C07	Basic Data Structures Lab	0	0	2	3	50	50	1
		Total	**19**	**2**	**6**	**-**	**430**	**620**	**24**

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

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

HEAD
Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

20EEC07 **ANALOG ELECTRONICS CIRCUTS LAB**

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks
CIE	50Marks
Credits	1

Pre-Requisite: Students should have a prior knowledge of semiconductor Physics and basics of circuit theory.

Course objectives:

1. To understand the V-I Characteristics of diode, Transistor and MOSFET.
2. To understand the frequency response of BJT, FET amplifiers.
3. To design linear and non-linear applications of Op-Amp.

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

1. Demonstrate the working principle of PN junction diode, transistor and MOSFET from their V-I characteristics.
2. Realize Half wave and Full wave rectifiers for C & π section filter combinations.
3. Analyze the significance of choosing a DC operating point for a transistor/MOSFET and to analyze the frequency response of CE amplifier.
4. Design of linear and non-applications of Op-Amps.
5. Design a 555 Timer in A stable mode to produce pulses for Pulse Width Modulation (PWM) Schemes.

LIST OF EXPERIMENTS

Part A

1. V-I characteristics of (Silicon and Germanium) diodes and measurement of static and dynamic resistance.
2. Zener diode characteristics and its application as a voltage regulator.
   (a) Design, realization and performance evaluation of rectifier circuits with and without filters (C & π section) Half wave rectifier.
   (b) Design, realization and performance evaluation of rectifier circuits with and without filters (C & π section) Full wave rectifier.
3. Plotting the characteristics of BJT and MOSFET.
4. Design of Biasing circuits for BJT
5. Design of Biasing Circuits for MOSFET
6. Design and Frequency response of Common Emitter BJT amplifier and measurement of Gain, Bandwidth, Input and Output impedances.

Part B

1. Measurements of Op-Amp parameters
2. Design of integrator and differentiator using Op-Amp.
3. Design of Active filters –LPF & HPF
4. Generation of triangular, sine and square wave using IC's.
5. Design of Clampers using Op-Amps.
6. Design of Clippers using Op-Amps.
7. Analysis of Hysteric comparator using Schmitt Trigger circuit.
8. Design of 555 Timer in A stable mode

Note: At least **FOUR** experiments from **Part-A** and **SIX from Part-B** should be conducted in the semester.

CO-PO & PSO Correlation Articulation Matrix-AEC -Lab

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	2	2	2	1	2	-	-	-	-	-	-	-	2	2	2
CO-2	2	2	2	2	2	-	-	-	-	-	-	-	2	2	2
CO-3	1	2	2	1	2	-	-	-	-	-	-	-	1	2	2
CO-4	3	3	2	1	2	-	-	-	-	-	-	-	2	3	2
CO-5	1	2	2	1	2	-	-	-	-	-	-	-	1	2	2

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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-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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Gandipet, Hyderabad - 75

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.

With effect from the Academic Year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of II Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20 EE C09	**Core -5** Digital Electronics	3	0	0	3	40	60	3
2	20 EE C10	**Core -6** Electrical Machines-1	3	0	0	3	40	60	3
3	20 EE C11	**Core -7** Electromagnetic Fields	3	0	0	3	40	60	3
4	20 EE C12	**Core -8** Power Electronics	3	0	0	3	40	60	3
5	20 EE C13	**Core -9 Power systems I**	3	0	0	3	40	60	3
6	20EGM02	Indian Traditional Knowledge	2	0	0	-	----	-	NC
7	20EGM03	Universal Human Values-II: Understanding Harmony	3	0	0	3	40	60	3
PRACTICALS									
8	20 EE C14	Digital Electronics Lab	0	0	2	3	50	50	1
9	20 EE C 15	Electrical Machines-1 Lab	0	0	2	3	50	50	1
10	20 EE C 16	Power Electronics Lab	0	0	2	3	50	50	1
		Total	**20**	**0**	**6**	**-**	**390**	**510**	**21**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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Gandipet, Hyderabad - 75

20 EEC 09

DIGITAL ELECTRONICS

Instruction	Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Pre-requisites: Basics of number systems, basics of transistors and MOSFETs

Course Objectives:

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

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

1. Understand the fundamental concepts and techniques used in logical operations.
2. Analyze and design various combinational circuits using k Maps and Q-M method
3. Design and implement Sequential logic circuits like counters shift register sand sequence generators
4. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
5. Implement PLD's to solve 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, and CMOS 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, **sequence detector,** 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, analog to digital converters: parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, specifications of A/D converters.- Significance of size of data on the accuracy of conversion

UNIT –V

Semiconductor memories and Programmable logic devices: Introduction to state diagram- Moore and Mealy machine 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.

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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

CO-PO & PSO Correlation Articulation Matrix-DE

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	-	-	-	-	-	-	-	1	1	-
CO2	2	3	3	2	1	-	-	-	-	-	-	-	1	2	-
CO3	2	3	3	2	1	-	-	-	-	-	-	-	1	3	1
CO4	2	2	2	2	1	-	-	-	-	-	-	-	1	1	1
CO5	1	2	2	1	1	-	-	-	-	-	-	-	1	1	2

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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-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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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

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

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.

UNIT-III

DC Motors: Principle of operation, back EMF and significance of back EMF, electromagnetic torque, types of DC motors, characteristics, speed control of DC motors, necessity of starter, three point starter and four point starter, losses and efficiency, applications of DC motors.

Testing of DC machines: Swinburne's test, brake test, Hopkinson's test, fields test, retardation test and separation of losses.

UNIT-IV

Single Phase Transformer : Constructional features, principle of operation, EMF equation, ideal transformer, transformer on NO load and ON load and its phasor diagrams, equivalent circuit, losses in transformer, voltage regulation and efficiency, All day efficiency, parallel operation of transformer.

Testing of transformer: Polarity test, Open circuit and short circuit test, Sumpner's test, separation of losses.

Auto transformer: - Construction, principle, applications and comparison with two winding transformer

UNIT-V

Three Phase Transformers: Construction, types of connection and their comparative features, Scott connection. Tap-changing transformers: No-load and on-load tap-changing of transformers, Three- winding transformers, Cooling of transformers.

Text Books:

1. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. H.Cotton, Advanced Electrical Technology, Wheeler & Co, CBS publishers, 7th Edition, 2005.
4. J.B Gupta, Theory and performance of electrical machines, S.K. Kataria & Sons, 14th Edition, 2014.

Suggested Readings:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. Ashfaq Hussain "Electrical Machines" Danapa[illegible] Edition 2012.

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18EE C11

POWER SYSTEMS - 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 introduce Generation of energy through conventional sources such as: Thermal, Hydro and Nuclear and renewable energy sources
2. To familiarize mechanical design of transmission lines and cables.
3. To familiarize present practices in tariff calculations and understand the classification and connection schemes of distribution systems

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

1. Gain knowledge of construction and operation of conventional and non-conventional sources of energy along with financial management
2. Know the effects sag on transmission lines.
3. Acquire the concepts to study the performance of insulators and cables
4. Understand the concept of Overhead Transmission Lines and Cable
5. Understand the concept of Economics of Power Generation and the concept of AC and DC distribution.

UNIT-I

Basic Concepts : Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids.

Generation: Thermal- Hydro -Power Plants: Principles, Choice of site, layout and various parts of generating stations, Brief description of Hydro Power Plant Dam, Spillways, Head works, Surge tank, Penstocks, Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses, Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Nuclear Station: Schematic Arrangement of Nuclear Power Station, Advantages and disadvantages, Types of Nuclear reactors

UNIT-II

Solar and Wind Sources: Solar cell fundamentals, Solar Cell characteristics, solar cell classification, solar cell, Module, Panel and Array Construction,

With effect from the Academic Year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of II Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20 EE C09	**Core -5** Digital Electronics	3	0	0	3	40	60	3
2	20 EE C10	**Core -6** Electrical Machines-1	3	0	0	3	40	60	3
3	20 EE C11	**Core -7** Electromagnetic Fields	3	0	0	3	40	60	3
4	20 EE C12	**Core -8** Power Electronics	3	0	0	3	40	60	3
5	20 EE C13	**Core -9 Power systems I**	3	0	0	3	40	60	3
6	20EGM02	Indian Traditional Knowledge	2	0	0	-	----	-	NC
7	20EGM03	Universal Human Values-II: Understanding Harmony	3	0	0	3	40	60	3
PRACTICALS									
8	20 EE C14	Digital Electronics Lab	0	0	2	3	50	50	1
9	20 EE C 15	Electrical Machines-1 Lab	0	0	2	3	50	50	1
10	20 EE C 16	Power Electronics Lab	0	0	2	3	50	50	1
		Total	**20**	**0**	**6**	**-**	**390**	**510**	**21**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

20EE C10 **ELECTRICAL MACHINES-I**

Instruction	3L Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Prerequisites: Basic Electrical Engineering.

Course Objectives: The objective of this course is to:

1. To inculcate the principles of Electromechanical Energy Conversions.
2. To determine the performance of DC Machines by conducting various tests.
3. To analyze and select a suitable DC Machine based on the application.
4. To impart the knowledge of transformers and evaluate its performance.

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

1. Identify the various parts of electrical machines and distinguish the nomenclature of electric and magnetic circuits.
2. Elucidate the principle of operation and characteristics of electrical machines.
3. Analyze the starting methods and speed control of DC machine.
4. Determine the performance parameters of a machine for a given data.
5. Explain the parallel operation of DC generators and single-phase transformers.
6. Choose a suitable DC machine and auto transformer for a specific application.

UNIT-I

Electromechanical energy conversion: Introduction to Magnetic circuits, forces and torques in magnetic field system, energy balance, singly excited and multiple excited magnetic systems, co-energy.

UNIT-II

DC Generators: Review of Constructional features and Principle of operation of a DC machine, armature windings diagram (Lap and Wave winding), analysis of 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.

UNIT-III

DC Motors: Review of Principle of operation, back EMF and significance of back EMF, electromagnetic torque, types of DC motors, characteristics, analysis of speed control methods, necessity of starter, three-point starter and four-point starter, soft starters (elementary treatment only) losses and efficiency, applications of DC motors.

Testing of DC machines: Swinburne's test, brake test, Hopkinson's test, fields test, retardation test and separation of losses.

UNIT-IV

Single Phase Transformer: Review of Constructional features, principle of operation, EMF equation and ideal transformer, transformer on no-load and on-load and its phasor diagrams. Detailed study of equivalent circuit, voltage regulation and efficiency. All day efficiency, parallel operation of transformer.

Testing of transformer: Polarity test, analysis of open circuit and short circuit test, Sumpner's test, separation of losses.

Auto transformer: - Construction, principle, applications and comparison with two-winding transformer.

UNIT-V

Three-Phase Transformers: Construction, types of connection and their comparative features, Scott connection. Tap-changing transformers: No-load and on-load tap-changing of transformers, Three-winding transformers, cooling of transformers.

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Text Books:

1. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.
2. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
3. H. Cotton, Advanced Electrical Technology, Wheeler & Co, CBS publishers, 7th Edition, 2005.
4. J.B Gupta, Theory and performance of electrical machines, S.K. Kataria & Sons, 14th Edition, 2014.

Suggested Readings:

6. A. E. Fitzgerald and C. Kingsley, "Electric Machinery”, New York, McGraw Hill Education, 2013.
7. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBS Publishers, 2004.
8. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.
9. Ashfaq Hussain “Electrical Machines” Danpat Rai and sons, 3rd Edition 2012.

CO-PO & PSO Correlation Articulation Matrix- EM1

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	2	1	2	1	--	--	--	--	--	--	--	1	2	2
CO-2	3	3	2	2	1	--	--	--	--	--	--	--	1	2	2
CO-3	3	3	2	2	1	--	--	--	--	--	--	--	1	2	2
CO-4	3	3	2	2	1	--	--	--	--	--	--	--	1	2	2
CO-5	3	3	2	2	1	--	--	--	--	--	--	--	1	2	2
CO-6	3	3	2	2	1	--	--	--	--	--	--	--	1	2	2

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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-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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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

With effect from the academic year 2020-21

18EEC16 **POWER ELECTRONICS**

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

Course Objective:

1. To identify the characteristics of different static switches and their turn-ON & turn-OFF methods.
2. To know the principles of AC-DC, DC-DC, DC-AC and AC-AC energy conversions.
3. To study various methods of voltage control in power converters.

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

1. Understand the construction, operation and characteristics of various power semiconducting devices and to identify their selection in appropriate application.
2. Comprehend the driver/trigger circuits for various devices & also protection circuit, different turn-OFF methods, series & parallel operation of SCRs.
3. Illustrate the principle of working of AC-DC, AC-AC, DC-DC & DC-AC converters.
4. Analyse the performance for various power converters with different loads and modes of working.
5. Describe various voltage control techniques in power electronic converters with their applications

UNIT-I

Power Switching Devices: Power diode, characteristics, Recovery characteristics, Types of power diodes, General purpose diodes, Fast recovery diodes, their applications. Bipolar Junction Transistors(BJT), Power MOSFET, IGBT Basic structure and working, Steady state and switching characteristics, Gate drive circuits for MOSFET and IGBT, Comparison of BJT, MOSFET and IGBT, Their applications.

UNIT-II

Silicon Controlled Rectifier (SCR): SCR-Static characteristics, Two transistor analogy, Protection of SCRs, Dynamic characteristics, Series and parallel operation of SCRs, SCR trigger circuits-R, RC and UJT triggering circuits, Commutation methods of SCR.

UNIT-III

Thyristors Rectifiers: Study of Single-phase and three phase half wave and full wave controlled rectifiers with R, RL, RLE loads, significance of freewheeling diode, Effect of source inductance, Dual converters - circulating and non circulating current modes.

UNIT-IV

DC-DC Converters: Principles of Step-down, Step-up, Step UP/Down choppers, Time ratio control and current limit control, Types of choppers Type- A, B, C, D and E, Voltage commutated chopper, Introduction to Buck, Boost and Buck-Boost regulators.

AC-AC Converters: Principle of operation of Single phase step-up and step-down Cyclo-converters and their applications. Single-phase AC Voltage Controllers with R and RL loads

UNIT-V

DC-AC Converters: Principle of operation of Single-phase Bridge inverters, Voltage control methods, Single pulse width modulation, Multiple pulse width modulation, Sinusoidal pulse width modulation, Three-phase bridge Inverters, 180^0 & 120^0 modes of operation, switch states, instantaneous output voltages, average output voltages for single & three phase inverters, Current source inverters, Comparison of Voltage Source Inverters and Current Source Inverters,

Text Books:

1. Singh. M. D, Khanchandani.K. B, "Power Electronics", Tata McGraw Hill, 2nd Edition, 2017.
2. Rashid. M. H., "Power Electronics Circuits Devices and Applications", 4th Edition, Pearson India, 2017.
3. Bimbra. P. S, "Power Electronics", Khanna Publishers, 3rd Edition, 2013.
4. R. W. Erickson and D. Maksimovic, "Fundamentals of Power Electronics", Springer Science & Business Media, 2013

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With effect from the Academic Year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of II Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20 EE C09	**Core -5** Digital Electronics	3	0	0	3	40	60	3
2	20 EE C10	**Core -6** Electrical Machines-1	3	0	0	3	40	60	3
3	20 EE C11	**Core -7** Electromagnetic Fields	3	0	0	3	40	60	3
4	20 EE C12	**Core -8** Power Electronics	3	0	0	3	40	60	3
5	20 EE C13	**Core -9 Power systems I**	3	0	0	3	40	60	3
6	20EGM02	Indian Traditional Knowledge	2	0	0	-	----	-	NC
7	20EGM03	Universal Human Values-II: Understanding Harmony	3	0	0	3	40	60	3
PRACTICALS									
8	20 EE C14	Digital Electronics Lab	0	0	2	3	50	50	1
9	20 EE C 15	Electrical Machines-1 Lab	0	0	2	3	50	50	1
10	20 EE C 16	Power Electronics Lab	0	0	2	3	50	50	1
		Total	**20**	**0**	**6**	**-**	**390**	**510**	**21**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

With effect from the Academic Year 2021-22

20EEC12 **POWER ELECTRONICS**

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Prerequisite Analog Electronic Circuits

Course Objective:

1. To identify the characteristics of different static switches and their turn- ON & turn - OFF methods.
2. To know the principles of AC-DC, DC-DC, DC-AC and AC-AC energy conversions.
3. To study various methods of voltage control in power converters.

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

1. Understand the construction, operation and characteristics of various power semiconducting devices and to identify their selection in appropriate application.
2. Comprehend the driver/trigger circuits for various devices & also protection circuit, different turn -OFF methods, series & parallel operation of SCRs.
3. Illustrate the principle of working of AC-DC, AC-AC, DC-DC & DC-AC converters.
4. Analyse the performance for various power converters with different loads and modes of working.
5. Describe various voltage control techniques in power electronic converters with their applications

UNIT-I

Power Switching Devices: Power diode, characteristics, Recovery characteristics, Types of power diodes, General purpose diodes, Fast recovery diodes, their applications. Bipolar Junction Transistors(BJT), Power MOSFET, IGBT Basic structure and working, Steady state and switching characteristics, Gate drive circuits for MOSFET and IGBT, Comparison of BJT, MOSFET and IGBT, Their applications.

UNIT-II

Silicon Controlled Rectifier (SCR): SCR-Static characteristics, Two transistor analogy, Protection of SCRs, Dynamic characteristics, Series and parallel operation of SCRs, SCR trigger circuits-R, RC and UJT triggering circuits, Commutation methods of SCR.

UNIT-III

Thyristors Rectifiers: Study of Single-phase and three-phase half wave and full wave-controlled rectifiers with R, RL, RLE loads, significance of freewheeling diode, Effect of source inductance, Dual converters - circulating and non-circulating current modes.

UNIT-IV

DC-DC Converters: Principles of Step-down, Step-up, Step UP/Down choppers, Time ratio control and current limit control, Types of choppers Type- A, B, C, D and E, Voltage commutated chopper, Introduction to Buck, Boost and Buck-Boost regulators, Basics of flyback and forward converters.

AC-AC Converters: AC Voltage Controller, integral cycle control, phase control, AC Voltage controllers with R and RL loads

UNIT-V

DC-AC Converters: Single-phase Bridge inverters, Voltage control methods, Single pulse width modulation, Multiple pulse width modulation, Sinusoidal pulse width modulation, Three-phase bridge Inverters, 180^0 & 120^0 modes of operation, switch states, instantaneous output voltages, average output voltages for single & three phase inverters, Current source inverters, Comparison of Voltage Source Inverters and Current Source Inverters,

Text Books:

1. Singh. M. D, Khanchandani. K. B, "Power Electronics", Tata McGraw Hill, 2nd Edition, 2017.
2. Rashid. M. H., "Power Electronics Circuits Devices and Applications", 4th Edition, Pearson India, 2017.
3. Bimbra. P. S, "Power Electronics", Khanna Publishers, 3rd Edition, 2013.
4. Erickson and D. Maksimovic, "Fundamentals of Power Electronics". Springer Science

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Suggested Reading:

1. N. Mohan, T.M. Undeland , "Power Electronics: Converters, Applications and Design", John Wiley & Sons,2007
2. P.C. Sen, "Power Electronics", Tata Mc-Graw Hill, 1st Edition, 2001.
3. L.Umanand, "Power Electronics: Essentials and Applications", Wiley India, 2009.

CO-PO & PSO Correlation Articulation Matrix: PE

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	2	2	3	2	2	2	--	2	--	1	2	--	2	2
CO-2	2	2	2	2	1	--	1	--	1	--	1	--	--	2	2
CO-3	3	2	1	2	1	--	1	--	2	1	3	2	--	2	2
CO-4	3	1	1	2	1	--	--	--	1	1	--	--	--	2	2
CO-5	3	2	2	2	--	--	1	--	1	--	1	1	--	2	2

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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
SCHEME OF INSTRUCTION AND EXAMINATION
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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Dept. of EEE, CBIT (A)
Gandipet, Hyderabad - 75

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

DC Motors: Principle of operation, back EMF and significance of back EMF, electromagnetic torque, types of DC motors, characteristics, speed control of DC motors, necessity of starter, three point starter and four point starter, losses and efficiency, applications of DC motors.

Testing of DC machines: Swinburne's test, brake test, Hopkinson's test, fields test, retardation test and separation of losses.

UNIT-IV

Single Phase Transformer : Constructional features, principle of operation, EMF equation, ideal transformer, transformer on NO load and ON load and its phasor diagrams, equivalent circuit, losses in transformer, voltage regulation and efficiency, All day efficiency, parallel operation of transformer.

Testing of transformer: Polarity test, Open circuit and short circuit test, Sumpner's test, separation of losses.

Auto transformer: - Construction, principle, applications and comparison with two winding transformer

UNIT-V

Three Phase Transformers: Construction, types of connection and their comparative features, Scott connection. Tap-changing transformers: No-load and on-load tap-changing of transformers, Three- winding transformers, Cooling of transformers.

Text Books:

1. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. H.Cotton, Advanced Electrical Technology, Wheeler & Co, CBS publishers, 7th Edition, 2005.
4. J.B Gupta, Theory and performance of electrical machines, S.K. Kataria & Sons, 14th Edition, 2014.

Suggested Readings:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.
3. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
4. Ashfaq Hussain "Electrical Machines" Danapatrai and sons 3rd Edition 2012.

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18EE C11

POWER SYSTEMS - 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 introduce Generation of energy through conventional sources such as: Thermal, Hydro and Nuclear and renewable energy sources
2. To familiarize mechanical design of transmission lines and cables.
3. To familiarize present practices in tariff calculations and understand the classification and connection schemes of distribution systems

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

1. Gain knowledge of construction and operation of conventional and non-conventional sources of energy along with financial management
2. Know the effects sag on transmission lines.
3. Acquire the concepts to study the performance of insulators and cables
4. Understand the concept of Overhead Transmission Lines and Cable
5. Understand the concept of Economics of Power Generation and the concept of AC and DC distribution.

UNIT-I

Basic Concepts : Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids.

Generation: Thermal- Hydro -Power Plants: Principles, Choice of site, layout and various parts of generating stations, Brief description of Hydro Power Plant Dam, Spillways, Head works, Surge tank, Penstocks, Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses, Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Nuclear Station: Schematic Arrangement of Nuclear Power Station, Advantages and disadvantages, Types of Nuclear reactors

UNIT-II

Solar and Wind Sources: Solar cell fundamentals, Solar Cell characteristics, solar cell classification, solar cell, Module, Panel and Array Construction,

Maximizing the solar PV output and load matching, Solar PV Systems
Basic Principles of Wind Energy Conversion, The Nature of the Wind, The Power in the Wind, Forces on the Blades, Wind Energy Conversion, Wind Data and Energy Estimation, Site Selection Considerations.

UNIT-III

Line Parameter Calculations: Inductance & Capacitance calculations of Transmission Line, single-phase and three-phase symmetrical composite conductors, GMD, GMR, Transposition of conductors, Bundled conductors, effect of earth capacitance.

UNIT-IV

Overhead Transmission Lines and Cables: Overhead line materials, supports, types, Ground wires, Sag /Tension calculations, Equal / Unequal supports, Effects of wind, ice / Erection Conditions Stringing charts. Insulators, Types, Material for construction, potential distribution over string of insulators, equalizing of potential, Methods.

Underground Cables: Construction of Cables, Insulating Materials for Cables, Classification of Cables, Insulation Resistance of a Single-Core Cable, Capacitance of a Single-Core Cable, Dielectric Stress in a Single-Core Cable, Most Economical Conductor Size in a Cable, Grading of Cables,Capacitance Grading, Inters heath Grading, Capacitance of 3-Core Cables, Measurements of Ce and Cc.

UNIT-V

Economics of Power Generation: Load curve, Load demand and diversified factors, Base load operation, Types of costs and depreciation calculations; Tariffs, different types of tariffs; Methods of power factor improvement.

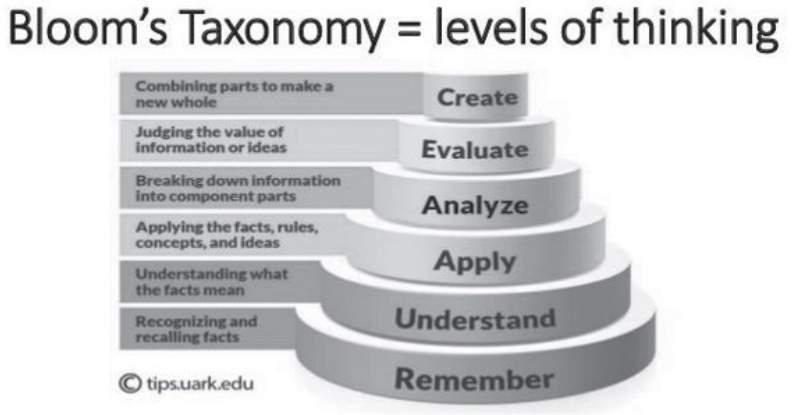
General Aspects of AC and DC Distribution Systems-Types of D.C. & A.C Distributors, Calculations for Distributor fed at one end, distributor fed at both ends.

Text Books:

1. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education, 1994.
2. C.L.Wadhwa, "Electric Power Systems Theory", New Academic science Limited, 2012.
3. B.H. Khan, "Non Conventional Energy Resources" Mc Graw Hill Education, 2015.

Suggested Reading:

1. A. R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
2. D. P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill, 2003.
3. B. M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012.



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With effect from the Academic Year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of II Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20 EE C09	**Core -5** Digital Electronics	3	0	0	3	40	60	3
2	20 EE C10	**Core -6** Electrical Machines-1	3	0	0	3	40	60	3
3	20 EE C11	**Core -7** Electromagnetic Fields	3	0	0	3	40	60	3
4	20 EE C12	**Core -8** Power Electronics	3	0	0	3	40	60	3
5	20 EE C13	**Core -9 Power systems I**	3	0	0	3	40	60	3
6	20EGM02	Indian Traditional Knowledge	2	0	0	-	----	-	NC
7	20EGM03	Universal Human Values-II: Understanding Harmony	3	0	0	3	40	60	3
PRACTICALS									
8	20 EE C14	Digital Electronics Lab	0	0	2	3	50	50	1
9	20 EE C 15	Electrical Machines-1 Lab	0	0	2	3	50	50	1
10	20 EE C 16	Power Electronics Lab	0	0	2	3	50	50	1
		Total	**20**	**0**	**6**	**-**	**390**	**510**	**21**

L: Lecture T: Tutorial P: Practical

CIE - Continuous Internal Evaluation SEE - Semester End Examination

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With effect from the Academic Year 2021-22

20 EE C 13

POWER SYSTEMS –I

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Pre-requisite: Knowledge of energy resources, Mathematics1

Course Objectives:

1. To introduce Generation of power through conventional sources such as: Thermal, Hydro, Nuclear and Renewable energy sources
2. To familiarize mechanical design of transmission lines and cables.
3. To familiarize present practices in tariff calculations and understand the classification and Connection schemes of distribution systems

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

1. Discuss the construction and operation of conventional and non-conventional sources of energy along with financial management
2. Determine the line parameters such as inductance and capacitance for different configurations of transmission line
3. Calculate the sag and tension of given transmission line under different weather conditions
4. Discuss the operation of underground cables, insulators and calculate the capacitance of cables and string efficiency of insulators
5. Discuss the different tariff structures, types of costs and general aspects of distribution systems

UNIT-I

Basic Concepts: Evolution of Power Systems and Present-Day Scenario. Structure of a power system: Bulk Power Grids and Micro-grids.

Generation: Thermal- Hydro -Power Plants: Principles, Choice of site, layout and various parts of generating stations, Brief description of Hydro Power Plant Dam, Spillways, Head works, Surge tank, Penstocks, Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses, Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers.

Nuclear Station: Schematic Arrangement of Nuclear Power Station, Advantages and disadvantages, Types of Nuclear reactors

UNIT- II

Solar and Wind Generation: Solar cell fundamentals, Solar Cell characteristics, solar cell classification, solar cell, Module, Panel and Array Construction, Maximizing the solar PV output and load matching, Solar PV Systems, Basic Principles of Wind Energy Conversion, The Nature of the Wind, The Power in the Wind, Forces on the Blades, Wind Energy Conversion, Wind Data and Energy Estimation, Site Selection Considerations

UNIT-III

Line Parameter Calculations: Inductance & Capacitance calculations of Transmission Line, single-phase and three-phase symmetrical composite conductors, GMD, GMR, Transposition of conductors, bundled conductors, effect of earth capacitance.

UNIT-IV

Overhead Transmission Lines and Cables: Overhead line materials, supports, types, Ground wires, **Sag**/Tension calculations, Equal / Unequal supports, Effects of wind, ice / Erection Conditions stringing charts. Insulators, Types, Material for construction, potential distribution over string of insulators, equalizing of potential, Methods.

Underground Cables: Construction of Cables, Insulating Materials for Cables, Classification of Cables, Insulation Resistance of a Single-Core Cable, Capacitance of a Single-Core Cable, Dielectric Stress in a Single-Core Cable, Most Economical Conductor Size in a Cable, Grading of Cables, Capacitance Grading, Inters heath Grading, Capacitance of 3-Core Cables, Measurements of Ce and Cc.

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UNIT- V

Economics of Power Generation: Load curve, Load demand and diversified factors, Base load operation, Types of costs and depreciation calculations; Tariffs, different types of tariffs; Methods of power factor improvement.

General Aspects of Distribution Systems-Types of Distribution, Ring Main & Radial Distribution system, Calculations for Distributor fed at one end, distributor fed at both ends.

Text Books:

1. J. Grainger and W. D. Stevenson, "Power System Analysis", McGraw Hill Education, 1994.
2. C.L. Wadhwa, "Electric Power Systems Theory", New Academic Science Limited, 2012.
3. B.H. Khan, "Non-Conventional Energy Resources" Mc Graw Hill Education, 2015

Suggested Reading:

1. A.R. Bergen and V. Vittal, "Power System Analysis", Pearson Education Inc., 1999.
2. D.P. Kothari and I. J. Nagrath, "Modern Power System Analysis", McGraw Hill, 2003.
3. B.M. Weedy, B. J. Cory, N. Jenkins, J. Ekanayake and G. Strbac, "Electric Power Systems", Wiley, 2012

CO-PO & PSO Correlation Articulation Matrix-PS1

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO-1	1	2	2	1	-	-	2	-	-	-	-	-	1	-	2
CO-2	2	3	2	2	-	-	-	-	-	-	-	-	1	-	2
CO-3	2	3	2	2	-	-	-	-	-	-	-	-	1	-	2
CO-4	2	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO-5	1	2	2	1	-	-	-						-	-	2

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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 Hours per week L	T	P	Scheme of Examination Duration In Hours	Maximum Marks CIE	SEE	Credits
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 Hours per week L	T	P	Scheme of Examination Duration In Hours	Maximum Marks CIE	SEE	Credits
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

18EE C05

ELECTRO MAGNETIC 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 ...otential lines, Properties of materials, convection and conduction ...ctors, dielectric constant, continuity equation and relaxation

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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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Scheme of III rd to VIII th Semesters of R-20regulation were approved by all the BoS members

Item:3. Approval of the Syllabus for III & IV Semesters of B.E. (EEE) Program as per R20 Regulation

The proposed Syllabus for III & IV Semesters of B.E.(EEE) Program as per R20 Regulation is approved with the following recommendations:

- Inclusion of simulation experiments, Active filters to Analog electronics circuits lab
- Inclusion of topics impact of number of bits in ADC and state diagram and Moore and Mealy machines in the subject of Digital Electronics
- Inclusion of topics of data sheets of Transformer, motors, Standard electrical codes to Electrical Machines-1 syllabus.
- Removal topics of Thyristor based Inverters, series & Parallel Inverters, cyclo-converters from Power Electronics Course.
- Inclusion of topics of Voltage source converters, forward & fly back converters to Power electronics.
- Power Systems-I course, Unit-II name has to changed from Solar & Wind sources to Solar & Wind Generations.

  Action taken: Suggestions given by the BoS members are incorporated in the syllabus of above respective subjects.

- BoS suggested to have contact hours for evaluation of internships.

  Action taken: It is recommended to academic council

- BoS suggested that topics of HTLS conductor, polymer Insulator & its advantages, present day tariff system, New polices by regulated board, Graph meters, Net meters, Terms like ring main, radial in Distribution systems can be circulated in the form of handouts to keep the students updated to latest technologies of Power systems-I Syllabus.

  Action taken: Suggestions given by the BoS members are incorporated

- Inclusion of topics of Hall effect sensors, Digital meters and modern measurement devices to syllabus of Electrical measurement & Instrumentation

  Action taken: Suggestions given by the BoS members are incorporated in the syllabus of corresponding lab

Item:4. To approve the syllabus of all the other COURSES under this EEE board offered to the other departments [20 EE M 01 - Indian Traditional Knowledge]

Proposed syllabus of Indian Traditional Knowledge was approved.

Item:5. Any other item with the permission of the chair

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

AICTE Model Curriculum with effect from AY 2022-23

B.E (Electrical and Electronics Engineering)

SEMESTER – V

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		CIE	SEE	
THEORY									
1	20 EE C17	**Core – 10** Electrical Machines-II	3	-	-	3	40	60	3
2	20 EE C18	**Core -11** Power Systems -II	3	-	-	3	40	60	3
3	20 EE C19	**Core -12** Microcontrollers and Applications	3	-	-	3	40	60	3
4	20 EE C20	**Core -13** Control Systems	3	-	-	3	40	60	3
5	20 EE Exx	**PE- I**	3	-	-	3	40	60	3
6	20 EE Exx	**PE-2**	3	-	-	3	40	60	3
7	20 xx Oxx	OE-1	3	-	-	3	40	60	3
PRACTICALS									
8	20 EE C21	Control Systems Lab	-	-	2	3	50	50	1
9	20 EE C22	Electrical Machines- II Lab	-	-	2	3	50	50	1
10	20 EE C23	Microcontrollers and Applications Lab	-	-	2	3	50	50	1
11	20EGCO3	Employability Skills	-	-	2	3	50	50	1
12	20 EE I02	Industrial / Rural Internship	3-4 Weeks/90 Hours				50	--	2
Total			**21**	**-**	**08**	**-**	**530**	**620**	**27**
Clock Hours Per Week: 29									

L: Lecture **P: Practical/Project Seminar/Dissertation** **CIE: Continuous Internal Evaluation**

T: Tutorial **SEE: Semester End Examination**

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

AICTE Model Curriculum with effect from AY 2022-23

B.E (Electrical and Electronics Engineering)

SEMESTER – VI

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		CIE	SEE	
THEORY									
1	20 EE C24	**Core -13** Power System Protection	3	-	-	3	40	60	3
2	20 EE C25	**Core -14** Power System Operation and Control	3	-	-	3	40	60	3
3	20 EE C26	**Core -15** Electrical Drives	3	-	-	3	40	60	3
4	20 EE C27	**Core -16** IoT for Electrical Engineering	3	-	-	3	40	60	3
5	20 EE Exx	**PE- 3**	3	-	-	3	40	60	3
6	20 EG M01	Indian Constitution& Fundamental Principles	2	-	-	2	-	-	NC
PRACTICALS									
7	20 EE C28	Power Systems Lab	-	-	2	3	50	50	1
8	20 EE C29	Electrical Simulation Lab	-	-	2	3	50	50	1
9	20 EE C30	Electrical Drives Lab	-	-	2	3	50	50	1
10	20 EE C31	IoT Lab	-	-	2	3	50	50	1
Total			**17**	**-**	**08**	**30**	**440**	**510**	**22**
Clock Hours Per Week: 25									

L: Lecture **P: Practical/Project Seminar/Dissertation** **CIE: Continuous Internal Evaluation**

T: Tutorial **SEE: Semester End Examination**

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20EE C27

IoT for Electrical Engineering

(Semester-VI)

Instruction	3 L Hours per Week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Prerequisite: Students should have prior knowledge on basic programming knowledge and networking

Course Objectives:

1. To provide knowledge of basic IoT Network Architectures, IoT Processing, Connectivity and Communication technologies
2. To provide knowledge of Arduino boards and basic components and Develop skills to design and implement various smart system application.
3. To provide knowledge of programming skills, application development and prototyping using Python.

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

1. Understand the basic principles and terminologies of computer networking, network security, WSN, M2M, CPS, sensors and actuators.
2. Describe various data types in IoT applications, connectivity protocols in IoT, communication protocols in IoT.
3. Understand basic concepts of Arduino UNO and Design smart system applications using Arduino UNO.
4. Apply Python programming for Problem solving and application development.
5. Understand the working of Raspberry Pi and develop IoT applications.

UNIT-I

Introduction to IoT: Introduction-Network types-IoT Protocol and Architecture-Network Security- Wireless Sensor Networks (WSN)- Machine-to-Machine (M2M) Communications- Cyber Physical Systems (CPS)- Differentiate between WSN, M2M, and CPS- IoT Sensors and Actuators-Advantages and Disadvantages of IoT.

UNIT-II

IoT Processing, Connectivity and Communication: Data format- Importance of Processing in IoT- Processing Topologies- IoT Device Design and Selection Considerations- IEEE 802.15.4-Thread- ISA100.11A- WirelessHART- RFID- LoRa- Wi-Fi- Bluetooth- Infrastructure Protocols- Discovery Protocols- Data Protocols- Identification Protocols

UNIT-III

Introduction to Arduino Programming: Introduction-Features of Arduino-Types of Arduino board-Arduino UNO-Arduino IDE overview-Sketch Structure-Data types-Function libraries-Operators in Arduino-Control statement-Loops-Arrays-String-Math Library-Random number-Interrupts-Example program: Blink LED-Traffic Control system- Pulse Width Modulation-Analog to Digital Conversion- Wireless Connectivity to Arduino- Integration of Sensors with Arduino- Integration of Actuators with Arduino

UNIT-IV

Introduction to Python Programming: Introduction to Python- Variables and Data types- Operators-NumPy-matplotlib-Array- Pandas-Lists- Loops- Conditional statements-Functions-Strings-Tuples- Sets-Dictionaries- Array- Data Visualization-File handling.

UNIT-V

Introduction to Raspberry Pi and IoT Applications: Introduction to Raspberry Pi-Basic architecture- Working of Raspberry Pi-Pin configuration- Example program: Blink LED- Capture Image using Raspberry Pi -Implementation of IoT with Raspberry Pi: Sensor and actuator interfaced with Raspberry Pi-IoT application-Speed control of DC and AC machines-Measuring parameters of DC machine, AC machine and solar panel.

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20EEC31

IoT Lab
(Semester-VI)

Instruction	2 P Hours per Week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Prerequisites: Students should have prior knowledge on basic understanding of C programming language, understanding the IoT technologies and standards.

Course Objectives:

1. To understand fundamental connectivity schemes of Arduino / Raspberry Pi boards
2. To understand the recent application domains of IoT in everyday life
3. To interface external objects with Arduino / Raspberry Pi
4. To develop programming skills, application development and prototyping using Arduino/ Raspberry Pi.

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

1. Understand use of Arduino / Raspberry Pi board circuit
2. Implement interfacing of various sensors with Arduino /Raspberry Pi
3. Demonstrate the ability to transmit data wirelessly between different devices
4. Show an ability to upload/download sensor data on cloud and server
5. Analyze basic protocols in wireless sensor network

List of Experiments

1. Interfacing of Raspberry Pi with existing system components
2. Characteristics of p-n junction diode, Zener diode and Light Emitting Diode (LED) using Arduino IDE
3. Design of half wave rectifier using Arduino /Raspberry Pi
4. Temperature measurement using Arduino /Raspberry Pi
5. Distance measurement using Arduino /Raspberry Pi
6. Stopwatch control using Arduino / Raspberry Pi
7. Traffic Light Controller using Arduino /Raspberry Pi
8. Dark Sensing LED using Arduino/Raspberry Pi
9. Design of digital dc voltmeter and ammeter using Arduino /Raspberry Pi
10. Design of digital ac voltmeter and ammeter using Arduino / Raspberry Pi
11. Measurement of power and energy using Arduino / Raspberry Pi
12. Speed control of dc motor using Arduino / Raspberry Pi
13. Monitoring of temperature and humidity in PC screen using Raspberry Pi
14. Interfacing of motor using relay with Arduino /Raspberry Pi and write a program to turn ON motor when push button is pressed
15. Interfacing of Bluetooth with Arduino /Raspberry Pi and write a program to send sensor data to smart phone using Bluetooth
16. Uploading of temperature and humidity data from Arduino/Raspberry Pi to thing speak cloud
17. Retrieval of temperature and humidity data from thing speak cloud to Arduino/Raspberry Pi

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

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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

18EEE18 **SWITCH MODE POWER CONVERTERS**

(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 Objective:

1. To study the design aspects of DC-DC converters and SMPS.
2. To comprehend the basic concepts of resonant converters.
3. To familiarize with the design of inductor, transformer for power converter circuits and to know various voltage control techniques in inverters.

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

1. Design different types of DC-DC converters.
2. Comprehend different types of SMPS for electrical applications.
3. Understand the operation of different resonant converters.
4. Design a suitable filter along with the suitable selection of transformer and switches that are used in power electronic converter circuits.
5. Compare different voltage control techniques in inverters.

UNIT-I

Basic Converter Circuits: Design of critical inductance and capacitance of Buck, Boost and Buck Boost Regulators, Cuk Converter Choice of Switching Frequency-Design Aspects

UNIT-II

Isolated SMPS: Fly back Converters, Forward Converters, Half Bridge and Full Bridge Converters, Push Pull Converters and SMPS with multiple outputs, Choice of Switching Frequency-Design Aspects

UNIT-III

Resonant Converters: Classification, Basic resonant circuit concepts, Load resonant, Resonant switch converters, Resonant D.C Link Inverters with Zero Voltage Switching, High frequency Link Integral Half-Cycle converters.

UNIT-IV

Design of Inductor and Transformer: Selection of Output Filter Capacitor, Selection of Energy Storage Inductor, Design of High Frequency Inductor and High Frequency Transformer, Selection of Switches, Snubber Circuit Design.

UNIT-V

Voltage Control in Inverters: Voltage control Techniques in inverters, Bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage, three-phase sinusoidal modulation

Text Books:

1. Mohan N. Undeland . T & Robbins W, Power Electronics Converters, Application and Design. John Wiley, 3rd edition, 2007.
2. Mohammed H. Rashid, “Power Electronics, Devices, circuits and applications”, Pearson Education, 4th Edition, 2017
3. H. W. Whittington, B. W. Flynn and D. E. MacPherson, Switched Mode Power Supplies, Design and Construction, Universities Press, 2009.

Suggested Reading:

1. Umanand L., Bhat S.R., Design of magnetic components for switched Mode Power Converters. , Wiley Eastern Ltd.,1992
2. V. Ramanarayanan, Course Material on Switched Mode Power Conversion

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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.

Part B

1. Measurements of Op Amp parameters:
2. Inverting and Non Inverting Amplifiers
3. Design of integrator and differentiator using Op-Amp.
4. Generation of triangular, sine and square wave using IC's.
5. Peak Clamper using Op-Amps.
6. Clippers using Op-Amps..
7. Schmitt Trigger,

Note: At least **FIVE** experiments from **Part-A** and **FIVE** from **Part-B** should be conducted in the semester.

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18EE C08

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB

Instruction	2 Hours per week
Duration of Semester End Exam	2 Hours
Semester End Exam	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To understand the various Electrical Measuring instruments for measuring various electrical quantities.
2. To measure the unknown values of different electrical elements.
3. To become familiar with digital instruments.

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

1. Design and validate DC and AC bridges.
2. Learn about various measurements devices, their characteristics and limitations.
3. Understand the operation of DSO and analyse various signals.
4. Demonstrate the principles of magnetic measurements.
5. Select the right instrument for the given circuit.

LIST OF EXPERIMENTS

1. Calibration of single-phase energy meter with Phantom Loading.
2. Measurement of high resistance and insulation resistance using Megger.
3. Measurement of iron losses using Epstein's square bridge.
4. Measurement of unknown frequency using Lissajous Patterns.
5. Study of Digital Instruments
6. Measurement of bandwidth and sampling rate of a signal using DSO.
7. Usage of DSO to capture transients in RLC circuits.
8. Measurement of unknown resistance using Kelvin's double bridge.
9. Measurement of unknown Inductance using Maxwell's bridge and validating with LCR meter.
10. Measurement of unknown inductance using Anderson's bridge and validating with LCR meter.
11. Measurement of unknown capacitance using Schering bridge and validating with LCR meter.

With effect from the Academic Year 2021-22

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instructions of III Semester of B.E. – Electrical & Electronics Engineering as per AICTE Model Curriculum 2021-22

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		CIE	SEE	
THEORY									
1	20MTC07	Applied Mathematics	3	1	0	3	40	60	4
2	20 CS C06	Basic Data Structures	2	0	0	3	40	60	2
3	20 EE C03	**Core- 1** Electrical Circuit Analysis	3	0	0	3	40	60	3
4	20 EE C04	**Core- 2** Analog Electronic Circuits	3	1	0	3	40	60	4
5	20 EE C05	**Core- 3** Electrical Measurements and Instrumentation	3	0	0	3	40	60	3
6	20 EE C06	**Core- 4** Signals & System	3	0	0	3	40	60	3
7	20 CE M01	Environmental Science	2	0	0	2	----	50	NC
8	20 EE I01	MOOCs/Training/ Internship	2-3 weeks/90 hours				**40**	**60**	2
PRACTICALS									
9	20 EE C 07	Analog Electronic Circuits Lab	0	0	2	3	50	50	1
10	20 EE C08	Electrical Circuits and Measurements Lab	0	0	2	3	50	50	1
11	20 CS C07	Basic Data Structures Lab	0	0	2	3	50	50	1
		Total	**19**	**2**	**6**	**-**	**430**	**620**	**24**

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

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

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20EEC08 **ELECTRICAL CIRCUITS AND MEASUREMENTS LAB**

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	50 Marks
CIE	50 Marks
Credits	1

Pre-Requisite: Students should have

1. Fundamental knowledge in calculus and complex algebra.
2. Electromagnetism and circuit theory concepts.

Course Objectives:

1. To plot the frequency response & locus diagrams of first and second order circuits
2. To verify various circuit theorems and to determine different parameters of two-port network.
3. To measure the unknown values of different electrical elements.
4. To become familiar with different transducers.

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

1. Obtain and plot the frequency response, locus diagrams of RLC circuits.
2. Verify various circuit theorems.
3. Determine various two-port network parameters.
4. Design and validate DC and AC bridges for measuring unknown electrical parameters.
5. Demonstrate the principles of magnetic measurements.
6. Demonstrate the measurement of non-electrical quantity with an appropriate transducer.

PART-A

1. Frequency response of RLC series circuit.
2. Frequency response of RLC Parallel circuit.
3. Locus diagrams of RL & RC circuits.
4. Verification of Maximum power transfer theorem.
5. Verification of Milliman's theorem.
6. Verification of Compensation Theorem.
7. Determination of Z, Y, ABCD & h parameters of two-port network

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PART-A

8. Measurement of unknown resistance using Kelvin's double bridge. Measurement of unknown Inductance using Maxwell's bridge and validating with LCR meter.
9. Measurement of unknown inductance using Anderson's bridge and validating with LCR meter.
10. Measurement of unknown capacitance using Schering bridge and validating with LCR meter.
11. Measurement of iron losses using Epstein's square bridge.
12. Measurement of strain using strain gauge.
13. Measurement of Displacement using LVDT.
14. Measurement of unknown voltage using D.C Crompton's potentiometer.
15. Study of measurements with digital current and potential transformers.

Note: Five experiments from **Part-A** and **Five** experiments from **Part-B** should be conducted in the semester.

CO-PO & PSO Correlation Articulation Matrix-EMI Lab

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO-1	2	2	1	-	-	-	-	-	-	-	-	1	-	3	-
CO-2	2	2	-	-	-	-	-	-	-	-	-	1	-	3	-
CO-3	2	2	-	-	-	-	-	-	-	-	-	1	-	3	-
CO-4	2	2	3	1	-	-	-	-	-	-	-	-	2	1	1
CO-5	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO-6	2	2	-	-	-	-	-	-	-	-	-	-	2	-	2

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)

AICTE Model Curriculum with effect from AY 2022-23

B.E (Electrical and Electronics Engineering)

SEMESTER – VI

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		CIE	SEE	
THEORY									
1	20 EE C24	**Core -13** Power System Protection	3	-	-	3	40	60	3
2	20 EE C25	**Core -14** Power System Operation and Control	3	-	-	3	40	60	3
3	20 EE C26	**Core -15** Electrical Drives	3	-	-	3	40	60	3
4	20 EE C27	**Core -16** IoT for Electrical Engineering	3	-	-	3	40	60	3
5	20 EE Exx	**PE- 3**	3	-	-	3	40	60	3
6	20 EG M01	Indian Constitution& Fundamental Principles	2	-	-	2	-	-	NC
PRACTICALS									
7	20 EE C28	Power Systems Lab	-	-	2	3	50	50	1
8	20 EE C29	Electrical Simulation Lab	-	-	2	3	50	50	1
9	20 EE C30	Electrical Drives Lab	-	-	2	3	50	50	1
10	20 EE C31	IoT Lab	-	-	2	3	50	50	1
Total			**17**	**-**	**08**	**30**	**440**	**510**	**22**
Clock Hours Per Week: 25									

L: Lecture **P: Practical/Project Seminar/Dissertation** **CIE: Continuous Internal Evaluation**

T: Tutorial **SEE: Semester End Examination**

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20EE C28

POWER SYSTEMS LAB

(Semester-VI)

Instruction	2 P Hours per Week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Prerequisite: Power systems-I, Power systems-II, Switchgear and Protection

Course Objectives: The objective of the course is to

1. Determine regulation &efficiency of short, medium and long transmission lines and to calculate A, B, Cand,D constants .
2. Understand the importance of protective relays in power system such as different protection of Transformer, IDMT Characteristics of over current relay and static relays.
3. Understand steps involved in finding sequence parameter of Transformers and Alternators.
4. Determine dielectric strength of Transformer oil, sting efficiency and Fault location of Underground cables cable

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

1. Calculate ABCD constants of transmission lines and evaluate regulation and efficiency.
2. Examine relay setting and compensation techniques for safe operating of power system.
3. Identity sequence parameters of transformer and alternator and discuss its importance.
4. Calculate the time constant, perform Fault Analysis of an Alternator and Identify Fault location of an Underground Cable.
5. Determine the dielectric strength of transformer oil and calculate the efficiency of string insulators of a transmission line.

List of Experiments

1. Determination of regulation & efficiency of 3-Phasetransmission lines.
2. IDMT characteristics of Over-current relay.
3. Determination of A, B, C, D constants of 1-Phasetransmissionline.
4. Differential protection of 1-phase transformer.
5. Sequence impedance of 3-PhaseAlternators by fault Analysis.(LG,LL & LLL)
6. Determination of positive, negative and zero-sequence impedance of 3 – Phase transformers.
7. Determination of Synchronous machine reactance and Time constant from 3-Phase S.C test.
8. Determination of dielectric strength of Transformer oil and Megger.
9. Characteristics of Static Over current Relays.
10. Measurement of capacitance of 3-corecables.
11. Determination of positive, negative and zero-sequence impedance of 3 phase Alternator.
12. Determination of Voltage distribution and String efficiency of string of Insulators.
13. Study of Series-shunt compensation of a long transmission line.
14. Fault location of Underground cables.
15. Visiting nearby substation and submitting the report

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

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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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18EEC24 MICROCONTROLLERS AND ITS APPLICATIONS LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
Semester End Examination	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To explain instruction set of 8051 microcontroller
2. To demonstrate assembly language programming using 8051 microcontroller
3. To illustrate programming 8051 microcontroller with 'embedded C' Language.

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

1. Use instruction set of 8051 microcontroller to develop ALPs.
2. To write and execute simple programs using 8051 microcontroller.
3. Demonstrate the functioning of different instructions and subroutines using 8051 programming.
4. Create small application models by interfacing devices to 8051 programming through Keil/ Ride software.
5. Apply the knowledge of experiments done in the laboratory for doing mini projects and academic projects.

List of Experiments

PART-A

Using 8051 Microcontroller Kit:

1. Programs using Data Transfer Instructions- Block move, Exchange, Sorting, Finding Largest Element in an Array.
2. Programs using Arithmetic Instructions: Multi byte operations
3. Programs using Boolean and Logical Instruction (Bit manipulations).
4. Programs using JUMP and CALL Instructions
5. Programs to generate delay, programs using serial port and on chip timer/counter.
6. Programs using Look-up Table
7. Programs using interrupts.

PART-B

Program Development using 'c' cross compiler for 8051 Microcontroller

(Any 3 of the below mentioned experiments are to be Conducted)

1. DAC interfacing for Generation of Sinusoidal Waveform.
2. Stepper Motor control (clockwise and anticlockwise directions)
3. Interfacing of Keyboard and 7-segment Display Module
4. ADC interfacing for temperature monitoring
5. Traffic signal light controller

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

AICTE Model Curriculum with effect from AY 2022-23

B.E (Electrical and Electronics Engineering)

SEMESTER – V

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		CIE	SEE	
THEORY									
1	20 EE C17	**Core – 10** Electrical Machines-II	3	-	-	3	40	60	3
2	20 EE C18	**Core -11** Power Systems -II	3	-	-	3	40	60	3
3	20 EE C19	**Core -12** Microcontrollers and Applications	3	-	-	3	40	60	3
4	20 EE C20	**Core -13** Control Systems	3	-	-	3	40	60	3
5	20 EE Exx	**PE- I**	3	-	-	3	40	60	3
6	20 EE Exx	**PE-2**	3	-	-	3	40	60	3
7	20 xx Oxx	OE-1	3	-	-	3	40	60	3
PRACTICALS									
8	20 EE C21	Control Systems Lab	-	-	2	3	50	50	1
9	20 EE C22	Electrical Machines- II Lab	-	-	2	3	50	50	1
10	20 EE C23	Microcontrollers and Applications Lab	-	-	2	3	50	50	1
11	20EGCO3	Employability Skills	-	-	2	3	50	50	1
12	20 EE I02	Industrial / Rural Internship	3-4 Weeks/90 Hours				50	--	2
Total			**21**	**-**	**08**	**-**	**530**	**620**	**27**
Clock Hours Per Week: 29									

L: Lecture **P: Practical/Project Seminar/Dissertation** **CIE: Continuous Internal Evaluation**

T: Tutorial **SEE: Semester End Examination**

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20EE C23

MICROCONTROLLERS AND APPLICATIONS LAB

(Semester-V)

Instruction	2 P Hours per Week
Duration of SEE	3Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Prerequisite: Students should have basic knowledge of programming in C language.

Course Objectives: This course aims to:

1. Develop and understand the 8051 and ARM7 C programming
2. Understand the usage of Integrated Development Environment (Keil)
3. Control the operation of various peripherals using 8051 and ARM7 microcontroller

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

1. Develop the programs of 8051 and ARM using their respective instruction set.
2. Understand the usage of various debugging tools available to program different microcontrollers
3. Build code for 8051 and ARM7 to interface various input/output modules
4. Analyze the hardware and software interaction and integration.
5. Design and develop the 8051 and ARM 7 based embedded systems for various applications

LAB EXPERIMENTS

(Any 5 experiments. are to be conducted in each cycle)

I. 8051 Programming

1. Familiarity and use of 8051 microcontroller trainer kit, Keil IDE and simple programs under different addressing modes.
2. Assembly programming using instruction set
3. Timer and counter operations and programming using 8051.
4. Interfacing applications using LED, switch, relay and buzzer.
5. Generation of waveforms using DAC by interfacing it with 8051.
6. Stepper motor interfacing.
7. LCD interfacing.
8. Development of Embedded 'C' Code based on the module specifications. (under Structured enquiry)

II. ARM7 Programming

1. Study and use of LPC214x Microcontroller trainer kit and simple programs using its instruction set
2. Interfacing applications using LED, switches
3. Interfacing applications using relay and buzzer.
4. DC Motor interfacing.
5. Programming on-chip ADC.
6. Waveform generation using internal DAC.
7. Development of Embedded 'C' Code based on the module specifications

III. Design an experiment related to the Embedded Application of your choice using 8051/ARM based architectures. (under Open ended enquiry)

Suggested Reading:

1. Mazidi M.A, Mazidi JG &Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C", 2/e, Pearson Education, 2007.
2. Philips semiconductors, "ARM 7 (LPC 214x) user manual", 2005

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