# CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)

## Department of Electrical and Electronics Engineering

### A TWO YEAR (I–IV Semesters) PG Program
### POWER SYSTEMS AND POWER ELECTRONICS

**1. VISION & MISSION OF THE INSTITUTE:**

**Vision:** To be center of excellence in technical education and research

**Mission:** To address the emerging needs through quality technical education and advanced research.

**2. VISION & MISSION OF THE DEPARTMENT:**

**Department Vision:**

To achieve Academic and Professional Excellence in Teaching and Research in the frontier areas of Electrical and Electronics Engineering Vis-a -Vis serve as a Valuable Resource for Industry and Society.

**Department Mission:**

Empowering the Faculty and Student Rendezvous to Nurture Interest for Conceptual Keystone, Applied Multidisciplinary Research, Inspiring Leadership, and Efficacious Entrepreneurship culture, Impeccable Innovation in frontier areas to be synergetic with Environmental, Societal and Technological Developments of the National and International community for Universal Intimacy.

**M1:** Emphasis on providing Strong Theoretical Foundation & Engineering Leadership Eminence, infusion of Creativity and Management skill while maintaining Ethics and Moral for Sustainable Development. (Individual development).

**M2:** Enable the Faculty and Student Interactions to trigger interest for Applied Multidisciplinary Research and Entrepreneurship Culture resulting in Significant Advancement of the field of Specialization with Involvement of Industries and Collaborative Educational Networks. (Sense of Ownership, Networking, and Eco system development).

**M3:** Extend the Conducive Neighbourhoods for Innovation in frontier areas to keep pace with Environmental, Societal and Technological Developments of the National and International Community to Serve Humanity. (Service to Society, Atmanirbhar Bharat).

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

Dr. M Balasubbareddy
HOD, EEE-CBIT

**Program Educational Objectives of M.E (Power Systems & Power Electronics) Program:**

- ❖ PEO 1: Will excel in Power System and Power Electronics area.
- ❖ PEO 2: Will become successful in executing software related applications.
- ❖ PEO 3: Will carry out research in new technologies relevant to PS & PE.
- ❖ PEO 4: Will develop with professional ethics, effective communication skills and knowledge of societal impacts of computing technologies.

**Program Outcomes of M.E (Power System & Power Electronics) Program**

**PO 1:** An ability to independently carry out research/investigation and development work to solve practical problems.

**PO 2:** Ability to write and present a substantial technical report/document.

**PO 3:** Student should be able to demonstrate a degree of mastery over the area as per the Specialization of the Program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

**PO 4:** The Student will be able to analyze, design and develop new control strategies in the areas of Power systems and Power electronics suitable for Industry requirements.

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## Department of Electrical and Electronics Engineering
## Course outcomes statements ME-PSPE

| S.NO | Year/ SEM | Code No. | Subject | Course Outcome Statements |
|---|---|---|---|---|
| 1 | 1st /I-SEM | 23EEC101 | Real-time control of power systems | 1. Understand supervisory control and data acquisition |
| | | | | 2. Develop mathematical models for analysis of linear and nonlinear state estimation, Observability and Contingency analysis of any practical Power System |
| | | | | 3. Prepare the practical input data required for linear and nonlinear state estimation methods and contingency analysis. |
| | | | | 4. Analyse the power system security and challenges in secure operation of power systems. |
| | | | | 5. Have a complete overview of Real Time operation of Power Systems (RTPS), communication and protocols employed in RTPS. |
| 2 | 1st /I-SEM | 23EEC102 | Analysis of Power Converters | 1. Select appropriate switching devices for power converters |
| | | | | 2. Design switch mode converters like buck, boost, buck-boost and Cuk converters. |
| | | | | 3. Analyze the Switching DC Power Supplies. |
| | | | | 4. Analyze and design load and switch resonant converters. |
| | | | | 5. Synthesize and design magnetic components for power converter. |
| 3 | 1st /I-SEM | 23EEE111 | Restructured Power Systems | 1. Analyze the operation of power system in de-regulated and competitive environment |
| | | | | 2. Understand operation and planning policies in deregulated environment. |
| | | | | 3. Explore various transmission pricing methodologies. |
| | | | | 4. Distinguish different ancillary services provided by the ISO |
| | | | | 5. Understand open access same-time information system. |
| 4 | 1st /I-SEM | 23EEE114 | Machine Learning and Applications | 1. Understand basic concepts of Machine Learning Techniques |
| | | | | 2. Understand the different types of datasets. |
| | | | | 3. Develop skills in using machine learning algorithms for solving practical problems. |

| | | | | 4. Analyze and work with different datasets. |
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| | | | | 5. Apply Machine Learning Algorithms for Electrical Engineering problems |
| 5 | 1st /I-SEM | 23EGA101 | English for Research Paper Writing | 1. Improve work performance and efficiency, illustrate the nuances of research paper writing and draw conclusions on professional usefulness. |
| | | | | 2. Classify different types of research papers and organize the format and citation of sources. |
| | | | | 3. Explore various formats of APA, MLA and IEEE and set up for writing a research paper. |
| | | | | 4. Draft paragraphs and write theme based thesis statements in a scientific manner. |
| | | | | 5. Develop an original research paper while acquiring the knowledge of how and where to publish their papers |
| 6 | 1st /I-SEM | 23MEM103 | Research Methodology and IPR | 1. Define research problems, review, and assess the quality of literature from various sources |
| | | | | 2. Improve the style and format of writing a report for technical paper/ Journal report, understand and develop various research designs |
| | | | | 3. Collect the data by various methods: observation, interview, questionnaires. |
| | | | | 4. Analyze problems by statistical techniques: ANOVA, F-test, and Chi-square. |
| | | | | 5. Understand apply for patent and copyright |
| 7 | 1st /I-SEM | 23EEC103 | Advance Power Systems Lab | 1. Find the sequence reactance of the synchronous machine and 3-phase transformer. |
| | | | | 2. Plot the relay characteristics. |
| | | | | 3. Calculate efficiency, regulation and ABCD constants of single-phase transmission line |
| | | | | 4. Learn about various types of faults |
| | | | | 5. Validate the I–V and P- V characteristics of a PV module. |
| 8 | 1st /I-SEM | 23EEC104 | Advanced Power Electronic Circuits and Drives Lab | 1. Understand the effect of source inductance on phase controllers |
| | | | | 2. Design inductors used in DC-DC Converter and also illustrate the converter performance with different types of loads |
| | | | | 3. Develop basic control schemes for different converters and implement it in MATLAB/SIMULINK platfor |

| | | | | 4. Implement different control schemes for DC Drives and verify it experimentally and/or through simulatio |
|---|---|---|---|---|
| | | | | 5. Implement different control schemes for AC Drives and verify it experimentally and/or through simulation. |
| 9 | 1st/ II - SEM | 23EEC105 | Advanced Computational Methods in Power Systems (ACMPS) | 1. Develop proper mathematical models for analysis of a selected problem like load flow study of Power System and Distribution Network or Fault analysis |
| | | | | 2. Determine Power flows with various load flow methods. |
| | | | | 3. Obtain the power flows for distribution systems. |
| | | | | 4. Develop power system software /implementation algorithm for fault analysis |
| | | | | 5. Find the fault currents by implementing algorithms for different faults. |
| 10 | 1st/ II - SEM | 23EEC106 | Power Converters and Control Techniques for Microgrids (PCCTM) | 1. Understand the basic concepts and types of microgrid. |
| | | | | 2. Analyze various control methods of microgrid. |
| | | | | 3. Model different power convertersrequired in microgrid |
| | | | | 4. Illustrate the control of AC microgrid |
| | | | | 5. Describe the need and control process of DC-DC converter control the DC microgrid. |
| 11 | 1st/ II - SEM | 23EEC107 | Data Science Applications in Power Engineering (DSAPE) | 1. Distinguish between Algorithmic based methods and Knowledge based Methods. |
| | | | | 2. Able to distinguish between Artificial Neural Networks and Fuzzy Logic |
| | | | | 3. Able to analyze the critical power system data with AI techniques. |
| | | | | 4. Adopt Soft Computing techniques for solving Power Engineering Problems. |
| | | | | 5. Apply appropriate AI framework for solving Power Engineering Problems. |
| 12 | 1st/ II - SEM | 23EEE115 | Smart Grid Technologies (SGT) | 1. Identify the difference between smart grid & conventional grid. |
| | | | | 2. Demonstrate the role of smart devices such as PMU, IED etc. in Smart Grid |
| | | | | 3. Understand the role of SCADA in Smart grid controlling and data acquisition |
| | | | | 4. Analyze the operation and control of Micro Grid |

| | | | | 5. Choose the suitable modern communication technologies for the required smart grid operation |
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| 13 | 1st/ II - SEM | 23EEE120 | Evolutionary Algorithms Applications in Power Engineering (EAAPE) | 1. Familiarize conventional optimization techniques |
| | | | | 2. Analyze the capabilities of bio- Inspired systems and conventional methods for solving optimization problems. |
| | | | | 3. Analyze how evolutionary algorithms can be explored and exploited to obtain near global optimal results. |
| | | | | 4. Differentiate between evolutionary algorithms |
| | | | | 5. Apply bio- Inspired algorithms Power Engineering applications. |
| 14 | 1st/ II - SEM | 23EEC108 | Power Systems Computational Lab (PSC Lab) | 1. Analyze the power system under various fault conditions. |
| | | | | 2. Evaluate the economic dispatch in the power system operation. |
| | | | | 3. Estimate the state and Asses the stability of a power system. |
| | | | | 4. Analyze the security of power system during Line/Generator outages. |
| | | | | 5. Analyze and select artificial intelligence techniques for the Power System operation and control. |
| 15 | 1st/ II - SEM | 23EEC109 | Data Science Applications Lab (DSA Lab) | 1. Analyze and choose suitable AI techniques for power system problems |
| | | | | 2. Design fuzzy logic rule-based system. |
| | | | | 3. Understand and design neural networks for electrical engineering problems. |
| | | | | 4. Understand basic concepts of deep learning algorithms. |
| | | | | 5. Analysis of power electronics converters using AI Techniques. |
| 16 | 1st/ II - SEM | 23EEC110 | Mini Project | 1. Organize the literature review identify and formulate the engineering problem. |
| | | | | 2. Provide engineering solutions for simple problems utilizing modern tools and methods. |
| | | | | 3. Demonstrate a sound technical knowledge of their selected mini project topic. |
| | | | | 4. Communicate with engineers and the community have consciousness of surroundings. |
| | | | | 5. Adapt the skills and attitudes of a Professional Engineer. |

| 17 | 2nd / III - SEM | 20EEE113 | Energy Auditing & Management | 1. Acquire the background required for engineers to meet the role of energy managers |
|---|---|---|---|---|
| | | | | 2. Gain the skills and techniques required to implement energy management |
| | | | | 3. Demonstrate energy conservation aspects |
| | | | | 4. Apply the energy conservation techniques to industrial loads |
| | | | | 5. Perform basic energy audit in an organization |
| 18 | 2nd / III - SEM | 20CSO101 | Business Analytics | 1. To understand the basic concepts of business analytics |
| | | | | 2. Identify the application of business analytics and use tools to analyze business data |
| | | | | 3. Become familiar with various metrics, measures used in business analytics |
| | | | | 4. Illustrate various descriptive, predictive and prescriptive methods and techniques |
| | | | | 5. Model the business data using various business analytical methods and techniques |
| 19 | 2nd / III - SEM | 20EEC110 | Industrial Project /Dissertation Phase-I | 1. State research questions related to main problem and identify the Research methods |
| | | | | 2. Identify literature for review |
| | | | | 3. Integrate theory and practice |
| | | | | 4. Apply knowledge and understanding in relation to the agreed area of study. |
| | | | | 5. Communicate in written form by integrating, analysing and applying key texts and practices |
| 20 | 3rd / IV - SEM | 20EEC111 | Dissertation-II | 1. State research questions related to main problem and identify the Research methods |
| | | | | 2. Identify literature for review |
| | | | | 3. Integrate theory and practice |
| | | | | 4. Apply knowledge and understanding in relation to the agreed area of study. |
| | | | | 5. Communicate in written form by integrating, analysing and applying key texts and practices |