



Pradnya Niketan Education Society, Pune's  
**N. K. ORCHID COLLEGE OF ENGINEERING  
& TECHNOLOGY, SOLAPUR**

NAAC Accredited, Approved by AICTE, New Delhi & Affiliated to DBATU, Lonere  
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Post Box No. 154, Gut No. 16, Solapur-Tuljapur Road, Tale Hipparaga, Solapur- 413 002.

## **Criteria-2: Teaching Learning and Evaluation**

**2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated**

### **INDEX**

<b>Department of Electrical Engineering</b>		
<b>Sr.No</b>	<b>Evidence Document</b>	<b>Page Number</b>
<b>2.6.1.1</b>	<b>Programme Outcomes (POs) and Course Outcomes (COs)</b>	<b>2-15</b>
<b>2.6.1.2</b>	<b>Dissemination of POs and COs</b>	<b>16-23</b>



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**Department of Electrical Engineering**

**2.6.1.1 PROGRAM OUTCOME STATEMENTS**

PO No.	Statements
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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2.6.1.1 Course outcomes of all courses (A.Y. 2022-23)		
SE-I (DBATU) Theory Courses		
Course no.	Course code	Course name
PCC1	BTEEC302	Electrical Machines-I
<b>COs</b>	After the successful completion of this course student will be able to:	
<b>1</b>	Know construction and operating principles of three induction motors	
<b>2</b>	Get detailed acquaintance of construction, operating principles of three phase induction motors.	
<b>3</b>	Find equivalent circuit parameters and performance parameters for single & three phase induction motors.	
<b>4</b>	Know construction and operating principles of Single-Phase induction motors	
<b>5</b>	Get detailed acquaintance of construction, operating principles of single-phase induction motor.	
Course no.	Course code	Course name
PCC2	BTEEC303	Electrical and Electronics Measurement
<b>COs</b>	After the successful completion of this course student will be able to:	
<b>1</b>	Appreciate the fundamentals of Electrical instruments.	
<b>2</b>	Represent signals in frequency meter	
<b>3</b>	Elucidate the circuit diagram of different type instruments	
<b>4</b>	Use power, Frequency, Resistance meter	
Course no.	Course code	Course name
HSSMC	BTEEC304	Basic Human Rights
<b>COs</b>	After the successful completion of this course student will be able to:	
<b>1</b>	Understand fundamentals of human rights	
<b>2</b>	Use Laws and regulation of human rights	
<b>3</b>	Know about Institutions of human rights	
Course no.	Course code	Course name
ESC	BTES305	Engg. Material Sci
<b>COs</b>	After the successful completion of this course student will be able to:	
<b>1</b>	Get acquainted with semiconducting materials, metals and Superconductors and its various applications.	
<b>2</b>	Apply electromagnetic field theory in electromagnetic energy conversion devices.	
<b>3</b>	Analyze electromagnetic wave propagation and Poynting vector.	



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SE-I (DBATU) Laboratory Courses			
Course no.		Course code	Course name
LC		BTEEL306	Electrical Machines-I Lab
COs	After the successful completion of this course student will be able to:		
1	Perform OC & SC Test on Single phase transformer		
2	Find the circuit parameters of transformer and draw its characteristic		
3	Elucidate the Three phase induction motor, construction & circuit diagrams		
4	Control the speed of Induction Motor		
5	Understand starting methods of Induction motor		
Course no.		Course code	Course name
LC		BTEEL307	Electrical and Electronics Measurement Lab
COs	After the successful completion of this course student will be able to:		
1	Appreciate the low resistance using kelvin's double		
2	Represent the medium resistance using Wheatstone's bridge		
3	Elucidate the high resistance by loss of charge method		
4	Acquire insulation resistance using Megger		
5	Design various type of indicating instruments		
Course no.		Course code	Course name
Project		BTEEP308	Mini Project-I
COs	After the successful completion of this course student will be able to:		
1	Understand concepts of project management		
2	Develop a project plan.		
3	Understand the project implementation strategy.		
4	Analyze post project affects.		
Course no.		Course code	Course name
Internship		BTES211P	Internship-I Evaluation
COs	After the successful completion of this course student will be able to:		
1	Conceptualize the role and developmental nature of experiential learning.		
2	Develop procedures and policies for experiential learning.		
3	Analyze and develop a right work attitude, self-confidence, interpersonal skills, and ability to work as a team in a real organizational setting.		
SE-II (DBATU) Theory Courses			
Course no.		Course code	Course name
PCC3		BTEEC401	Network Theory
COs	After the successful completion of this course student will be able to:		



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1	Understand various network elements and network topology		
2	Implement various network theorem for problem solving		
3	Analyze circuits in both time domain and frequency domain		
4	Develop skills in field of signal spectra		
5	Analyze two port network functions		
Course no.		Course code	Course name
PCC4		BTEEC402	Power System
COs	After the successful completion of this course student will be able to:		
1	Create models of different types of Generation resources of power plants.		
2	Analysis of line parameter of transmission system and underground cables and the performance of line in the different loading conditions.		
3	Model of different types of transmission lines.		
4	Understand modelling of different types of Insulators and tower and derive and interpret its reliability.		
Course no.		Course code	Course name
PCC5		BTEEC403	Electrical Machine-II
COs	After the successful completion of this course student will be able to:		
1	Appreciate the fundamentals of Electrical Machine		
2	Represent different types D.C Machine		
3	Elucidate the circuit diagram of different types of Synchronous Machines		
4	Invent Types of Synchronous Machine		
5	Design Synchronous Motor		
Course no.		Course code	Course name
BSC		BTBS404	Analog and Digital Electronics
COs	After the successful completion of this course student will be able to:		
1	Differentiate between various electronics components such as diodes, BJTs and FETs.		
2	Understand the applications and design of analogue and digital circuits.		
3	Understand of various types of amplifier circuits.		
4	Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.		
5	Understand the concepts of combinational logic circuits and sequential circuits.		
Course no.		Course code	Course name
PEC1		BTEEPE405(B)	Signals & System
COs	After the successful completion of this course student will be able to:		
1	Classify different types of CT & DT Signals.		
2	Comment on property of the system		





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3	Find the property of LTI Systems		
4	Convert time domain signal to frequency domain signal and comment on system property.		
5	Evaluate discrete time signal using DTFT and Z transform.		
SE-II (DBATU) Laboratory Courses			
Course no.		Course code	Course name
LC		BTEEL406	Network Theory Lab
COs	After the successful completion of this course student will be able to:		
1	Analyze implications of the fundamentals of Ohm's law, Kirchhoff's current and voltage laws		
2	Make practical implementation of the fundamental electrical theorems and modelling of simple electrical systems		
3	Measure accurate voltage, current, power and impedance of any circuit		
4	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts		
Course no.		Course code	Course name
LC		BTEEL407	Power System Lab
COs	After the successful completion of this course student will be able to:		
1	Develop Modelling different types of Generation resources of power plants.		
2	Analyze of line parameter of overhead transmission system and underground cables		
3	Develop Modelling of different types of transmission lines.		
4	Develop Modelling of different types of Insulators and tower and derive and interpret its reliability.		
Course no.		Course code	Course name
LC		BTEEL408	Electrical Machine-II
COs	After the successful completion of this course student will be able to:		
1	Appreciate the fundamentals of Electrical Machine		
2	Represent different types D.C Machine		
3	Elucidate the circuit diagram of different type Synchronous Machine.		
4	Invent Types of Synchronous Machine		
5	Understand Design aspects of Synch. Motor		
Course no.		Course code	Course name
LC		BTEEL409	Analog and Digital Electronics lab
COs	After the successful completion of this course student will be able to:		
1	Introduce components such as diodes, BJTs and FETs.		



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2	Know the applications of analogue and digitalComponents.		
3	Give Understand of various types of amplifier circuits.		
4	Learn basic techniques for the design of digitalcircuits.		
Course no.		Course code	Course name
Internship		BTEEP410	Internship-II
COs	After the successful completion of this course student will be able to:		
1	Demonstrate the application of knowledge and skill sets acquired from thecourse.		
2	Communicate and collaborate effectively and appropriately with different professionals		
3	Exhibit professional ethics by displayingpositive dispositionduring internship		
TE-I (DBATU) Theory Courses			
Course no.		Course code	Course name
PCC4		BTEEC501	Power SystemAnalysis
COs	After the successful completion of this course student will be able to:		
1	Develop the Modelling of Power system, analysis of Load flow in various types of method and itsuse in practically field.		
2	Analyze the swing equation and equal areacriteria in details with several loading condition.		
3	Execute the different types of control methods of Voltage and reactive power in details.		
4	Monitor and control of Power system withSCADA and DAC system. Economy ofpower system.		
Course no.		Course code	Course name
PCC5		BTEEC502	Microprocessor & Microcontroller
COs	After the successful completion of this course student will be able to:		
1	Understand working of 8085microprocessors		
2	Work with microcontroller		
3	Understand instruction sets		
Course no.		Course code	Course name
PCC6		BTEEC503	Power Electronics
COs	After the successful completion of this course student will be able to:		
1	Understand the characteristics of various power electronic semiconductor devices.		
2	Design and analyze power electronic converter circuits.		
3	Evaluate the performance of powerelectronic circuits applied in various applications.		
4	Recognize the critical areas in applicationlevels and derive suitable solutions.		



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Course no.		Course code	Course name
PCC2		BTEEPE504(B)	Power Quality Issues
COs	After the successful completion of this course student will be able to:		
1	Understand various issues affecting power quality,their production, monitoring.		
2	Learn various methods of power qualitymonitoring		
3	Identify the different standards of powerquality		
4	Understand the effects of various power quality phenomenon invarious equipment.		
5	Identify various grounding andearthing problems and solution for same.		
Course no.		Course code	Course name
OEC1		BTEEPE505(B)	Electrical Safety
COs	After the successful completion of this course student will be able to:		
1	Concept of industrial electrical safety		
2	Understand concept of domestic electricalsafety		
3	Get acquainted with electrical safetystandards		
TE-I (DBATU) Laboratory Courses			
Course no.		Course code	Course name
LC		BTEEL507	PSA Lab
COs	After the successful completion of this course student will be able to:		
1	Develop Modelling of Power system, analysis of Load flow in various types of method and itsuse in practically field.		
2	Analyze of swing equation and equal areacriteria in details with several loading condition.		
3	Execute the different types of control methods of Voltage and reactive power in details.		
4	Monitor and control of Power system withSCADA and DAC system.		
5	Understand Economy ofpower system.		
Course no.		Course code	Course name
LC		BTEEC508	Microprocessor & Microcontroller
COs	After the successful completion of this course student will be able to:		
1	Understand working of 8085microprocessors		
2	Work with microcontroller		
3	Understand instruction sets		





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Course no.		Course code	Course name
LC		BTEEL509	PE Lab
COs	After the successful completion of this course student will be able to:		
1	Understand the fundamental principle and components of power electronics.		
2	Identify the various components used in Analog electronics.		
3	Describe the operation of different types of converter circuits.		
4	Recognized the different commutation circuits and gate signal generation techniques		
Course no.		Course code	Course name
Project		BTEEL510	Mini Project Lab
COs	After the successful completion of this course student will be able to:		
1	Understand concepts of project management.		
2	Develop a project plan.		
3	Understand the project implementation strategy.		
4	Analyze post project affects.		
	TE-II (DBATU) Theory Courses		
Course no.		Course code	Course name
PCC7		BTEEC601	Switch Gear Protection
COs	After the successful completion of this course student will be able to:		
1	Interpret the significance of different types of faults occurs in power system.		
2	Distinguish and analyze various relay and parameters associated.		
3	Analyze, test and use of various circuit breakers.		
4	Demonstrate and examine different protection scheme.		
5	Examine and test power system for proper protection of system faults		
Course no.		Course code	Course name
PCC8		BTEEC602	Electrical Machine Design
COs	After the successful completion of this course student will be able to:		
1	Interpret the significance of fundamental aspect of Electrical Machine Design, modern trends in design.		
2	Design and formulating the dc machines.		
3	Design, formulating, and constructing of transformers.		
4	Design, formulating, and constructing of 3- phase induction motor.		
5	Design a 3- phase synchronous electrical machines and Computer Aided Design (CAD).		
Course no.		Course code	Course name
PCC9		BTEEC603	Control System Engineering
COs	After the successful completion of this course student will be able to:		
1	Obtain models of dynamic systems in the form of transfer function and state space		



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	model.	
2	Work with control techniques on various controllers.	
3	Analyze the system response in both time domain and frequency domain	
4	Design various controllers in both time domain and frequency domain	
5	Analyze different types of plots and find stability through them.	
<b>Course no.</b>	<b>Course code</b>	<b>Course name</b>
PEC3	BTEEPE604(C)	Mod. Sim. & Con. of ED
<b>COs</b>	After the successful completion of this course student will be able to:	
1	Solve numerical on starting, speed control and braking and analyses the construction, characteristics, and application of D.C.	
2	Understand the working of various phase-controlled converters used in DC Drives	
3	Understand the working of various phase-controlled converters used in AC Drives	
4	Acquire the knowledge of rotor side control such as Slip power recovery static Scherbius Drive, Static Kramer Drive.	
5	Understand and analyses various phase converters used in synchronous	
<b>Course no.</b>	<b>Course code</b>	<b>Course name</b>
OEC2	BTEEP605(B)	Power Plan Engineering
<b>COs</b>	After the successful completion of this course student will be able to:	
1	Understand the working principle of different power plants	
2	Review basic components of power system, energy sources.	
3	Discuss and analyze the mathematical and working principles of different electrical power plants.	
4	Understand principle of construction and operation of different conventional power plants.	
<b>TE-II (DBATU) Laboratory Courses</b>		
<b>Course no.</b>	<b>Course code</b>	<b>Course name</b>
LC	BTEEL606	SGP Lab
<b>COs</b>	After the successful completion of this course student will be able to:	
1	Analyze various abnormal conditions that could occur in power system.	
2	Distinguish and analyse various relay and parameters associated.	
3	Examine various conventional relays, their design, and latest developments.	
4	Test various relays for different characteristics and compare the performance characteristics provided by manufacturers	
<b>Course no.</b>	<b>Course code</b>	<b>Course name</b>
LC	BTEEL607	Machine Design Lab
<b>COs</b>	After the successful completion of this course student will be able to:	
1	Interpret the significance of analysis, synthesis and hybrid methods of computer	



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	aided design of small a.c. electrical machines and advantages of computer aided design.		
2	Analyze and design the 3-phase induction motor.		
3	Analyze and design the 3-phase synchronous electrical machines.		
4	Various formulae for calculations for small a.c. electrical machines.		
5	Analyze various design phenomena related to a.c. electrical machines.		
Course no.		Course code	Course name
LC		BTEEL608	Control System Lab
COs	After the successful completion of this course student will be able to:		
1	Write M-Codes for different forms of transfer function of a given system		
2	Analyse the system in time, frequency, and S-Domain		
3	Comment on stability of system through its Nyquist and Bode plot		
Course no.		Course code	Course name
Seminar		BTEEM609	Seminar
COs	After the successful completion of this course student will be able to:		
1	Deliver a technical note in stage.		
2	Ensure effective information transfer over a group of students.		
3	Demonstrate the model.		
Course no.		Course code	Course name
Internship		BTEEL610	Internship-III
COs	After the successful completion of this course student will be able to:		
1	Demonstrate the application of knowledge and skill sets acquired from the course.		
2	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means.		
3	Exhibit professional ethics by displaying positive disposition during internship		
BE-I (DBATU) Theory Courses			
Course no.		Course code	Course name
PCC11		BTEEC702	Power System Operation & Control
COs	After the successful completion of this course student will be able to:		
1	Understand the fundamental concepts of power system.		
2	Obtain mathematical model of Synchronous machine, excitation, and speed governing system.		
3	Analyze the transient stability of power system.		
4	Understand the economic operation of power system.		
5	Explain various techniques of reactive power and voltage Control		
Course no.		Course code	Course name



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PCC10		BTEEC701	High Voltage Engineering
<b>COs</b>	After the successful completion of this course student will be able to:		
<b>1</b>	Learn conduction and breakdown in gases, liquids, and solids.		
<b>2</b>	Understand the methods and measurement of high voltage generation and measurement.		
<b>3</b>	Explain the lightning phenomenon and insulation co-ordination.		
<b>4</b>	Understand different non-destructive testing and standards in HV.		
<b>Course no.</b>		<b>Course code</b>	<b>Course name</b>
OEC3		BTEEC704(G)	Mechatronics
<b>COs</b>	After the successful completion of this course student will be able to:		
<b>1</b>	Able to explain mechatronics approach.		
<b>2</b>	Outline appropriate sensors and transducers for engineering applications.		
<b>3</b>	Outline appropriate actuators for engineering applications.		
<b>4</b>	Able to write simple microprocessor program.		
<b>5</b>	Able to develop PLC ladder program.		
<b>Course no.</b>		<b>Course code</b>	<b>Course name</b>
OEC4		BTEEE704(H)	Testing, Maintenance and Commissioning of Electrical Equipment
<b>COs</b>	After the successful completion of this course student will be able to:		
<b>1</b>	Evaluate and select appropriate condition monitoring methods based on equipment types and operational requirements.		
<b>2</b>	Identify and apply various condition monitoring techniques and Interpret condition monitoring data to assess the health and possible faults in transformers.		
<b>3</b>	Analyze condition monitoring data to diagnose motor faults and recommend appropriate actions.		
<b>4</b>	Understand safety protocols and precautions associated with electrical testing.		
<b>5</b>	Perform specialized tests to identify faults and evaluate the effectiveness of grounding systems.		
<b>Course no.</b>		<b>Course code</b>	<b>Course name</b>
PEC4		BTEEE703(F))	Energy Audit & Conservation
<b>COs</b>	After the successful completion of this course student will be able to:		
<b>1</b>	Understand the basic process involved in the energy audit and the terminologies associated in the process.		
<b>2</b>	Develop audit reports of any firm including large- and small-scale industries, residential and commercial establishments.		
<b>3</b>	Select and comment on the appropriate method for the planning and monitoring of		



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	any energy conservation project.		
BE-I (DBATU) Laboratory Courses			
Course no.		Course code	Course name
LC		BTEEL707	HVE Lab
COs	After the successful completion of this course student will be able to:		
1	Acquire the knowledge of necessity and methods of testing various apparatus in power system.		
2	Acquire the Knowledge of various circuits for generating high voltages for testing various apparatus and their measurement method.		
3	Acquire the Knowledge of the various reasons of overvoltage in power system and protection methods against them.		
4	Acquire the Knowledge of insulation coordination and design of insulation levels of various parts of power system		
Course no.		Course code	Course name
Internship		BTEEP609	Internship-III Evaluation
COs	After the successful completion of this course student will be able to:		
1	Demonstrate the application of knowledge and skill sets acquired from the course.		
2	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means.		
3	Exhibit professional ethics by displaying positive disposition during internship		
Course no.		Course code	Course name
Project		BTEEM708	Project Part-I
COs	After the successful completion of this course student will be able to:		
1	Understand concepts of project management		
2	Develop a project plan.		
3	Understand the project implementation strategy.		
4	Analyze post project affects.		
BE-II (DBATU) Laboratory Courses			
Course no.		Course code	Course name
Project/Internship		BTEEP802	Inhouse Project Part-II /Internship in Industry.
COs	After the successful completion of this course student will be able to:		
1	Apply concepts of project management.		
2	Develop a project model.		
3	Understand project modelling and working.		
4	Analyze post project operating stages.		
BE-II MOOCs Courses			





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Course no.		Course name
1		Power Management Integrated Circuits
COs	After the successful completion of this course student will be able to:	
1	Understand the principles of power management	
2	Learn about different types of power management ICs	
3	Learn the coordination of Power ICs	
Course no.		Course name
2		DC Power Transmission Systems
COs	After the successful completion of this course student will be able to:	
1	Understand the principles of DC power transmission	
2	Analyze and design DC power transmission systems	
3	Evaluate system performance	
Course no.		Course name
3		High Power Multilevel Converters
COs	After the successful completion of this course student will be able to:	
1	Understand the principles and operation of multilevel	
2	Analyze the advantages and challenges of multilevel converters:	
3	Learn about modulation strategies for multilevel converters	
4	Understand the control techniques for multilevel converters	
5	Explore applications of high-power multilevel converters	
Course no.		Course name
4		Fuzzy Sets, Logic, and Systems & Applications
COs	After the successful completion of this course student will be able to:	
1	Gain a comprehensive understanding of fuzzy sets and fuzzy logic.	
2	Use fuzzy logic systems and their applications.	
3	Learn about various applications of fuzzy systems in different domains.	
Course no.		Course name
5		The Joy of Computing using Python
COs	After the successful completion of this course student will be able to:	
1	Learn the basic principles of programming using Python.	
2	Emphasize problem-solving techniques and strategies using Python.	
3	Practice coding in Python through hands-on exercises.	
4	Understand computational thinking involves problem-solving and analytical skills essential in the digital era	
Course no.		Course name
6		Introduction to Industry 4.0 and Industrial Internet of Things
COs	After the successful completion of this course student will be able to:	



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1	Gain a comprehensive understanding of the concept of Industry 4.0
2	Understand concept of IIoT and its role in industries.
3	Explore real-world applications of IIoT across various industries.
4	Examine how IIoT is reshaping business models and operations in various industries.
<b>Course no.</b>	<b>Course name</b>
7	Entrepreneurship Essentials
<b>COs</b>	After the successful completion of this course student will be able to:
1	Cultivate an entrepreneurial mindset among students.
2	Gain a understanding of the entrepreneurial process.
3	Develop essential business skills.
4	Identify and evaluate potential business opportunities



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## Department of Electrical Engineering

### 2.6.1.2 Dissemination of POs and COs

The Program Outcomes & Course Outcomes for the courses offered by the Department is stated and is disseminated through following way:

Sr.No.	Evidence Documents	Page No.
2.6.1.2.1	Website	17
2.6.1.2.2	Department Notice Board	17
2.6.1.2.3	Orientation Sessions	18-19
2.6.1.2.4	Laboratory Manuals	20
2.6.1.2.5	Question Papers	21-23



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### 2.6.1.2.1 Website

Website Link
<a href="http://www.orchidengg.ac.in.ac.in/e&amp;tc.php">http://www.orchidengg.ac.in.ac.in/e&amp;tc.php</a>

### 2.6.1.2.2 Department Notice Board

Notice Board





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### 2.6.1.2.3 Orientation Sessions

#### Class Coordinator Orientation Report

A.Y. 2021-22 SE-II



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#### (Electrical Engineering Department)

#### Class Coordinator Orientation Report

**A.Y. 2021-22 (Sem-II)**

**Class- SE (Electrical)**

On 14-03-2022, Class Coordinator orientation program was conducted in TE (Electrical class). This orientation program was conducted by Prof. A. J. Mehta (CC, TE-Electrical). Total 60 number of students were presented in the class and following topics were discussed:

- Course curriculum, Course Objectives, PEOs, POs and scheme of 2<sup>nd</sup> year Electrical.
- Selection of elective subjects.
- 2<sup>nd</sup> year Time table
- 2<sup>nd</sup> year faculty members
- Important dates (End-Sem & Mid-Sem Examinations, Theory & Practical classes).
- No. of actual working days in this semester.

Attendance of students is attached herein.







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**(Electrical Engineering Department)**  
**Class Coordinator Orientation (14.03.2022)**  
**A.Y. 2021-22 (Sem-II) Class- SE (Electrical)**

Roll No.	Student Name	Sign
1	RADHIE SUMIT BASAVAI	
2	RADHIA MURDEEN SATHE	
3	RANJANI SAKUMAR SURE	
4	RANJODH PANKAJ SINGH	
5	RASATAPAGARE EDGAR RAJENDRA	
6	RAHATKAR VIKAS VIKAS	
7	RAHATKAR VIKAS VIKAS	
8	RAHATKAR VIKAS VIKAS	
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17	RAHATKAR VIKAS VIKAS	
18	RAHATKAR VIKAS VIKAS	
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32	RAHATKAR VIKAS VIKAS	
33	RAHATKAR VIKAS VIKAS	

**N. K. Orchid College of Engg. & Technology, Solapur.**  
**Department of Electrical Engineering**

Date: \_\_\_\_\_

Roll No.	Student Name	Sign
34	RASHIDAGAR ONKAR SURE	
35	RASHIDAGAR ONKAR SURE	
36	RASHIDAGAR ONKAR SURE	
37	RASHIDAGAR ONKAR SURE	
38	RASHIDAGAR ONKAR SURE	
39	RASHIDAGAR ONKAR SURE	
40	RASHIDAGAR ONKAR SURE	
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66	RASHIDAGAR ONKAR SURE	



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### 2.6.1.2.4 Laboratory Manuals

**Department of Electrical Engineering**  
**A.Y. 2021-22 (BE-I)**  
**Lab Course- Electrical Drives Lab (BTEEL708)**  
**Lab Manual**

**Department of Electrical Engineering**  
**A.Y. 2021-22 (BE-I)**  
**Lab Manual for Lab Course- Electrical Drives Lab (BTEEL708)**

**Course Outcomes (COs): -**

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

- CO1.** Get acquainted comprehensive understanding of the basic principles, operation, and control techniques of electrical drives.
- CO2.** Identify and differentiate between various types of electrical drives, such as DC drives, AC drives, servo drives, and stepper motor drives.
- CO3.** Gain hands-on experience with different components of drive systems, including motors, motor controllers, power electronic devices, sensors, and feedback mechanisms.
- CO4.** Analyse and troubleshoot drive system problems.
- CO5.** Design and implement control strategies for different types of drives, considering factors like speed control, torque control, and position control.
- CO6.** Gain proficiency in using software tools for drive system analysis, simulation, and control, such as MATLAB/Simulink or other relevant software packages.

### INDEX

S. No.	Title	Page No.	Date		Grade	Sign
			Expt. Performed	Expt. Submitted		
1	To analyze the operation and control of four-quadrant operation for Permanent Magnet DC Motor.					
2	To Control the speed of Induction motor using V/F control method.					
3	To analyze the operation and control of single-phase half and fully controlled converter (Microcontroller based).					
4	To analyze the operation & control of Three-phase half and fully controlled converter (Microcontroller based).					
5	To analyze the operation and control of 3-Phase Cycloconverter.					
6	Three phase induction motor speed controllers using SPR scheme.					



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## 2.6.1.2.5 Question Papers

### CA Question Paper

**Department of Electrical Engineering**

**A. Y. 2021-2022**

**Course Name: Power Electronics**

**Class: T.E.**

**Semester: -II**

**CA-I**

**Course: B.Tech. (Electrical)**

**Subject Code: BTEEC603**

**Subject Name: Power Electronics**

**Duration: - 1 Hr.**

**Max Marks: 20**

**Date: - 16/04/2022**

**Instructions to the Students:**

1. Question paper is divided into two sections.
2. Section A contains the multiple-choice questions.
3. Section B contains the descriptive type questions.
4. All questions carry equal marks.

**Course outcomes:**

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

- a. To analyze and compare the construction, principle of operation and characteristics of various power semiconductor devices.
- b. To understand the switching behavior and commutation schemes for major power semiconductor devices.
- c. To design and analyze the controlled and uncontrolled rectifiers circuits with different loading scenario.
- d. To evaluate and control the performance of AC-AC converters.
- e. To differentiate between different DC-DC converters and control their operation.
- f. To classify the different modes of operation and control of DC-AC converters

**Section-A (Multiple Choice Questions)**

	<b>Q.1 Choose the correct option for following multiple choice questions.</b>	(Level/CO)	(1×05 =05)
1	<b>An ideal switch is</b> a. Lossless b. Carry current in any direction when it is on c. Does not carry any current in any direction when it is off d. All of these	Understand /CO1	

2	<b>For the power semiconductor devices IGBT, MOSFET, Diode and Thyristor, one of the following statements is true.</b> a. All the four are majority carrier devices b. All are minority carrier devices c. IGBT and MOSFET are majority carrier devices whereas Diode and Thyristor are minority carrier devices d. MOSFET is majority carrier device, whereas IGBT, Diode, Thyristor are minority carrier devices.	Remember/CO1	
3	<b>When UJT is used for triggering an SCR the waveshape of the signal obtained from UJT circuit is:</b> a. Sinusoidal                      b. Trapezoidal c. Rectangular                      d. Sawtooth	Analyse/CO2	
4	<b>Which one of the following is used in domestic fan speed control circuit?</b> a. Diode                              b. Diac c. Triac                              d. SCR	Analyse/CO2	
5	<b>Capacitance of a reverse biased junction of a thyristor is 20pF. The charging current of this thyristor is 4 mA. The limiting value of dv/dt in V/micro-sec is:</b> a. 500                              b.100                              c. 150                              d.200	Evaluate/CO1	

**Section-B (Descriptive type questions)**

**Note: - Attempt any 3 questions out of following.**

1	Enlist the various power semiconductor devices with their ratings, application and symbols.	Remember/CO1	
2	Explain and plot the static and switching characteristic of SCR.	Create/CO1	
3	What are different commutation schemes in thyristor. Explain any one of them in detail.	Remember/CO2	
4	Explain the reverse recovery process in Thyristor and describe the condition for ideal commutation in thyristors.	Understand/CO2	
5	Differentiate between Power BJT, Power MOSFET and SCR.	Understand/CO1	



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**Mid Sem Question Paper**

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**  
**Mid Semester Examination – May 2022**

**Course:** B. Tech in Electrical Engineering

**Sem:** VI

**Subject Code:** BTEEC603

**Subject Name:** Power Electronics

**Max Marks:** 20

**Date:-** 15-05-2022

**Duration:-** 1.30 Hr.

**Instructions to the Students:**

2. Assume data, if necessary.
3. All questions are compulsory.

**Course outcomes:**

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

- a. To analyze and compare the construction, principle of operation and characteristics of various power semiconductor devices.
- b. To understand the switching behavior and commutation schemes for major power semiconductor devices.
- c. To design and analyze the controlled and uncontrolled rectifiers circuits with different loading scenario.
- d. To evaluate and control the performance of AC-AC convertors.
- e. To differentiate between different DC-DC convertors and control their operation.
- f. To classify the different modes of operation and control of DC-AC convertors

**Q. 1 Choose the Correct Answer**

(Level/CO) (1×06=06)

- 1) Ripple frequency in output voltage of 6-pulse 50Hz convertor is:

Evaluate/  
CO3

- (a) 155 Hz (b) 300 Hz (c) 600 Hz (d) 900 Hz

- 2)  $(V_m/2\pi)(1 + \cos \alpha)$  is the average value of output voltage of;

Remember/  
CO3

- (a) Single-Phase Half wave controlled rectifier  
(b) Single-phase half wave diode rectifier  
(c) Single-Phase full wave controlled rectifier  
(d) Single-phase full wave diode rectifier

- 3) Harmonics in the convertors can be eliminated by connecting:

Understand/  
CO3

- (a) Freewheeling diode (b) Filter  
(c) Reactive support (d) Inductor

- 4) Figure shown below represents the circuit of:

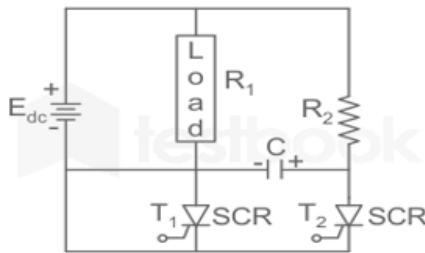
Remember/  
CO3





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- (a) Class A Commutation
- (a) Class C Commutation
- (a) Class D Commutation
- (a) Class B Commutation

- 5) Peak Inverse Voltage across a non-conducting diode of a full wave center tap secondary diode rectifier is: Apply/ CO3
- (a)  $V_m$  (b)  $2V_m$  (c)  $V_m/2$  (d)  $3V_m$
- 6) Power factor of the convertor can be increased by connecting Apply/ CO2
- (a) Freewheeling diode (b) Reactive support
- (c) Filter (d) a & b

**Q.2 Attempt Any Two**

(3×2=06)

- (A) Compare between C and L filters. Analyze/ CO3
- (B) On following parameters compare the performance of 1-pulse and 2-pulse uncontrolled AC-DC convertors: Evaluate/ CO2
- Rectification efficiency, Crest factor, Ripple factor, DC output voltage
- (C) The output voltage ripple frequency of single-phase 50 Hz controlled rectifier is 100 Hz. Draw the circuit diagram of such a rectifier and derive the expression for RMS value of output voltage of rectifier. Evaluate/ CO3
- (D) Enlist the application of freewheeling diode. Remember / CO3

**Q.3 Attempt Any One**

(8×1=08)

- (A) Explain in detail the working of three phase diode bridge rectifier with R load and derive the expressions for average and RMS value of output voltage. Understand/ CO3
- (B) In which type of thyristor commutation scheme, a load current carrying thyristor is commutated by transferring its current to another incoming thyristor. Explain the working of such type of commutation in detail Understand/ CO2

\*\*\* End \*\*\*