

Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE ODD SEMESTER 2023-2024

Course Syllabi with CO's

Faculty Name: Sowmyashree K S				Academic Year: 2023-2024			
Department: Electrical & Electronics Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BEE304	TRANSFORMERS AND GENERATORS	Core	Engineering Physics, Basic Electrical Engineering	3			40
Objectives	1. To understand the construction, working and various tests of single phase Transformer. 2. To understand the construction, working and parallel operation of three phase Transformer. 3. To understand the construction, working and analysis of Synchronous Generator. 4. To understand the construction, working of solar and wind power generators.						
Topics Covered as per Syllabus							
Module-1 Single-phase Transformers: Necessity of transformer, principle of operation, Types and construction, EMF equation, equivalent circuit, Operation of practical transformer under no-load and on-load with phasor diagrams. Losses and methods of reducing losses, efficiency, and condition for maximum efficiency. Polarity test, Sumpner’s test. Open circuit and Short circuit tests, calculation of equivalent circuit parameters. Predetermination of efficiency, voltage regulation, and its significance. Numerical. 8 Hours							
Module-2 Three-phase Transformers: Introduction, Constructional features of three-phase transformers. Transformer connection for three-phase operation– star/star, delta/delta and star/delta, comparative features. Labeling of three-phase transformer terminals. Parallel Operation of Transformers: Necessity of Parallel operation, conditions for parallel operation– Single phase and three phases. Load sharing in case of similar and dissimilar transformers. Numerical. Autotransformers and Tap changing transformers: Introduction to autotransformer-copper economy, equivalent circuit, no load, and on-load tap changing transformers. Numerical. 8 Hours							
Module-3 Synchronous Generators: Construction, working, Armature windings, winding factors, EMF equation. Harmonics–causes, reduction, and elimination. Armature reaction, Synchronous reactance, Equivalent circuit. Synchronous Generators Analysis: Open circuit and short circuit characteristics, Assessment of reactance-short circuit ratio, Alternator on load. Voltage regulation. Voltage regulation by EMF and MMF methods. Excitation control for constant terminal voltage. Numerical. 8 Hours							
Module-4 Synchronous Generators (Salient Pole): Effects of saliency, two-reaction theory, Parallel operation of generators and load sharing. Methods of Synchronization, Synchronizing power. Performance of Synchronous Generators: Power angle characteristic (salient and non-salient pole), power angle diagram, reluctance power, Capability curve for large turbo generators. Hunting and damper windings. Numerical. 8 Hours							

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Module-5 Wind power Generator –Basic components of wind energy conversion system, types of wind generators- Horizontal and vertical axis. Advantages and disadvantages of WECS. Solar power generator - principle of solar cell, Basic Solar Photo voltaic, system for power generation, Advantages and disadvantages.		8 Hours
List of Text Books		
TEXT BOOKS: 1. Electric Machines , D. P. Kothari, et al, 4th Edition, 2011. 2. Electric Machines , Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013. 3. Non-conventional Energy sources by G D Rai		
List of Reference Books		
1. Electric Machines , Mulukuntla S. Sarma, at el, Cengage, 1st Edition, 2009. 2. Electrical Machines, Drives and Power systems , Theodore Wildi, Pearson, 6th Edition, 2014. 3. Principals of Electrical Machines , V.K Mehta, Rohit Mehta, S Chand, 2nd edition, 2009		
List of URLs, Textbooks, Notes, Multimedia Content, etc		
1. www.nptel.ac.in		
Course Outcomes	At the end of the course, the student will be able to: 1. Explain the construction and working of a single-phase Transformer and also analyse the performance of a single-phase Transformer by various tests. (L3) . 2. Explain the construction, and working of three-phase transformer and autotransformer. Evaluate the parallel operation of the transformer. (L2) . 3. Analyze the regulation of the Synchronous Generator by EMF and MMF, Methods and explain the construction and working principle of the Synchronous Generator (L3) . 4. Analyze the performance of the salient pole Synchronous Generators on infinite bus and parallel operation (L3) . 5. Explain the construction and working of solar and wind power generators. (L2) .	
Internal Assessment Marks: 50		

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	BEE304	TITLE: Transformers and Generators						Faculty Name:	Prof. Sowmyashree K S			
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	3	-	-	-	-	-	-	-	-	-	3
CO-2	3	3	-	-	-	-	-	-	-	-	-	3
CO-3	3	3	-	-	-	-	-	-	-	-	-	3
CO-4	3	3	-	-	-	-	-	-	-	-	-	3
CO-5	3	3	-	-	-	3	3	-	-	-	-	3

Note: 3= Strong Contribution 2 = Average Contribution 1 = Weak Contribution '-' = No Contribution

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The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code:	BEE304	TITLE: Transformers and Generators	Faculty Name:	Sowmyashree K S
List of Course Outcomes	Program Specific Outcomes			
	PSO1	PSO2		
CO-1	-	3		
CO-2	-	3		
CO-3	-	2		
CO-4	-	2		
CO-5	-	2		

Note: 3= Strong Contribution 2 = Average Contribution 1 = Weak Contribution '-' = No Contribution