

25MEET401	ELECTRIC POWER SUPPLY AND DISTRIBUTION SYSTEMS	Category	L	T	P	R	Credit	Year of Introduction
		VAC	4	0	0	0	4	2025

Preamble: This course provides fundamental understanding of electric power supply and distribution systems, including generation, transmission, distribution, and modern power system technologies.

Prerequisite: IEE104 Introduction to Electrical & Electronics Engineering.

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

CO	Course Outcomes	Knowledge Level
CO1	Explain the types, components, and characteristics of electrical power systems.	K2 Understand
CO2	Apply symmetrical components, load flow, and fault analysis techniques to analyze faults and harmonic effects in power systems.	K3 Apply
CO3	Apply microgrid architecture, control, protection, and stability concepts to analyze microgrid operation and grid integration.	K3 Apply
CO4	Explain energy storage and smart grid concepts, and apply basic integration and automation principles in modern power systems.	K2 Understand

Mapping of course outcomes with program outcomes and program specific outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	-	-	-	-	2	-	-	-	-	2	1
CO2	3	3	-	2	-	-	-	-	-	-	-	3	2
CO3	2	3	2	2	-	-	2	-	-	-	-	3	3
CO4	2	2	1	1	-	-	3	-	-	-	-	2	2
Avg	2.5	2.25	1.5	1.66	-	-	2.33	-	-	-	-	2.5	2

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*	-	-	-	-	*
CO2	*	*	*	*	-	-	-	*	-
CO3	*	*	*	*	*	-	-	*	*
CO4	*	*	*	*	*	-	-	*	*

Wks Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
*	*	*	*	*	-	-	*	*

Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	40	60	2.5 Hours

Continuous Internal Evaluation Pattern:

Attendance : 5 marks
Continuous Assessment Test : 20 marks
Continuous Assessment Assignment: 15 marks

SYLLABUS

Module 1 (15 Hours)

Types of electrical power systems, components of power systems, power system characteristics. Electrical power generation methods and technologies: Conventional power generation, renewable energy sources (solar, wind, geothermal). AC/DC transmission and distribution systems: Advantages and disadvantages of AC and DC transmission, high voltage AC and DC transmission, sub-transmission, and distribution systems

Module 2 (12 Hours)

Symmetrical components, sequence impedance, fault analysis, symmetrical fault analysis, unsymmetrical fault analysis. Load flow equations. Harmonic analysis: Harmonic sources, harmonics in power systems, power system harmonics standards, harmonic mitigation techniques.

Module 3 (14 Hours)

Types of microgrids and their applications: Types of microgrids, microgrid topologies, microgrid control and protection, microgrid planning and design. Control and protection of microgrids: Microgrid control, microgrid protection, microgrid stability, microgrid reliability. Integration of

microgrids with the grid: Integration of microgrids with the main grid, microgrid interconnection, microgrid power quality, microgrid market integration.

Module 4 (15 Hours)

Energy storage systems, applications of energy storage systems, energy storage system design and analysis, energy storage system control and management. Smart grid concepts, communication technologies for the smart grid, smart grid applications, smart grid security. Future trends in electrical power supply systems, energy systems integration, energy systems optimization, energy systems automation.

Text Books:

1. Ned Mohan. (2012). *Electric power systems: A first course*. Wiley India.
2. J. Duncan Glover., Thomas Overbye., & Mulukutla S. Sarma. (2008). *Power system analysis and design* (4th ed.). Cengage Learning.
3. V. K. Mehta., & Rohit Mehta. (2005). *Principles of electric power systems* (3rd ed.). S. Chand Publishing.

Reference Books:

1. Ned Mohan. (2012). *Electric power systems: A first course*. John Wiley & Sons.
2. F. C. Chan. (1994). *Electric power distribution systems* (3rd ed.). McGraw-Hill.
3. K. R. Padiyar. (2004). *Power system dynamics: Stability and control*. Anshan Ltd..
4. Turan Gonen. (2014). *Electric power distribution engineering* (3rd ed.). CRC Press.
5. James Momoh. (2012). *Smart grid: Fundamentals of design and analysis*. Wiley-IEEE Press.

END SEMESTER EXAMINATION – MODEL QUESTION PAPER (STC 2025 SCHEME)

Course Code	25MEET401
Course Name	ELECTRIC POWER SUPPLY AND DISTRIBUTION SYSTEMS
Max. Marks: 60	Duration: 2.5 Hours

Part A

(Answer all questions. Each question carries 3 marks)

Qn No.	Question	Marks	CO	BL
1.	Explain the components of an electrical power system and their functions.	3	1	L2
2.	Describe the advantages and disadvantages of AC and DC transmission systems.	3	1	L2
3.	A three-phase system experiences a line-to-ground fault. Determine the sequence networks required for fault analysis.	3	2	L3
4.	A power system is affected by harmonics generated by nonlinear loads. Select suitable harmonic mitigation techniques for improving power quality.	3	2	L3
5.	Select a suitable microgrid topology for supplying power to a remote village and justify your choice.	3	3	L3

6.	Determine the importance of microgrid protection and stability in grid-connected operation.	3	3	L3
7.	Explain the applications of energy storage systems in modern power systems.	3	4	L2
8.	Describe the communication technologies employed in smart grid systems.	3	4	L2
Part B (Answer any one full question from each Module. Each carry 9 marks)				
Module I				
Qn No.	Question	Marks	CO	BL
9.a.	Explain the types of electrical power systems and their characteristics.	5	1	L2
9.b.	Describe conventional and renewable methods of electrical power generation.	4	1	L2
OR				
10.a.	Explain the various components of an electrical power system and their functions.	5	1	L2
10.b.	Describe high-voltage AC and DC transmission systems and their applications.	4	1	L2
Module II				
Qn No.	Question	Marks	CO	BL
11.a.	Apply symmetrical components to develop the sequence networks for unsymmetrical fault analysis.	5	2	L3
11.b.	Determine the significance of sequence impedance in fault studies.	4	2	L3
OR				
12.a.	Develop the load flow equations and explain their role in power system analysis.	4	2	L3
12.b.	Select suitable harmonic mitigation techniques for reducing harmonic distortion in power systems and justify your selection.	5	2	L3
Module III				
Qn No.	Question	Marks	CO	BL
13. a.	Classify the different types of micro grids and select suitable applications for each.	4	3	L3
13. b.	Determine the factors affecting micro grid planning and design.	5	3	L3
OR				
14. a.	Apply micro grid control and protection concepts to analyze micro grid stability and reliability.	5	3	L3

14. b.	Determine the issues associated with the integration of micro grids with the main grid.	4	3	L3
Module IV				
Qn No.	Question	Marks	CO	BL
15.a.	Explain the design and control requirements of energy storage systems.	6	4	L2
15. b.	Describe the applications of energy storage systems in power systems.	3	4	L2
OR				
16. a.	Explain the concepts and applications of smart grids with suitable examples.	5	4	L2
16. b.	Describe future trends in electrical power supply systems, emphasizing energy systems integration and automation.	4	4	L2
