

Q.6

Attempt any two:

- i. Discuss the economic justification for capacitor allocation in improving power factor. Provide a systematic approach for determining the best location for capacitors.
- ii. Describe the role of voltage control equipment in distribution systems and analyze the effect of series capacitors on the system.
- iii. Explain the effect of shunt capacitor on power factor correction.

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*Total No. of Questions: 6**Total No. of Printed Pages: 4***Enrollment No.....****Faculty of Engineering****End Sem Examination Dec 2024****EE3EL17 Electrical Power Distribution**

Programme: B.Tech.

Branch/Specialisation: EE

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Marks	BL	PO	CO	PSO
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- Q.1 i. What is the primary purpose of a distribution system?
 (a) Power generation
 (b) Power transmission
 (c) Power distribution to consumers
 (d) None of these
- ii. The load factor is defined as the ratio of-
 (a) Average load to maximum load
 (b) Maximum load to average load
 (c) Total energy consumed to energy supplied
 (d) None of these
- iii. Which of the following is typically a characteristic of commercial loads?
 (a) Constant usage throughout the day
 (b) High startup currents
 (c) Large energy requirements during peak hours
 (d) None of these
- iv. A coincidence factor less than 1 indicates that-
 (a) Loads are always at maximum together
 (b) Loads operate at maximum simultaneously only part of the time
 (c) Loads are independent of each other
 (d) None of these

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v.	The major design considerations for distribution feeders include-	1 01 01 01 01	ii. Discuss the classification of loads into residential, commercial, agricultural, and industrial categories, and provide examples of their characteristics.
	(a) Voltage drop and load distribution		OR iii. Describe the relationship between the load factor and loss factor in distribution systems, along with its implications for system design.
	(b) Capital investment only		
	(c) Aesthetics of the distribution system		
	(d) None of these		
vi.	For a radial feeder, the primary purpose is to-	1 01 01 01 01	Q.3 i. Explain the basic principles behind the location and rating of distribution substations.
	(a) Provide redundancy in supply		ii. Discuss the benefits and methods of the optimal location of substations in distribution systems.
	(b) Distribute power from a single source		OR iii. What are the design considerations for radial and loop types of primary feeders? Discuss their advantages and disadvantages.
	(c) Supply power to multiple sources		
	(d) None of these		
vii.	The primary function of protective devices in a distribution system is to-	1 01 01 01 01	Q.4 i. Derive the expression for voltage drop in uniformly distributed loads and provide a numerical example.
	(a) Regulate voltage		ii. Explain how to calculate power losses in distribution lines for both uniformly and non-uniformly distributed loads. Provide relevant formulas and examples.
	(b) Maintain power factor		OR iii. Discuss the significance of three-phase balanced primary lines in the context of voltage drop and power loss calculations.
	(c) Protect equipment from faults		
	(d) Increase load capacity		
viii.	Which of the following is a common fault in distribution systems?	1 01 01 01 01	Q.5 i. Briefly describe the objectives of distribution system protection and common types of faults it experiences.
	(a) Phase shift		ii. Explain the working principle of circuit reclosures and line sectionalizers. Also write its importance in a distribution system.
	(b) Overloading		OR iii. Discuss various types of coordinated operation of protective devices, including the role of residual current circuit breaker.
	(c) Ground fault		
	(d) All of these		
ix.	Capacitive compensation improves the power factor primarily by-	1 01 01 01 01	
	(a) Decreasing the load current		
	(b) Canceling out inductive reactance		
	(c) Reducing line losses		
	(d) Stabilizing voltage levels		
x.	The term 'AVR' stands for-	1 01 01 01 01	
	(a) Automatic Voltage Regulator		
	(b) Automated Voltage Relay		
	(c) Average Voltage Regulation		
	(d) None of these		
Q.2 i.	Define and differentiate between the coincidence factor and contribution factor in the context of load classification.	4 03 01 01 01	

Marking Scheme

EE3EL17 (T) Electrical Power Distribution (T)

Q.1	i)	(c) Power distribution to consumers	1	ii.	Benefits of optimal location (3 marks) Methods for determining optimal location (3 marks)	6
	ii)	(a) Average load to maximum load**	1	OR	iii. Design considerations for radial feeders (2 marks) Design considerations for loop feeders (2 marks) Advantages and disadvantages of each type (2 marks)	6
	iii)	(C) Large energy requirements during peak hours	1			
	iv)	(b) Loads operate at maximum simultaneously only part of the time	1	Q.4	i. Derivation of voltage drop expression (3 marks) Numerical example (1 mark)	4
	v)	(a) Voltage drops and load distribution	1	ii.	Explanation for uniformly distributed loads (3 marks) Explanation for non-uniformly distributed loads (3 marks)	6
	vi)	(b) Distribute power from a single source**	1	OR	iii. Significance of three-phase balanced lines (3 marks) - Implications for voltage drop and power loss (3 marks)	6
	vii)	(c) Protect equipment from faults	1			
	viii)	(c) Ground fault	1	Q.5	i. Objectives of system protection (2 marks) Common types of faults (2 marks)	4
	ix)	(b) Cancelling out inductive reactance	1	ii.	Working principles explained (3 marks) Importance in distribution systems (3 marks)	6
	x)	a) Automatic Voltage Regulator	1	OR	iii. Various types of coordinated operations (3 marks) Role of Residual Current Circuit Breaker (3 marks)	6
Q.2	i.	Definition of coincidence factor (2 marks)	4	Q.6		
		Definition of contribution factor (2 marks)		i.	Explanation of economic benefits (3 marks) Systematic approach for determination (2 marks)	5
	ii.	Explanation of residential loads (1 mark)	6	ii.	Role of voltage control equipment (3 marks) Effects of series capacitors on the system (2 marks)	5
		Explanation of commercial loads (1 mark)				
		Explanation of agricultural loads (1 mark)		iii.	Clearly stated assumptions (1 mark) Step-by-step calculations (4 marks)	5
OR		Explanation of industrial loads (1 mark)				
		Examples highlighting characteristics (2 marks)				
	iii.	Definition of load factor (1 mark)	6			
		Definition of loss factor (1 mark)				
Q.3		Explanation of their relationship (2 marks)				
		Implications for system design (2 marks)				
	i.	Basic principles of location (2 marks)	4			
		Basic principles of rating (2 marks)				

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P.T.O.