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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**

Course Code: 19EE6PCPSP **Max Marks: 100**

Course: Power System Protection

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Define fuse law. Explain the cut-off characteristics of fuse in detail.	CO1	PO1	**06**
	b)	Explain the functional characteristics of a protective relaying in detail	CO1	PO1	**07**
	c)	Zone protection is an essential part of power system. Explain with neat diagram of zones of protection as applied to a power system. Also briefly explain the essential basic requirements of a protective system.	CO1	PO1	**07**
		OR			
2	a)	What are the factors to be considered for selection of a fuse?	CO1	PO1	**05**
	b)	What are MCBs? Give one application of MCB as applied to a protective scheme.	CO1	PO1	**05**
	c)	Define the following terms with respect to fuse. (i) Fuse Element (ii) Fusing Factor, (iii) Prospective current (iv) Rupturing capacity (v) Minimum Fusing Current.	CO1	PO1	**10**
		UNIT - II			
3	a)	Explain the theory of arc formation and its different extinction methods employed in circuit breakers	CO2	PO2	**07**
	b)	For a 132 kV system, the reactance and capacitance up to the location of circuit breaker is 3 ohms and 0.015 µF. Determine i) Frequency of restriking voltage transient ii)Peak restriking voltage across the circuit breaker iii)Max RRRV	CO2	PO3	**06**
	c)	List the classification of circuit breaker. Mention the voltage range of operation of each.	CO2	PO2	**07**

			OR			
	4	a)	With a neat sketch, explain Puffer-type SF_6 circuit breaker. Summarize the advantages and limitations of SF_6 circuit breaker.	*CO2*	*PO2*	**07**
		b)	Examine, why low resistance method of arc quenching is preferred only for AC circuits?	*CO2*	*PO3*	**06**
		c)	In a short circuit test, on a circuit breaker, the following data was obtained on a frequency transient (i) time to reach the peak restriking voltage is 55 μsec. (ii) peak restriking voltage is 100 kV. Determine (a) Natural frequency of circuit. (b) Average rate of rise of restriking voltage?	*CO2*	*PO2*	**07**
			UNIT - III			
	5	a)	Derive the torque equation of an electromechanical relay with usual notations.	*CO3*	*PO3*	**07**
		b)	Explain co-incidence type phase comparator with waveforms and block diagram.	*CO3*	*PO2*	**06**
		c)	Explain with neat sketch construction and working principle of electro mechanical directional over current relay.	*CO3*	*PO2*	**07**
			OR			
	6	a)	With a neat sketch explain the working principle of static relays. What are its advantages and disadvantages?	*CO3*	*PO2*	**07**
		b)	With a neat circuit diagram, explain the working of circulating current type rectifying bridge comparator.	*CO3*	*PO2*	**07**
		c)	With block diagram, explain any one type of phase comparator.	*CO3*	*PO2*	**06**
			UNIT - IV			
	7	a)	Explain the zones of protection employed with relevant diagram in detail	*CO4*	*PO2*	**06**
		b)	Where is Merz-Price differential protection for generator scheme used? With a neat diagram explain its operation.	*CO4*	*PO2*	**07**
		c)	What all protection schemes are employed for the protection of transmission lines? Explain in detail.	*CO4*	*PO2*	**07**
			OR			
	8	a)	With neat sketch, explain working of Merz-price voltage balnce protection scheme.	*CO4*	*PO2*	**07**
		b)	Justify, why over current relay cannot be used as primary protection in transmission lines?	*CO4*	*PO2*	**06**
		c)	What are the factors that cause faults in generator? Explain.	*CO4*	*PO2*	**07**

			UNIT - V			
	9	a)	What are the factors that cause faults in generator? Explain the scheme employed for the protection against the stator faults.	*CO4*	*PO2*	**07**
		b)	With a neat diagram, explain the working of Buchholz's relay.	*CO4*	*PO2*	**07**
		c)	Elaborate Mho relay with neat sketch. List its applications.	*CO4*	*PO3*	**06**
			OR			
	10	a)	With a neat block diagram of digital relaying, explain the working and merits of digital relaying.	*CO4*	*PO2*	**07**
		b)	Explain how relay coordination is accomplished in interconnected power system.	*CO4*	*PO2*	**07**
		c)	Explain tripping mechanism of digital relay.	*CO4*	*PO2*	**06**

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