U.S.N.										

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

Autonomous Institute Affiliated to VTU

July 2023 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 **Date: 10.07.2023**

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 the following terms w.r.t fuse. (i) Fuse element, (ii) Fusing factor, (iii) prospective current, (iv) Rupturing capacity, (v) Minimum fusing current.	CO1	PO1	**10**
	b)	Explain HRC fuse with neat sketch. List its advantages and limitations.	CO1	PO1	**05**
	c)	Give an outline on essential qualities of protective relaying.	CO1	PO1	**05**
		UNIT - II			
2	a)	With a neat sketch explain puffer-type SF_6 circuit breaker. Summarize the advantages and disadvantages of SF_6 circuit breaker.	CO2	PO2	**10**
	b)	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	PO3	**05**
	c)	Explain current zero arc interruption methods.	CO2	PO2	**05**
		UNIT - III			
3	a)	Elaborate rectifier bridge type amplitude comparator with neat sketch.	CO3	PO2	**10**
	b)	Derive the expression for Torque of an electromechanical relay. Explain with neat sketch construction and working principle of electro mechanical directional over current relay.	CO3	PO2	**04** **06**
		OR			
4	a)	Using the general equation of the comparator, Derive the comparator equation for a phase (cosine) comparator.	CO3	PO2	**10**
	b)	A 50 MVA transformer which is used to operate at 50% over load feeds a 66 kV bus bar through a circuit breaker. The	CO2	PO2	**10**

			transformer circuit breaker is equipped with 1000/10 CT and feeder circuit breaker with 500/5 CT. both the CTs feed IDMT relays having the following characteristics. PSM: 2, 3, 5, 10, 15, 20 Time (Sec): 10, 6, 4.1, 3, 2.5, 2.2 Relay on the feeder circuit breaker has 125% plug setting and 0.4 TSM. If a fault current of 3000 A flows from transformer to feeder, determine a. Operating time of feeder relay. b. Suggest suitable PSM and TSM of the transformer relay to ensure adequate discrimination of 0.5 sec between transformer relay and feeder relay.			
			UNIT - IV			
	5	a)	With neat sketch, explain working of Merz-price protection (differential biased). List its advantages, limitations and applications.	*CO3*	*PO2*	**10**
		b)	Give an outline on Buchhloz's relay with a neat sketch. List the type of faults encountered in transformers.	*CO3*	*PO2*	**10**
			OR			
	6	a)	Elaborate Mho relay with neat sketch. List its applications.	*CO3*	*PO2*	**10**
		b)	Explain stator and rotor fault protection for generator.	*CO3*	*PO2*	**10**
			UNIT - V			
	7	a)	Explain tripping mechanism of relay.	*CO3*	*PO2*	**05**
		b)	With a neat block diagram explain digital relaying.	*CO2*	*PO2*	**10**
		c)	Give an outline on adaptive relaying.	*CO3*	*PO2*	**05**

****