Ref No:

Ex/PG/EE/T/129C/2024

M.E. ELECTRICAL ENGINEERING FIRST YEAR SECOND SEMESTER EXAM 2024

SUBJECT: - POWER SYSTEM PROTECTION (PS)

Time: Three hours **Full Marks: 100**

No. of Questions		Answer any *five* questions	Marks
1)	a)	Explain the zonal protection philosophy with regard to power system protection. What do you understand by Back-up Protection in power system? Explain the various types of back up protection.	(10)
	b)	With a neat diagram explain the generalized block diagram representation of relay.	(10)
2)	a)	Explain with the help of a clear block diagram the generalized theory of two input comparators. Explain the reasons for the development of two input comparators.	(10)
	b)	With the help of relevant diagrams explain the duality between phase comparators and amplitude comparators.	(10)
3)	a)	State the working principle of a three-input co-incidence comparator and obtain its characteristic with the help of a combination of 2-input sine comparator. Draw the relevant phasor and circuit diagrams for this explanation.	(10)
	b)	Explain with relevant circuit diagrams the operation of a rectifier bridge type amplitude comparator. Also mention its special features.	(10)
4)	a)	On what factors does the reach of the over current relay depends? Explain their effect on the reach of the over current relay.	(5)
	b)	Considering a balanced transmission line explain how a distance relay detects and locate three phase fault, double line fault and single line to ground fault on a transmission line.	(15)
5)	a)	Explain the effect of power swing on distance relays. In this context with the help of diagrams explain how each of the distance relays perform against power swings.	(2+8=10)
	b)	Design an Impedance relay and a reactance relay with the help of two input 90° phase comparator.	(10)
6)	a)	Explain the need for Carrier Aided Distance Protection. State the attributes of an Ideal Carrier Channel. Explain in the context of a line-	(3+3+4= 10)

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		to-ground coupling, how the carrier signal is coupled and trapped into the desired line section of a transmission line.	
	b)	Using a suitable diagram explain the inter-tripping scheme for carrier-aided distance protection.	(10)
7)	a)	Describe the operating principle of Blocking Scheme for Carrier Aided Distance Protection.	(10)
	b)	Describe the operating principle of phase comparison relaying for both internal and external faults.	(10)
8)	a)	Why for the protection of short transmission lines wire pilot relays preferred to distance relays? Explain each of the problems in wire pilot relaying.	(10)
	b)	Explain the ideal protection characteristic for wire pilot relaying. What do you understand by "circulating current scheme" with regard to wire pilot relaying?	(10)