SUBJECT: - POWER SYSTEM PROTECTION

Full Marks: 100

Time: Three hours

No. of Questions		Answer any *five* questions	Marks
1)	a)	What are the main properties of protective relaying? Explain each one of them. What do you understand by primary protection and back up protection.	(10)
	b)	With help of a block diagram explain the operation of a relay.	(10)
2)	a)	Find out the general characteristic obtained by a two-input phase comparator and show the plot on a complex plane.	(10)
	b)	Briefly discuss a 90° phase comparator and a sine comparator. How can you realize a sine comparator from a 90° phase comparator?	(7+3= 10)
3)	a)	With proper diagrams explain the duality between phase comparators and amplitude comparators.	(10)
	b)	Explain how a 3-input phase sequence detector works. Also obtain its characteristic with the help of a combination of 2-input sine comparator. Draw the equivalent circuit of an n-input phase sequence detector.	(5+3+2 =10)
4)	a)	Considering a balanced transmission line explain how double line fault and single line to ground fault are located and detected by a distance relay.	(10)
	b)	Deduce the expression for the apparent impedance seen by a relay in a two area system as function of angle of separation δ. Show that the locus is a straight line if $|E_A| = |E_B|$.	(10)
5)	a)	With suitable diagram explain how zone discrimination is carried out on a transmission line by Distance Relay. Also explain why zone 1 of the distance relay does not cover the entire length of the line.	(12+3= 15)
	b)	Discuss the effect of series capacitance on distance relaying. Explain in the context of a mho relay.	(5)
6)	a)	Why for the protection of short transmission lines wire pilot relays are preferred to distance relays? Explain the ideal protection	(5+5= 10)

[Turn over

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		characteristic for wire pilot relaying.	
	b)	What do you understand by "circulating current scheme" with regard to wire pilot relaying? Explain each of the problems in wire pilot relaying.	(5+5= 10)
7)	a)	State and explain the use of each of the major Power Line Carrier coupling equipments in a carrier communication scheme.	(10)
	b)	Using suitable diagram explain the inter- tripping scheme for carrier aided distance protection.	(10)
8)	a)	Describe the operating principle of phase comparison relaying for both internal and external faults.	(10)
	b)	Why single line to ground coupling is not a suitable choice for carrier coupling? Explain how this problem can be taken care of.	(5)
	c)	State the attributes of an Ideal Carrier Channel.	(5)