

Ref No:

Ex/PG/EE/T/129C/2019

M.E. ELECTRICAL ENGINEERING FIRST YEAR SECOND SEMESTER - 2019
SUBJECT: - POWER SYSTEM PROTECTION

Full Marks: 100

Time: Three hours

No. of Questions	Answer any five questions	Marks
1)	a) Explain 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) Draw the block diagram of a relay. Explain each part of it.	(10)
2)	a) State the reasons for the development of two input comparators? Draw the block diagram of a two input comparator and explain the generalized theory of two input comparators.	(10)
	b) Obtain the general characteristics of a 2-input amplitude comparator using average comparison of input quantities. In this context also show that amplitude circle is orthogonal to the phase comparator arcs.	(10)
3)	a) With the help of suitable phasor and circuit diagrams explain how a three input co-incidence comparator can be realized with the help of a combination of 2-input sine comparator.	(10)
	b) Explain, with suitable circuit diagrams, Rectifier Bridge type phase comparator.	(10)
4)	a) With a suitable diagram explain Adamson/Wede-pohl pulse type comparator. What are the special features of a pulse type comparator?	(10)
	b) Explain, with suitable circuit and phasor diagrams, the function of a phase splitting type phase comparator. What are its special features?	(10)
5)	a) Explain how a distance relay detect and locate three phase and double line faults in a balanced transmission line.	(10)
	b) Discuss in detail the working principle and characteristics of Impedance and reactance relays. Which one is more suitable for short transmission lines and why?	(10)
6)	a) Explain the effect of power swing on distance relays. In this context, with the help of relevant trip circuit diagram also explain the out-of-step blocking scheme used in distance relays to protect a transmission line against power swings.	(10)

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	b)	Design an Ohm relay and an Offset Mho relay with the help of two input 90° phase comparator.	(10)
7)	a)	Develop the characteristics equations at the two ends of a pilot wire feeder when restraining coils is on the C.T. side for a circulating current scheme. Also discuss opposed voltage scheme of Pilot wire protection characteristics.	(10+5 =15)
	b)	Explain the ideal protection characteristic for wire pilot relaying.	(5)
8)	a)	Explain the need for Carrier Aided Distance Protection. State the attributes of an Ideal Carrier Channel. How the carrier signal is coupled and trapped into the desired line section of a transmission line. Explain in the context of a line to ground coupling.	(3+3+4 =10)
	b)	Describe the operating principle of Carrier Acceleration Scheme in Carrier Aided Distance Protection. What are its merits and demerits?	(10)