Roll No ....

MEPS/MTPS/MTPA/MEHP - 103
M.E./M.Tech., I Semester
Examination, December 2015

Advance Power System Protection Relays

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) What is a protective relay? Explain the functional characteristics of a protective relay.

b) Classify the various types of over current relays and give their applications along with approximate characteristics.

2. a) What is a non-regenerative switch? Describe the operation of various logic circuits with neat sketches.

b) Explain the different types of amplitude and phase comparators with neat sketches.

3. a) An alternator rated at 10kV protected by the balanced circulating current system has its neutral grounded through a resistance of 10 ohms. The protective relay is set to operate when there is an out of balance current of 1.8 ampere in the pilot wires, which are connected to the secondary windings of 1000/5 ratio current transformers. Determine :

i) The percent winding which remains unprotected

ii) The minimum value of the earthing resistance required to protect 80% of the winding .

b) For a 10MVA, 132 kV/6.6kV power transformer with delta-star connections, obtain the number of turns each current transformer should have, for the differential protection scheme to circulate a current of 5A in the pilot wires.

4. Explain the carrier system of protection. With the block diagram and neat sketches discuss how the phase comparison scheme can be used for protecting a transmission line.

5. a) Describe the salient features and applications of directional wave detection relay.

b) Enumerate schemes of protection for bus bar.

6. What are the advantages of digital protection? Describe with block diagram the principle of operation of a microprocessor based percentage differential relay scheme for the operation of a power transformer.

7. Derive the generalized mathematical expression for distance relays and realize the various types of distance relays using microprocessor based approach.

8. Write short notes on any two of the following :

a) Algorithm for transmission line protection

b) Salient features of 500 kV relaying protection

c) Generator transformer unit protection

d) Under and over frequency relay

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