Total No. of Questions :8] *[Total No. of Printed Pages :2*

Roll No.....

MEHP/MEPS/MTPS-103

M.E./M.Tech. I Semester

Examination, December 2017

Advance Power System Protection Relays

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions out of eight.
ii) All questions carry equal marks.

1. a) Discuss briefly the role of protective relays in a modem power system. 7
   b) Discuss the essential qualities of a protective relay. 7

2. a) What are the advantages of static relays over eletromechanical relays? 7
   b) Discuss how an amplitude comparator can be converted to a phase comparator and Vice-Versa. 7

3. a) Discuss the principle of a coincidence circuit for phase comparator. 7
   b) Discuss the operating principle of a rectifier bridge phase comparator. 7

4. a) Discuss the protection employed against loss of excitation of an alternator. 7
   b) A 5MVA, 6.6kV, Y, connected generator has a resistance per phase of 0.5Ω and synchronous reactance per phase of 2Ω. It is protected by a differential relay which operates when the out of balance cement exceeds 30% of load current. Determine what proportion of the generator winding is unprotected if the star point is grounded through a resistor of 6.5Ω. 7

5. a) What type of protective scheme is employed for the protection of a large power transformer against short circuits? With neat sketches discuss its working principle. 7
   b) A three phase 50MVA, 132kV/66kV Y – Δ transformer is protected by differential protection. Suggest suitable CT ratios and show the connection of the CT, on either side of the transformer. 7

6. Discuss why duplicate bus bar system is used? With a neat sketch develop the duplicate bus bar system and explain why bus-coupler circuit breaker is used. 14

7. Explain with the help of neat sketches the setup of carrier current relaying employed in transmission lines protection. Also explain the utility of: 14
   a) Line trap unit
   b) Coupling capacitor unit

8. a) Derive a generalized mathematical model of distance relays for numerical protection. 7
   b) How can numerical distance relaying algorithms be implemented on the 8086 microprocessor? Explain. 7

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197