R09

Code No: D5604

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
POWER SYSTEM PROTECTION WITH STATIC RELAYS
(POWER SYSTEMS (HIGH VOLTAGE))

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1.a) Write the advantages of static relays over electromagnetic relays.
b) Obtain the duality between phase comparator and amplitude comparator.
c) Discuss the essential qualities of protection relays.

2.a) Derive the generalized equation of amplitude comparator.
b) With the help of neat sketches, explain coincidence type phase comparator.

3.a) What is an IDMT characteristic? Explain how this is achieved in practice.
b) Write a short note on the time current characteristics of an over current relay. Draw these characteristics for the relays used to protect a radial feeder with three substations fed from one end.
c) Define the terms (i) Pick up value (ii) Reset value (iii) Reset time

4.a) What is Universal Torque Equation? Using these equation derive the characteristics of (i) Impedance relay (ii) Reactance relay (iii) mho relay.
b) What do you mean by power surge and clearly explain its effect on the performance of various distance relays?

5.a) Write the basic principle of operation of a differential relay.
b) With a neat sketch explain the protection of a transformer against internal faults.
c) What is meant by per cent bias? How is this achieved in practice in a directional relay?

6.a) In what way distance protection superior to over current protection for the protection of transmission lines?
b) Compare the static relays with electromagnetic relays.
c) Explain clearly how the selection of current and time settings is done in a time current graded system.

7.a) A 3-ph, 66/11 kV star-delta connected transformer is protected by Merz-price protection system. The C.Ts on the LT side have a ratio of 420/5 amps. Show that the C.Ts on the H.T side will have a ratio of $70:5/\sqrt{3}$.
b) With neat sketches, explain balanced voltage and circulating current pilot protection schemes.

8. Write short notes on:
(a) 3-Zone protection of transmission lines
(b) Parabolic characteristics of distance relays.
(c) Principle of phase sequence detectors.

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