

6E3111

Roll No. _____

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6E3111**B.Tech. VIth Semester (Main/Back) Examination, June - 2010****Electrical Engineering****6EE3 Protection of Power Systems (Common for EE and EX)****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****Instructions to Candidates:**

Attempt overall five questions selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Use of following supporting material is permitted during examination (Mentioned in form No. 205)

1. Logarithmic Table.

Unit - I

1. a) Explain what are primary protection and back-up protection? Discuss the remote back-up protection by simple time graded relays. (8)
- b) Explain the following schemes with basic requirements of protection system, used in circuit breakers. (8)
 - i) Trip circuit with relay of make type contact.
 - ii) Trip circuit with relay of break type contact.

OR

- a) How to minimize the ratio error and phase angle error in the instrument transformer? (6)
- b) There are 300 turns in secondary of a current transformer with single turn primary. A resistive load of 3 ohm at 3A is connected with the secondary. At frequency of 50 Hz, 80 AT is the magnetising $m.m.f$ required to set up the flux in the core. The magnetic core has cross-sectional area of 5cm^2 . Find the ratio and phase angle of the current transformer, and the maximum flux density in the core neglecting the iron and copper losses. (10)

Unit - II

2. a) To use a direction relay what are the conditions to be satisfied? Explain briefly. (3+4=7)
- b) Describe the differences between time over current relay, directional relay, differential relay. (9)

OR

- a) Find the universal relay torque equation and what is the use of this equation?(6)
- b) The current rating of a relay is 3A. PSM is 1.0 ; CT ratio is 300/3, fault current is 3000A. Find the operating time of the relay for a TMS (Time Multiplier Setting) = 0.3. At TMS = 1, the operating time at various PSM are :

P S M	2	4	6	7	8	10
Operating Time (s)	8	6	5	3	2.8	2.4

(10)

Unit - III

3. a) Draw and explain the Merz - Price protection of Alternator stator winding. State its advantage. (9)
- b) Explain the basic scheme for rotor earth fault protection. What are its advantages? (4+3=7)

OR

- a) With a neat sketch and vector diagram explain how a negative phase sequence relay is employed for protection of Electrical Power System. (8)
- b) Enumerate various faults and abnormal operating conditions to which a modern turbo alternator is likely to be subjected. (8)

Unit - IV

4. a) What is over fluxing in transformer? When it occurs? What are the methods to overcome this? (2+2+3=7)
- b) Draw and explain the diagram of the percentage differential protection scheme for transformers based on circulating current.
- i) Star - Delta transformer.
- ii) Delta - Star transformer. (4+5=9)

OR

- a) Draw and explain the construction and working of Buchhotz's relay. Against which fault Buchhotz relay gives the protection? State its advantages and disadvantages. **(5+3=8)**
- b) A three phase power transformer having a line voltage ratio of 400 V to 11 kV is connected in $Y-\Delta$. The CTs on 400 V side have current ratio 500/5. What must be the CT ratio on 11 kV side? **(8)**

Unit - V

5. a) Explain with diagram the working principle of MHO relay. Deduce the torque equation for the same. **(4+4=8)**
- b) Explain the working principle of distance time impedance relay and its application. What are the advantages of distance relays? **(4+4=8)**

OR

- a) Describe the scheme for single phasing protection of Induction motor. **(6)**
- b) How phase fault protection is provided to the induction motor? **(5)**
- c) What is phase reversal? What is its effect? How it is prevented in induction motors? **(5)**
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