Total number of printed pages – 3

B.Tech

PCEE 4402

Eighth Semester Regular Examination – 2015

POWER SYSTEM PROTECTION

BRANCH(S) : EEE, ELECTRICAL

QUESTION CODE : J 111

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

   (a) What is the physical significance of Positive Sequence, Negative sequence and Zero sequence current ?

   (b) What are the incipient faults of a transformer ?

   (c) What is plug setting multiplier if the pick up value of the relay is 5Amp and the fault current in the relay coil is 25 Amp ?

   (d) What do you mean by short time rating of an circuit breaker ?

   (e) Why is back up protection is needed ?

   (f) What is arc resistance ? Write the expression for arc resistance by Warrington's arc formula ?

   (g) Draw the block diagram of a numerical relay ?

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(h) What do you understand by time grading of radial feeder ?

(i) Mention the most commonly used protection scheme for alternators ?

(j) Write down the advantages of static relay over electromagnetic relay ?

2. (a) What are the requirements of protective relaying system ? 5

(b) Explain the construction and operation of induction type relay. 5

3. (a) Draw and explain Translay Scheme of Pilot Wire Protection. 5

(b) Describe the zones of protection. Explain the zones of protection for different distance relays. 5

4. (a) Explain the percentage differential relay with harmonic restraint in connection with Transformer protection. 5

(b) A 3 phase, 2 pole, 11 kV 10 MVA alternator has neutral earthed through a resistance of 10 ohm. The machine has current balance protection which operates upon out of balance current exceeds 20% of full load. Determine % winding protected against earth fault. 5

5. (a) Draw and explain the merz-price protection of alternator stator winding. 5

(b) Draw the characteristics of a directional relay and determine the expression for the torque developed. 5

6. (a) Explain briefly regarding numerical over current protection by drawing suitable block diagram. 5

(b) Draw a neat sketch to explain about minimum oil circuit breaker. 5

7. (a) State the principle of duality between an amplitude comparator and a phase comparator. Draw figures to explain the same.   5

    (b) What is carrier protection ? Briefly explain its merits and demerits.   5

8. Write short notes on any **two** of the following :   5×2

    (a) Unsymmetrical Faults

    (b) SF$_6$ Circuit Breaker

    (c) Earth Fault Relay.

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