Code: 13A02602 R13

B.Tech III Year II Semester (R13) Regular Examinations May/June 2016

POWER SYSTEM PROTECTION

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Write the universal torque equation.

(b) State any two advantages and disadvantages of microprocessor based relays.

(c) A bar-type current transformer which has 1 turn on its primary and 160 turns on its secondary is to be used with a standard range of ammeters that have an internal resistance of 0.2 Ω's. The ammeter is required to give a full scale deflection when the primary current is 800 Amps. Calculate the maximum secondary current and secondary voltage across the ammeter.

(d) How does a Buchholz relay work?

(e) State drawbacks of a radial electrical distribution system. How these drawbacks are overcome in ring main electrical distribution system?

(f) On what basis, the protection zones in a transmission line are categorized?

(g) Explain any two methods by which arc can be quenched in circuit breaker.

(h) Explain how a circuit breaker is rated.

(i) State any two reasons for generation of over voltages in a power system.

(j) What is factor of earthing?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Explain the construction and operation of differential relays, and explain how these relays are helpful in protecting generator windings.

OR

3 Explain the need for static relays. Explain the basic units in a static relay. Enumerate the advantages and disadvantages of static relays.

UNIT – II

4 (a) What are the various restraint schemes used?

(b) The primary winding of a transformer has 2000 turns and CT ratio is 600:5. The secondary has 10000 turns and is working on a tap of 60%. Find out CT ratio required for secondary side to establish circulating current scheme.

OR

5 (a) Explain various types of faults that occur in an electrical generator.

(b) Explain in detail the protection scheme for ground fault protection in the electrical generator.

UNIT – III

6 Explain the principle involved in protection of long distance transmission lines involving distance relays.

OR

7 With neat diagrams explain the protection schemes for radial and ring-main electrical distribution systems.

UNIT – IV

8 In a short circuit test on a 132 kV 3-phase system, the breaker gave the following result: p.f. of the fault 0.4, recovery voltage 0.95 of full line value, the breaking current is symmetrical and the re-striking transient had a natural frequency of 16 kHz. Determine the rate of rise of re-striking voltage. Assume the fault is grounded.

OR

9 With neat diagrams, explain the operation of Vacuum circuit breaker and SF6 circuit breaker.

UNIT – V

10 Explain the schemes for protection against over voltages caused due to lightening.

OR

11 Explain in detail how insulation levels are coordinated in a typical power system.

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