CBCS SCHEME

USN

15EE72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021

Power System Protection

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain the nature is causes of faults. Discuss the consequences of faults on a power system. **(08 Marks)**

b. Discuss how an amplitude comparator can be converted to a phase comparator. **(08 Marks)**

OR

2 a. Compare numerical relay with an electromechanical relay. **(05 Marks)**

b. Explain various methods of backup protection. **(05 Marks)**

c. Briefly explain the essential qualities of a protective relay. **(06 Marks)**

Module-2

3 a. An earth fault develops at point F on the feeder shown in Fig Q3(a) and the fault current is 16000A. The IDMT relays at points A & B are fed via 800/5 A CTs. The relay at B has a plug setting of 125% and Time Multiplier Setting (TMS) of 0.2. The circuit breakers take 0.20s to clear the fault, and the relay error in each case is 0.15s for a plug setting of 200% on the relay A, determine the minimum TMS on that relay for it not to operate before the circuit breaker at B has cleared the fault. Assume the operating time at PSM of 10 for a TMS of 1 = 3.0s. **(08 Marks)**

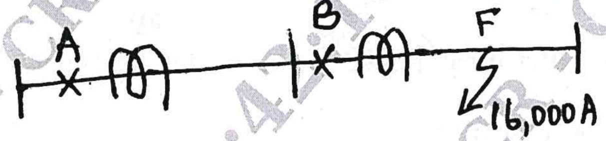

Fig Q3(a)

b. What is an impedance relay? Explain its operating principle, torque equation and operating characteristics for impendence relay. **(08 Marks)**

OR

4 a. Describe the operating principle of reverse power or directional relay with neat diagram. **(08 Marks)**

b. Explain Angle impedance relay with neat diagram. **(08 Marks)**

Module-3

5 a. Describe the balanced voltage (or opposed voltage) differential protection scheme. **(08 Marks)**

b. With a neat sketch, discuss the differential scheme for bus zone protection. **(08 Marks)**

OR

6 a. Describe with a neat sketch, the percentage differential protection of a modern alternator. **(08 Marks)**

b. Define the term pilot, with reference to power line protection lit the difference types of wire pilot protection schemes and explain any one of the scheme. **(08 Marks)**

Module-4

7 a. With a neat sketch, explain the recover rate theory and energy balance theory of arc interruption in a circuit breaker. **(08 Marks)**

b. For a 132KV system, the reactance and capacitance up to the location of the circuit breaker is 3Ω and 0.015μF, respectively. Calculate the following :

i) The frequency to transient oscillation
ii) The maximum value of restriking voltage across the contacts of the circuit breaker
iii) The maximum value of RRRV. **(08 Marks)**

OR

8 a. With a neat sketch, explain the direct testing of circuit breaker. **(05 Marks)**

b. List the classification of circuit breaker. **(05 Marks)**

c. What are the merits and demerits of SF_6 circuit breaker? **(06 Marks)**

Module-5

9 a. What do you mean by discrimination? Discuss discrimination between i) two fuses ii) a fuse and an over current relay. **(08 Marks)**

b. Describe the protection of stations and substations against direct lighting strokes. **(08 Marks)**

OR

10 a. What is GIS? What are the various component of a GIS? Briefly, describe their functions. **(08 Marks)**

b. Write short notes on :

i) Klydonograph
ii) Rod gap. **(08 Marks)**

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