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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; May / June - 2018

Switch Gear and Protection

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Assume missing data, if any.

UNIT - I

1 a. With a neat diagram, explain working of HRC fuse. Mention its application. 7

b. Explain: i) Isolating switches ii) Load breaking switches. 4

c. Derive an expression for rate of raise of restrikey voltage. 9

2 a. What are the different arc interruption methods? Explain any one of them in detail. 10

b. What is resistance switching? Derive an expression for critical resistance in terms of system inductance and capacitance. 10

UNIT - II

3 a. With a neat sketch, explain the construction and working principle of air blast CB. 10

b. Discuss the operating principles of SF_6 CB. What are its advantages over other types of CB? For what voltage range is it recommended? 10

4 a. Write a note on Testing of CB. 8

b. Explain the following : 6

i) Breaking capacity ii) Making capacity iii) Short time capacity

c. Mention the advantages and application of vacuum CB. 6

UNIT - III

5 a. With the help of neat sketch, explain the construction and working of non-directional induction type over current relay? 10

b. For a particular transmission line, relays are used as shown in Fig. 1; 7

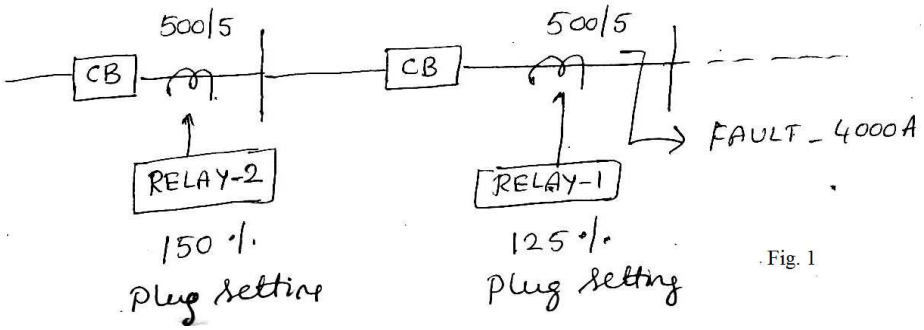

Fig. 1

For discrimination, time grading margin is 0.6 s. Determine the time of operation of two relays assuming that both the relays have character as shown in Fig. 2. The relay-1 has time setting multiplier of 0.3. Find the time setting multiplier of relay-2.

Contd…2

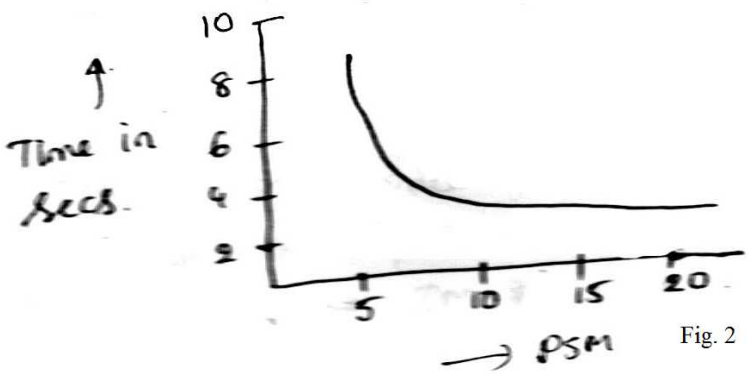

Fig. 2

PSM	2	4	5.5	6.4	8
Operating time(s)	10	5	3.8	3	2

Table: Operating time for various PSM

c. Mention the fundamental requirement of protective relaying. 3

6 a. Explain the three stepped distance protection of transmission line. 6

b. With the help of R-X diagram, explain the operating character of impedance relay. 8

c. Explain the operation of percentage differential relay. 6

UNIT - IV

7 a. With a neat diagram, explain restricted earth fault protection of generator. 6

b. The neutral part of a 11 kV alternator is earthed through a résistance of 12 Ω. The relay is set to operate where there is out of balance current of 0.8 A the CT's have ratio of 2000/5. What percentage of the winding is protected against earth faults? What must be the min value of earthing resistance required to give 90% of protection to each phase? 8

c. Explain abnormal running conditions of generator. 6

8 a. Explain the negative phase sequence protection for the generator. 10

b. Explain the stator protection against inter turn faults. 10

UNIT - V

9 a. Explain Merz-price protection for y-Δ transformer. 6

b. Explain the protection scheme for a large three phase IM. 6

c. Explain the various faults in a transformer. 8

10 a. With a neat diagram, explain the working of Buchholz relay. State its advantages and disadvantages. 10

b. Explain the abnormal condition and possible failure of IM. 10

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