Sixth Semester B.E. Degree Examination, June/July 2014
Switchgear and Protection

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1. a. Draw the block diagram of energy management of power system and explain. **(10 Marks)**
   b. With neat sketch describe the working principle of a liquid fuse. **(06 Marks)**
   c. With neat sketch explain cut off characteristics of HRC fuse. **(04 Marks)**

2. a. Discuss the recovery rate theory and energy balance theory of arc interruption in a.c. circuit breaker. **(10 Marks)**
   b. Discuss the phenomenon of inductive current chopping in a circuit breaker. **(10 Marks)**

3. a. Explain the working of air blast circuit breaker with reference to i) Axial blast; ii) Cross blast. **(10 Marks)**
   b. With neat sketch explain the construction and working of non-puffer type SF_6 breaker. **(10 Marks)**

4. a. With neat circuits explain two types of synthetic test on circuit breakers. **(10 Marks)**
   b. With a neat sketch, explain expulsion type lightning arrester. What are the advantages and disadvantages of the above? **(10 Marks)**

PART – B

5. a. Explain the concept of primary and back up protection. **(06 Marks)**
   b. Explain with the help of neat diagram, the construction and working of non directional induction type over current relay. Draw and explain its time current characteristics. **(10 Marks)**
   c. The current ratings of an over current relay is 5A. It has a PSM = 2, TSM = 0.3, CT ratio = 400/5, Fault current = 4000A. Determine the time of operation of the relay assuming normal IDMT characteristics. **(04 Marks)**

PSM	2	4	5	8	10	20
Operating time (s)	10	5	4	3	2.8	2.4

6. a. Explain the construction, working, torque equation and operating characteristics of reactance relay. **(10 Marks)**
   b. With a neat sketch, explain the construction and working of Buchholz relay. **(10 Marks)**

7. a. Which are the abnormal running conditions may exists in a generator? Explain in brief. **(10 Marks)**
   b. The natural point of a 11kV alternator is earthed through a resistance of 12Ω, the relay is set to operate when there is out of balance of 0.8A. The C.T.S. have a ratio of 2000/5. What percentage of the winding is protected against earth faults? What must be the minimum value of earthing resistance required to give 90% of protection to each phase? **(10 Marks)**

8. a. With a basic circuit diagram, explain harmonic restraint relay protection for transformer. **(10 Marks)**
   b. With the relevant Sketches explain i) Ground fault protection; ii) Phase fault protection of induction motor. **(10 Marks)**

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