C 3221

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fifth Semester

(Regulation 2004)

Electrical and Electronics Engineering

EE 1302 — PROTECTION AND SWITCHGEAR

(Common to BE (Part-Time) Fourth Semester - Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by Switchgear?

2. What are the functions of protection relaying?

3. Define the terms (a) pick up value (b) plug setting multiplier.

4. What are the advantages of static relay?

5. What are the common methods used for line protection?

6. What is the importance of busbar protection?

7. What is meant by current chopping?

8. List the factors on which the arc resistance depends.

9. What is self compensated explosion pot?

10. What is the special feature of vacuum circuit breakers?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the symmetrical components method to analyse an unbalanced system.

(ii) In a 3phase 4wire system, the currents R,Y and B under abnormal conditions of loading are as under

$\bar{I}_R = 100\angle 30°A, \bar{I}_Y = 50\angle 300°A, \bar{I}_B = 30\angle 180°A$.

Calculate the positive, negative and zero sequence currents in the R line and return current in the neutral wire.

Or

(b) (i) Describe the essential qualities of a protective relay.

(ii) Explain primary and back up protection.

12. (a) Describe the construction and principle of operation of Induction type directional over current relay.

Or

(b) Explain the construction, working principle and characteristics of reactance relay type distance relay.

13. (a) (i) Discuss the faults which may occur on an alternator.

(ii) A star connected 3 phase 10 MVA, 66 KV alternator is protected by Merz Price circulating current principle using 1000/5 current transformer. The star point of the alternator is earthed through a resistance of 7.5 ohm. If the minimum operating current for the relay is 0.5 A, calculate the percentage of each phase of the stator winding which is unprotected against earth faults when the machine is operating at normal voltage.

Or

(b) (i) What are the complications of circulating current in a transformer? Write the remedial measures also.

(ii) Compare C.T and P.T.

14. (a) Explain the phenomena of arc and the various methods of arc extinction.

Or

(b) (i) A 50 Hz 11 kV, 3 phase alternator with earthed neutral has a resistance of 5 ohms per phase and is connected to a bus bar through a circuit breaker. The distributed capacitance upto circuit breaker between phase and neutral is 0.01μF. Determine (1) peak restriking voltage across the contacts of the breaker (2) frequency of oscillation (3) average rate of rise of restriking voltage upto the first peak.

(ii) Discuss DC circuit breaking.

15. (a) How is SF_6 gas used as a arc quenching medium. Describe the construction and working of SF_6 of a circuit breaker. State its advantages and disadvantages and its applications.

Or

(b) (i) What are the advantages & disadvantages of air blast circuit breaker?

(ii) Discuss synthetic testing of circuit breakers.