(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2734 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2013-14

SWITCH GEAR AND PROTECTION

Time : 3 Hours *Total Marks : 100*

Note :– (i) Attempt **all** questions.

(ii) All questions carry equal marks.

(iii) In case of numerical problems assume data wherever required.

(iv) Be precise in your answer.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) What are essential requirements of protection system ?

(b) Differentiate the following :

(i) Primary and Backup Protection

(ii) Pickup and Reset value

(iii) Operating time and Reset time

(iv) Normal and Abnormal conditions.

(c) Derive the expression for induction type relay.

(d) Describe the gas actuated relay.

(e) What are the design considerations in electromagnetic relay ?

(f) Describe any vibrationless attracted armature type relay.

2. Attempt any **two** parts of the following : **(10×2=20)**

(a) Derive the characteristic equation for phase comparator under threshold condition.

(b) Derive the characteristic of Impedance, Reactance and Offset mho relays.

(c) What are the basic elements of a static relay ? Describe the function of each element.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) What is the principle of distance relaying ? Explain definite-distance time-graded method of distance protection.

(b) Describe the different component of carrier protection scheme and explain phase comparison carrier protection.

(c) What are the limitations of wire-pilot protection ? Describe the Translay and Solkor schemes.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain the terms recovery voltage, restriking voltage and RRRV. Derive the expression for the restriking voltage across the contact of Circuit Breaker.

(b) A 50 Hz, 400 kV, three phase alternator with earthed neutral has a reactance of 10 ohm per phase and is connected to bus bar through a circuit breaker. The

capacitance to earth between the alternator and the circuit breaker is 0.05 μF per phase. Assuming the resistance of the generator to be negligible calculate the following :

(i) Maximum restriking voltage across the contact of circuit breaker

(ii) Frequency of oscillations

(iii) Maximum value of RRRV

(iv) The average value of RRRV up to the first peak.

(c) Describe the equipments used in testing station of circuit breaker and draw the layout of testing station.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Discuss the advantages and disadvantages of air blast circuit breaker. Describe its methods for interrupting the fault current.

(b) Describe the principle of Merze Price system of protection applied to the alternator. What are the shortcomings of this scheme and how are they overcome ?

(c) The neutral point of a three-phase 10 MVA, 11 kV alternator is earthed through a resistance of 4.5 ohms, the relay is set to operate when there is an out of balance current of 1.3 A. The CTs have ratio of 1500/5. What percentage of winding is protected against an earth fault and what should be the minimum value of earthing resistance to protect 85% of the winding ?