

(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)**
- What are essential requirements of protection system ?
 - Differentiate the following :
 - Primary and Backup Protection
 - Pickup and Reset value
 - Operating time and Reset time
 - Normal and Abnormal conditions.
 - Derive the expression for induction type relay.
 - Describe the gas actuated relay.
 - What are the design considerations in electromagnetic relay ?
 - 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 $0.05 \mu\text{F}$ 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 ?