B.E. Electrical (Electronics & Power) Engineering Seven Semester

EP702 - Power System Protection & Switchgear

P. Pages : 2 **GUG/W/18/1774**

Time : Three Hours * 1 3 8 6 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Use of non programmable calculator is permitted.

1. a) Describe the constructional details of vacuum circuit breaker and explain it's principle of operation and working. **8**

b) Explain the phenomenon of current chopping in a circuit breaker what measures are to be taken to reduce it. **8**

OR

2. a) Discuss the recovery rate theory and energy balance theory of are interruption in a circuit breaker. **8**

b) Explain in detail the constructional features, principle of working of SF_6 circuit breaker with a neat diagram. **8**

3. a) State and explain essential qualities of protective relaying. **8**

b) Describe directional overcurrent relay. Explain why would you prefer directional overcurrent relay. **8**

OR

4. a) With a neat sketch explain the over current scheme for feeder protection. **8**

b) Compare the time current characteristics of inverse, very inverse and extremely inverse over current relays. Also discuss there are of applications. **8**

5. a) Explain a scheme of protection for transmission line showing the characteristics in R-X diagram using the following relays. **8**
i) Impedance relay ii) Reactance relay.

b) Explain the effect of following on performance of distance relays. **8**
i) Line length ii) Power swing.

OR

6. a) Illustrate the basic features of 3 zone stepped distance protection scheme for a long transmission line, employing MHO characteristic for Zones 1 and 2, with an offset MHO characteristics for Zone 3 and starting. **8**

b) Explain the directional comparison method of carrier current protection. **8**

7. a) Describe the principle of Merz-price system of protection applied to a power transformer. What are the short comings of this scheme. **8**

b) Describe the method of protecting bus bars by differential relaying. What are the limitations of this method. **8**

OR

8. a) Discuss a scheme of protection for a large three phase induction motor. **8**

b) Draw and explain the differential scheme of an alternator. Discuss it's limitations and suggest remedies to overcome them. **8**

9. a) Give the classification of static relay. Draw and explain the block diagram of a static relay indicating it's basic elements. **8**

b) Explain with a neat sketch - **8**

i) Phase comparator

ii) Amplitude comparator

OR

10. a) Draw and explain block diagram of microprocessor based reactance relay. **8**

b) Explain the following related to microprocessor based relays. **8**

i) Digital Logic Communication.

ii) Direct relay to relay digital logic communication.

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