

B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester - VII
PCC-1 / FE104 - Power System Protection

P. Pages : 2

Time : Three Hours



GUG/S/23/14245

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. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
 6. Answer five questions.
 7. Use of nonprogrammable calculator is permitted.

1. a) In a 132kv system, the inductance and capacitance upto the location of the circuit Breaker are 0.4H and 0.015 μ . Determine **8**
- i) The maximum value of Restriking voltage.
 - ii) The maximum value of RRRV.
 - iii) The frequency of transient oscillation.
- b) Explain in brief recover rate and energy balance theory applicable to current zero interruption. **8**

OR

2. Write short notes on following.
- a) Circuit breaker rating. **6**
 - b) SF6 circuit breaker. **5**
 - c) Air blast circuit breaker. **5**
3. a) Explain the following desirable properties of relays. **8**
- i) Sensitivity.
 - ii) Speed
 - iii) Selectivity
 - iv) Discrimination.
- b) Explain the terms primary and backup protection. Give suitable examples. **8**

OR

4. a) Derive torque equation of electromagnetic relay. **8**
- b) Explain the time graded system for protection of Radial Feeder. What is the draw back of this scheme. **8**

5. a) Explain carrier protection of transmission line based on phase comparison. 8
- b) Explain the effect of arc resistance, line length and source impedance on performance of distance relays. 8

OR

6. a) Draw impedance, reactance and MHO characteristics to protect the 100% of the line having $(4 + j8)$ impedance. A fault may occur at any point on the line through a resistance of 2.5Ω . Determine the maximum percentage of line section which can be protected by each type of relay. 8
- b) Derive the equation for the impedance seen by relay during power swing. Is power swing a fault? Which relay is most suitable for it? 8
7. a) A three phase, 11 kV/132 kV, $\Delta - Y$ connected power transformer is protected by differential protection. The CTS on the LV side have a current ratio of 500/5. What must be the current ratio of the CTS on the HV side and how should they can be connected. 8
- b) What are the abnormal conditions in a large synchronous generator against which protection is necessary. 8

OR

8. Explain in detail for generator protection.
- i) Turn - to - turn fault in stator winding. 5
- ii) Loss of excitation. 6
- iii) Loss of prime mover. 5
9. a) Compare static and electromagnetic Relay. 8
- b) What do you mean by comparator? Explain integrated type phase comparison. 8

OR

10. a) Discuss how amplitude comparator can be converted to phase comparator & vice versa. 8
- b) Explain with a neat sketch microprocessor based Impedance Relay. 8
