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**Question Paper Code : 80386**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Electrical and Electronics Engineering

EE 6702 — PROTECTION AND SWITCHGEAR

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between primary and back up protection?
2. What do you mean by dead spot in zones of protection?
3. What is the significance of PSM and TSM?
4. A relay is connected to 400/5 ratio current transformer with current setting of 150%. Calculate the plug setting multiplier when circuit carries a fault current of 4000A.
5. What is over fluxing? How it affect transformer?
6. Write two protection schemes used for protection of bus-bar.
7. Write two application of static relay.
8. State the difference between conventional relay and numerical relay.
9. What is the difference between re-striking voltage and recovery voltage?
10. State the difference between D.C. and A.C. circuit breaking.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail about the need and different types of earthing scheme. (10)
- (ii) A 132 KV, 3 phase, 50 cycles, overhead line, 50 Km long has a capacitance to earth for each line of  $0.0157 \mu\text{F/Km}$ . Determine the inductance and KVA rating of the arc suppression coil. (6)

Or

- (b) (i) Explain the essential qualities of protection and explain them in detail. (6)
- (ii) Explain the method of calculating fault current using symmetrical components. (10)
12. (a) With a neat diagram explain the working principle of a directional over current relay. Derive the torque equation and also explain about directional relay connection. (6 + 4 + 6)

Or

- (b) From the universal torque equation determine the condition of operation for impedance relay, reactance relay and admittance relay. (16)
13. (a) Draw and explain protection scheme of an A.C. induction motor. (16)

Or

- (b) (i) A generator is protected by restricted earth fault protection. The generator ratings are 13.2 KV, 10 MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground connection. (8)
- (ii) Explain a protection scheme for protection of transformer against incipient fault. (8)
14. (a) How will you synthesize a mho relay using static phase comparator? (16)

Or

- (b) Explain the numerical over current protection and numerical transformer differential protection. (8 + 8)

15. (a) (i) Derive the expression for restriking voltage and maximum RRRV. (8)
- (ii) In short circuit test on a 3 pole, 132 KV, circuit breaker, the following observations are made. Power factor for fault = 0.4, recovery voltage 0.9 times full line value, the breaking current symmetrical, frequency of oscillation of restriking voltage 16 KHZ. Assume neutral is grounded and fault is not grounded. Determine average RRRV. (8)

Or

- (b) (i) With a neat sketch explain the principle of vacuum circuit breaker. (8)
- (ii) Explain the phenomenon of interruption of capacitive current in a circuit breaker. (8)