[6010]-50
B.E. (Electrical Engineering) (Insem)
SWITCHGEAR & PROTECTION
(2019 Pattern) (Semester - VIII) (403148)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

1) Solve Q.1 or Q.2, Q.3 or Q.4.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
4) Assume suitable data, if necessary.
5) Use of non-programmable calculator is allowed.

Q1) a) Discuss various causes of faults in a power system. **[3]**

b) Explain following essential properties of protective relaying - **[6]**

   i) Selectivity

   ii) Stability

   iii) Adequateness

c) The current rating of an overcurrent relay is 5 A. The relay has a plug setting of 150% and time multiplier setting (TMS) of 0.5. The CT ratio is 400/5. Determine the operating time of relay for a fault current of 6000 A. At TMS = 1, operating time at various PSM are given below **[6]**

PSM	2	4	5	8	10	20
Operating time in Sec.	10	5	4	3	2.8	2.4

OR

Q2) a) Draw trip circuit of circuit breaker. **[3]**

b) Derive the torque equation in case of induction type of relays. **[6]**

c) With neat diagram, explain the construction & working of induction type nondirectional overcurrent relay. **[6]**

P.T.O.

Q3) a) Explain high and low resistance principles of arc interruption in case of circuit breakers. **[8]**

b) Explain following terms with respect to circuit breaker switching - **[7]**

   i) RRRV

   ii) Restriking voltage

   iii) Recovery voltage

   iv) Arc voltage

OR

Q4) a) A three phase alternator has the line voltage of 11 kV. The generator is connected to a circuit breaker. The inductive reactance upto the circuit breaker is 5 ohm per phase. The distributed capacitance up to circuit breaker between phase and neutral is 0.01 micro farad. Determine - **[8]**

   i) Peak restriking voltage across the circuit breaker.

   ii) Frequency of restriking voltage transient.

   iii) Average rate of restriking voltage up to peak restriking voltage.

   iv) Maximum RRRV.

b) With help of voltage & current waveform, explain the current chopping phenomenon associated with CB. In which circuit breaker this phenomenon occurs? What measures are taken to reduce it? **[7]**

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