

Total No. of Questions : 4]

SEAT No. :

PA-10180

[Total No. of Pages : 2

[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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