**PB272**

**[6270]-60**

## 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 additional data if necessary.*
5) *Use of non-programmable calculator is allowed.*

*Q1)* a) Explain different causes of faults in a power system. **[3]**

b) Define zones of protection? Explain primary and backup protection with diagrams? **[6]**

c) An IDMT overcurrent relay has a current setting of 175% and a time multiplier setting of 0.5. The relay is connected to supply circuit through a CT having ratio 400/5. Calculate the time of operation of relay if the circuit carries a fault current of 7000A. 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) Explain with neat diagram principle of current differential relay. **[3]**

b) With a suitable diagram explain construction & working of Induction disc type overcurrent relay? **[6]**

c) Explain the trip circuit of C.B with suitable diagram? **[6]**

*P.T.O.*

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

b) Derive the equation for restriking voltage, RRRV & maximum value of RRRV in case of circuit breaker. **[7]**

**OR**

**Q4) a)** A 3 phase 50 Hz alternator has inductance of 3 mH/ph & capacitance of 0.025 $\mu$ F/ph. The circuit breaker opens when RMS current is 8000 A. Determine: **[8]**

  i) frequency of oscillations

  ii) Peak restriking voltage

  iii) Average rate of restriking voltage

  iv) Maximum value of restriking voltage

b) Explain with suitable diagrams resistance switching in case of circuit breaker? State the expression for damped frequency oscillations. **[7]**

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