

Total No. of Questions : 10]

SEAT No. :

P1997

[Total No. of Pages : 3

[5059]-592

**B.E. (Electrical) (End Sem.)
SWITCHGEAR & PROTECTION
(2012 Pattern)**

Time : 2.30 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.No.1 or Q2, Q.No.3 or Q4, Q.No.5 or Q6, Q.No.7 or Q8, Q.No.9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) a) Explain low resistance principle of arc interruption in case of circuit breaker. **[4]**

b) In a 220kv system, the reactance & capacitance upto the location of circuit breaker is 8Ω and $0.025 \mu\text{f}$ respectively. A resistance of 600Ω is connected across the contacts of the circuit breaker. **[6]**

Determine-

- i) Natural frequency of oscillations
- ii) Damped frequency of oscillations
- iii) Critical value of resistance which will give no transient oscillations.

OR

Q2) a) A Vacuum circuit breaker is rated as 3 phase 1500 Amp, 2000 MVA, 33 kv, 3 seconds. Determine - **[4]**

- i) the breaking current
- ii) Making current
- iii) Short time current
- iv) Rated normal current

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- b) In case of circuit breaker, explain following ratings. [6]
- i) Making current
 - ii) Breaking current
 - iii) Short time current rating

- Q3)** a) Write a short note on 'zones of protection' [4]
- b) Explain important properties of SF₆ gas used in case of SF₆ CB [6]

OR

- Q4)** a) Classify relays on the basis of operating time. [4]
- b) Explain following essential qualities of protective relaying - [6]
- i) Stability
 - ii) Adequateness
 - iii) Discrimination

- Q5)** a) Draw a block diagram of static relay & explain its working. State advantages & limitations of static relay. [10]
- b) Explain the construction & working of metal oxide arresters state its advantages & disadvantages. [8]

OR

- Q6)** a) Draw a block diagram of numerical relay. & explain its working state its advantages over conventional & static relays. [10]
- b) Write a short note on - [8]
- i) Sampling theorem
 - ii) PMU (phasor measurement unit)

- Q7) a)** Explain with neat diagram protection scheme of transformer against incipient faults. [8]
- b) With neat diagram explain working of single phasing preventer in case of 3phase induction motor. [8]

OR

- Q8) a)** Explain the protection of alternater against [10]
- i) Loss of prime-mover
- ii) Interturn faults
- iii) Loss of excitation
- b) A 3phase 66kv/11kv, star-delta connected transformer is protected by merz price-system. The CTs on LT side have ratio of 420/5. Calculate the CT ratio on HT side draw this protection scheme also. [6]

- Q9) a)** Explain the effect of arc resistance and power swing on the performance of distance relay. [8]
- b) With neat sketch, explain three step distance protection scheme for transmission lines. [8]

OR

- Q10)a)** Explain how impedance relay is used for transmission line protection. Derive its torque equation. Draw its characteristics on R-x plain. [8]
- b) Draw & explain block schematic of carrier aided protection. [8]

