

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (EEE)/SEM-7/EEE-701/2010-11

2010-11

POWER SYSTEM - II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Which of the following results in a symmetrical fault ?
 - a) Single phase to earth
 - b) Phase to earth
 - c) All the three phase to earth
 - d) Two phase to earth.
- ii) The most common type of fault is
 - a) Single phase to ground
 - b) Phase to phase
 - c) Two phase to ground
 - d) Three phase to ground.



- iii) The maximum short circuit current occur in the case of
 - a) a three phase bolted fault
 - b) a double line to ground fault
 - c) a line to line fault
 - d) a single line to ground fault.
- iv) Current limiting reactor may be
 - a) air cored air cooled
 - b) oil immersed magnetically shielded
 - c) oil immersed non-magnetically shielded
 - d) any of these.
- v) In a star connected system without neutral grounding zero sequence currents are
 - a) zero
 - b) phasor sum of phase currents
 - c) same as *rms* value of phase currents
 - d) same as peak value of phase currents.
- vi) A circuit breaker is essentially
 - a) an arc extinguisher
 - b) a current interrupting device
 - c) a power factor correcting device
 - d) a device for neutralizing the effects of transients.



- vii) In a balanced 3 phase system,
- a) positive sequence is present
 - b) zero sequence is present
 - c) positive and negative sequences are present
 - d) none of these.
- viii) The torque produce in shaded pole structure induction type relay is
- a) proportional to the square of the current
 - b) proportional to the current
 - c) inversely proportional to the current
 - d) inversely proportional to the square of the current.
- ix) Over current protection responds to
- a) increase in current above peak up value
 - b) single line to earth fault
 - c) double line to earth fault
 - d) all of these.
- x) Impedance relay can be used for
- a) phase fault only
 - b) earth fault only
 - c) both earth and phase faults
 - d) transmission line.



xi) Equal area criterion is used to determine

- a) stability
- b) short circuit capability
- c) transient over voltage
- d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

$$3 \times 5 = 15$$

2. What is the reason of chatting noise in a.c. electro-magnetic attraction disc type relay ? Explain.
3. Describe IDMT characteristics. How is this obtained in practice ?
4. What are arc phenomena ? Explain different methods of arc extinction in circuit breaker.
5. Explain the different uses of current limiting reactor.
6. Explain the techniques adopted for bus bar protection. Establish its importance.



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain with neat sketch the construction, use, advantage and disadvantage of a SF6 circuit breaker.
- b) A 50Hz, 11kV, 3-phase alternator with earthed neutral has a reactance of 5Ω per phase and is connected to a bus-bar through a circuit breaker. The distributed capacitance up to circuit breaker between phase and neutral is $0.01 \mu\text{F}$. Determine
- i) Peak re-striking voltage across the contacts of the breaker.
 - ii) Frequency of oscillations
 - iii) The average rate of rise of re-striking voltage up to the first peak. 7 + 8
8. a) Develop the expression for fault current in a power system for a L-G fault and draw the interconnection of sequence networks for this type of fault.



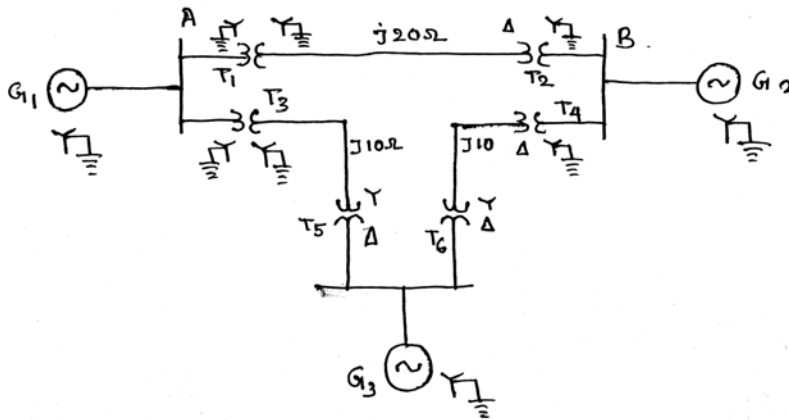
- b) Find the fault current for a L-G fault at C in the system shown in figure. The ratings of different equipment are :

G_1, G_2 :- 40MVA, 13.2kV, $X''=0.15\text{pu}$, $x_2=0.15\text{pu}$, $x_0=0.08\text{pu}$.

G_3 :- 60MVA, 13.8kV, $X''=0.20\text{pu}$, $x_2=0.20\text{pu}$, $x_0=0.08\text{pu}$

T_1, T_2, T_3, T_4 :- 40MVA, 13.8/138kV, $X_1=X_2=0.10\text{pu}$, $X_0=0.08\text{pu}$.

T_5, T_6 :- 30MVA, 13.8/138kV, $X_1=X_2=0.10\text{pu}$, $X_0=0.08\text{pu}$.



7 + 8

9. a) Discuss critical angle.
- b) A motor is receiving 25% of the power that it is capable of receiving from an infinite bus. If the load on the motor is doubled, calculate the maximum value of ' δ ' during the swinging of the rotor around its new equilibrium position.

7 + 8



10. What is load flow solution ? Explain its significance in power system analysis. Classify various system of buses in a power system for load flow studies. 2 + 8 + 5

11. Write short notes on any three of the following : 3 × 5

- a) Mho relay
 - b) Vacuum circuit breaker
 - c) Power angle curve
 - d) Current chopping in circuit breaker.
 - e) Impedance relay.
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