

2125  
B.E. (Electrical and Electronics Engineering)  
Fifth Semester  
PC-EE-501: Power System - II

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part. Assume the missing data.

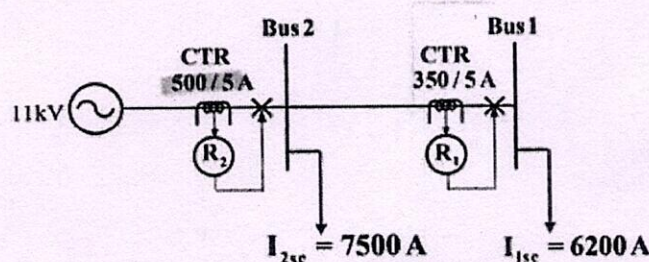
x-x-x

- 1 (i) Explain the following terms regarding SF6 gas usage as medium in circuit breaker
- Electronegativity
  - Arc time constant
- (ii) Define making and breaking current of a circuit breaker.
- (iii) Discuss role of impulse wave in selection of rating of lightning arrester.
- (iv) What is the role of switching resistors in air blast circuit breakers?
- (v) Define earth electrode and ground resistance. How these are correlated.

(5x2)

PART-A

- 2 (i) Derive an expression for short circuit current in an RL series circuit fed from alternating current source. Show that current has a DC component and ac component.
- (ii) A three phase 11 KV, 50000 KVA star connected alternator has differential protection. The neutral is earth through a resistance of 8 ohms. The relay operates for out of balance of 18% full load. Calculate percentage of winding on unprotected against ground fault. (5,5)
- 3 (i) Discuss protection of mesh type feeders using over current relay in the presence of directional, non-directional and time graded unit.
- (ii) What is directional unit? Explain its construction and working in combination with IDMT relay. (5,5)
- 4 (i) Why overreach and under reach criteria occur in distance relay? How these problems are overcome?
- (ii) The protective relay for an 11 kV radial system is as shown below. The overcurrent relay is IDMT in nature with rated current of 5A. The PSM for both R1 and R2 is 100%. For fault on bus 1, R1 should operate in 0.5 sec and coordination time between R1 and R2 required is 0.4 sec between R1 and R2.
- Find TMS for R1 and R2.
  - Find operating time of R2 in seconds for the calculated TMS as in(a).



(5,5)

P.T.O.

(2)

**PART-B**

- 5 (i) A 132 KV, 3 phase, 50 Hz overhead line of 30 km length has a capacitance to earth of each line of  $0.0157 \mu\text{F}$  per kilometre. Find line inductance and KVA rating of the earth suppression coil suitable for this line.
- (ii) Discuss the phenomena of current chopping and the principle of resistance switching.
- (iii) Describe arc quenching process in buffer type SF6 circuit breaker. (3,3,4)
- 6 (i) Explain the statement in an ungrounded system healthy line voltage increase by root 3 times during an Earth fault on third line with the help of a Phasor diagram.
- (ii) A 50Hz, 3-phase alternator with ground neutral has inductance of 1.4 mH per phase and connected to bus bar through a CB. The capacitance between alternator and circuit breaker is 0.05 microfarad. The CB opens when RMS value of current is 8000 A. Find RRRV (max), time to reach RRRV (max) and recovery voltage. (5,5)
- 7 (i) Define the terms for lightning arrester
- (a) Rated voltage of Discharge current
  - (b) Normal discharge current
  - (c) Residual voltage
  - (d) Power frequency impulse
  - (e) Non-linear resistance
- (ii) Discuss the protection of transmission lines against direct strokes.

(5,5)