B.E. (Electrical Engineering (Electronics & Power)) Seventh Semester (C.B.S.)

Electrical Power System - II

P. Pages : 3 **TKN/KS/16/7547**

Time : Three Hours * 0 9 0 2 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Use of non programmable calculator is permitted.

1. a) What are the different types of symmetrical components? Explain their significance. **5**

b) Determine the symmetrical components of current in a three phase system. The original phasors are $Ia = (12 + j6)$, $Ib = (12 - j12)$, $Ic = (-15 + j10)$. **8**

OR

2. a) Show that the positive and negative sequence impedances of transmission lines are same, where as its zero sequence impedance is higher than positive sequence impedance. **7**

b) Draw and explain zero sequence networks for the following type of transformer connections. **6**

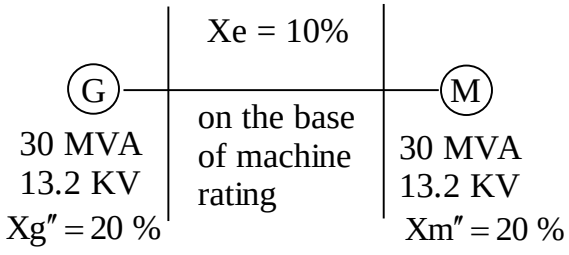
i) $\Delta - \Delta$

ii) Y–Y

iii) $\Delta - Y$

3. a) State the fault in electrical power system, in order of severity of fault and the order of the frequency of occurrence of faults. **5**

b) A generator is supplying a motor over a cable shown in figure. The motor is drawing 20MW at 0.8 P.F. leading at a terminal voltage of 12.8 KV when a symmetrical three phase fault occurs at motor terminals. Find the sub transient current in generator, motor and fault. **9**



OR

4. a) Why do we use reactor in power system? How are they classified? **6**

b) A three phase transmission line operating at 33KV and having resistance and reactance of 5Ω and 20Ω respectively is connected to a generator bus bar through a 15 MVA step up transformer which has reactance 0.06 pu. Alternator having capacities of 10 MVA and 5 MVA with reactance's of 0.1 pu and 0.075 pu respectively are connected to generator bus of 11 KV calculate short circuit MVA for a short circuit between the phases occurring at **8**

i) HV terminal of transformer
ii) At load end of line

5. a) Derive the relationship to determine the interconnection of sequence network for L – G fault. Also draw sequence network. **7**

b) Two 11 KV, 20 MVA, $3-\phi$ star connected generators operate in parallel. The +ve, -ve & zero seq. reactance's of each being respectily j 0.18, j 0.15 and j 0.10 p.u. The star point of one of the generator is isolated and that of the other is earthed through 2Ω resistor. A single line to ground fault occurs at the terminal of one of generator. Find **6**

i) The fault current.
ii) Current in the ground resistor.
iii) Voltage across the grounding resistor.

OR

6. a) Derive and draw the sequence network interconnection for one conductor open fault. **6**

b) A 25 MVA, 13.2 KV alternator with solidly grounded neutral has a subtransient reactance of 0.25 pu. The negative and zero sequence reactance's are 0.35 and 0.1 pu. respectively. Determine the fault current and line to line voltage when **7**

i) A single line to ground fault occurs at the terminals of unloaded alternator.
ii) A line to line fault occurs at the terminals of unloaded alternator.
iii) A double line to ground fault occurs at the terminals of unloaded alternator (neglect resistances)

7. a) Explain equal area criteria of stability when there is a sudden loss of one of the two parallel lines. **7**

b) A 50 cycle, 4 pole turbo generator of rating 20 MVA, 13.2 KV has an inertia constant of H = 9 KW sec/KVA. Find the kinetic energy stored in the rotor at synchronous speed. Find the acceleration if the input less, th rotational losses is 26800 hp and electric power developed is 16 MW. **6**

OR

8. a) What is mean by swing curve? What information is supplied by it? Derive the swing equation. **6**

b) A synchronous generator at 50Hz is on load of 1 p.u. connected to infinite bus. The maximum power transfer under healthy condition is 1.8 p.u. During the fault maximum power transfer is 0.4 p.u. After clearance of fault the maximum power transfer is 1.3 p.u. Determine the critical clearing angle for the stability. **7**

9. a) Write the function of load dispatch center. **5**

b) What is the importance of B – coefficient. Derive B – coefficients for two power plant system. **8**

OR

10. a) The fuel cost of two units are given by **7**

$F_1 = C_1 = 100 + 2P_1 + 0.005P_{12}$ Rs / hr.

$F_2 = C_2 = 200 + 2P_2 + 0.01P_{22}$ Rs / hr.

P_1 and P_2 are in MW. The plant supplies load of 450 MW. Find the economic load scheduling of the two unit and incremental fuel cost. Neglect transmission losses.

b) Explain : **6**

i) Input / Output curve of unit.

ii) Algorithm for coordination equation

11. a) Explain different types of earthing. **6**

b) What are the methods of avoiding arcing ground. Explain any one method. **8**

OR

12. a) A 230 KV, 3ϕ, 50 Hz, 200 km line has a capacitance to earth of $0.02\mu f / km / ph$. Calculate the inductance and KVA rating of the Peterson coil used for earthing. **6**

b) Explain the neutral grounding and discuss it's advantages & disadvantages in details. **8**

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