C 14724 (Pages 4) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

EE 04 604—POWER SYSTEMS—II

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) Three generators are rated as follows :

Generator 1 = 100 MVA , 33 kV, X = 10%

2 = 150 MVA , 32 kV, X = 8%

3 = 110 MVA , 30 kV, X = 12%

Determine the reactance of the generators corresponding to base values of 200 MVA and 35 kV.

(b) Classify various types of buses in a power system for load flow studies and explain what is load flow studies.

(c) The fuel input per hour of plants 1 and 2 are given as :

$F_1 = 0.2\ P_1^2 + 40\ P_1 + 120$ Rs. per hr ; $25 \leq P_1 \leq 100$ MW

$F_2 = 0.25\ P_2^2 + 30\ P_2 + 150$ Rs. per hr ; $25 \leq P_2 \leq 100$ MW.

The demand is 180 MW and transmission losses is neglected. Determine the economic operating schedule and corresponding cost of generation.

(d) Explain briefly about the automatic load dispatching and explain each block in detail.

(e) List types of faults in power system and explain single line to ground fault in detail.

(f) Write short notes about Sequence Impedance in power system.

(g) Explain briefly what is meant by steady-state, transient state and dynamic stability.

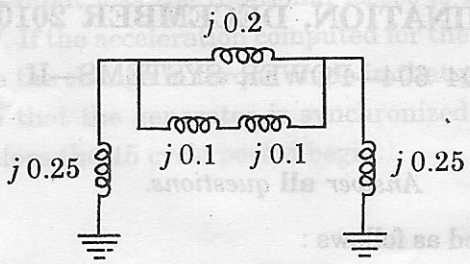
(h) What are all the factors affecting voltage stability ?

(8 × 5 = 40 marks)

2. (a) Explain clearly with the aid of a flowchart the computational problem of load flow solution using Gauss Seidal method when the system contains all types of buses.

Or

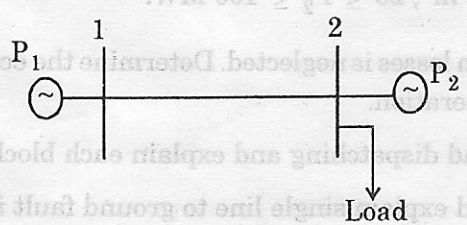
(b) Form the Bus Impedance Matrix for the Network given using Bus building Algorithm.



3. (a) For a given two bus system, if the load of 125 MW is transmitted from Plant 1 to the load, a loss of 15.625 MW is incurred. Determine the generation schedule and the load demand if the cost of received power is Rs. 24/MWhr. Solve the problem using co-ordination equation approach. The incremental production costs of the plants are :

$$\frac{dF_1}{dP_1} = 0.025\ P_1 + 15$$

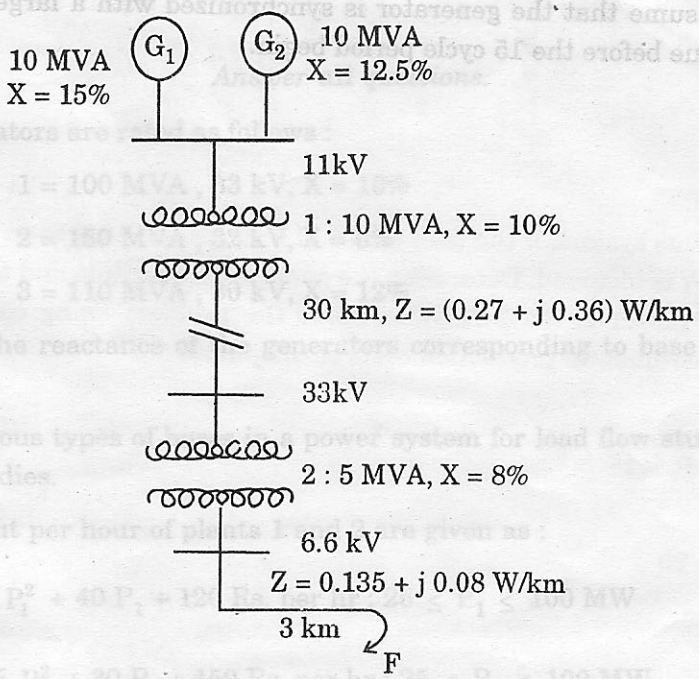
$$\frac{dF_2}{dP_2} = 0.05 + 20$$



Or

(b) Explain with the aid of a flowchart the solution of optimal dispatch problem through the use of Modified co-ordination equation.

4. (a) For the radial network shown below, a three phase fault occurs at F. Determine the fault current and the line voltage at 11 kV bus under fault condition.



Or

(b) Derive the sequence networks for fault on an unloaded generator with natural impedance Z_w and fault impedance Z_r for :

(i) Line to ground fault with Z_r.

(ii) Line to line fault with Z_r.

5. (a) Explain briefly about what is meant by equal area criteria. Derive an expression for equal area criterion.

Or

(b) A 50 Hz 4 pole turbo generator rated 20 MVA, 13.2 kV has an inertia constant of H = 9 kW-sec/kVA. Determine the K.E stored in the rotor at synchronous speed. Determine the acceleration if the input less the rotational losses is 25000 HP and the electric power developed is 15000 kW. If the acceleration computed for the generator is constant for a period of 15 cycles, determine the change in torque angle in that period and the r.p.m. at the end of the 15 cycles. Assume that the generator is synchronized with a large system and has no accelerating torque before the 15 cycle period begin.

(15 marks)

(4 × 15 = 60 marks)