C 47616 EE

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Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
JUNE 2008

Electrical

EE 04 604—POWER SYSTEMS—II

Time : Three Hours

Maximum : 100 Marks

1. (a) Write short notes on conditioning of Y-matrix.

   (b) Write down the Algorithm for Newton-Raphson method.

   (c) The Fuel inputs per hour of plants 1 and 2 are given as :

   $$F_1 = 0.2P_1^2 + 40P_1 + 120 \text{ Rs per hr}$$

   $$F_2 = 0.25\,P_2^2 + 30\,P_2 + 150 \text{ per hr}$$

   Determine the economic operating schedule and the corresponding cost of generation of the maximum and minimum of loading on each unit is 100 MW and 25 MW ; the demand in 180 MW and the transmission lines are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost.

   (d) Write a brief note on Automatic Voltage regulation.

   (e) A single line to ground fault of 0.05 N resistor occur in a 3 D system supplied by a synchronous generator with a generator e.m.f. of 11 kV between lines. The positive, negative and zero sequence reactances of the generator and networks upto the fault are 0.5 N, 0.2 N and 0.1 N respectively. Find the fault current.

   (f) In what aspects are the fault calculations, for a fault on the alternator terminals, different from the fault calculations for a fault in a Power System network.

   (g) What are the methods of improving the transient stability limits of a power system ?

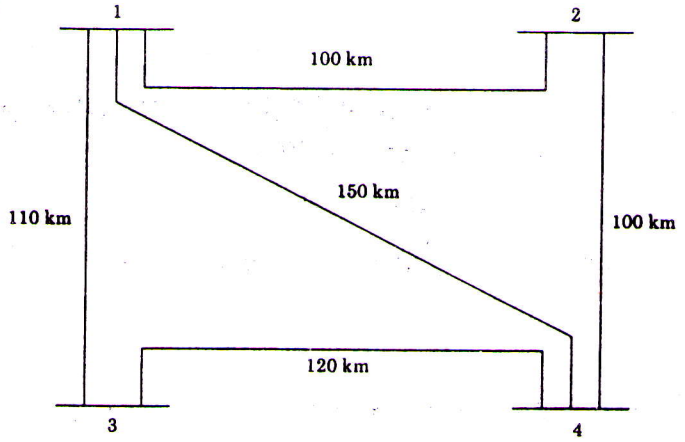
   (h) Explain briefly what is meant by steady state, transient and dynamic stability. Give the factors that affect the transient stability of the system.

   (8 × 5 = 40 marks)

2. (a) Explain clearly with the aid of a flow chart the computational problem of load flow solution using Gauss Seidel Method.

Or

(b)



(i) Find the bus incidence matrix A for the four bus system shown in the above figure Take ground as a reference.

(ii) Find the Primitive admittance matrix for the system. It is given that all the lines are characterized by a series impedence of $0.1 + j\ 0.7\Omega$/km and a shunt admittance of $j\ 0.35 \times 10^{-5}$ ℧/km. Lines are rated at 220 kV.

3. (a) Explain with the aid of flowchart, the solution of optimal dispatch problem through the use of modified co-ordination system.

Or

(b) With neat diagrams explain the automatic voltages controller for an alternator.

4. (a) Derive an expression for the fault current and voltages in terms of symmetrical components for one conductor open fault.

Or

(b) Determine the fault current in each phase flowing in a double-line-to-ground short circuit at the terminal of a star connected synchronous generator operating initially on an open circuit voltage of 1.0 pu. The positive, negative and zero sequence reactances of the generator are $j\ 0.35$, $j\ 0.5$, $j\ .20$ respectively and its star point is isolated from ground.

5. (a) Explain briefly what is meant by equal area criteria. Derive an expression for the critical clearing angle.

A 50 Hz generator is delivering 50 % of the power that is capable of delivering through a transmission line to an infinite bus.A fault occurs that increases the reactance between the generator and infinite bus to 500 % of the value before the fault. When the fault is isolated, the maximum power that can be delivered is 75 % of the original maximum value. Determine the critical clearing angle for the condition described.

Or

(b) Starting from first principles, derive the swing equation of a synchronous machine. Define inertia constant.

(4 × 15 = 60 marks)