This question paper contains 3 printed pages.

8488

Your Roll No.....

B.Tech. / III **A**

Paper (EEE - 306)
COMPUTER METHODS IN POWER SYSTEMS

Time : 3 hours *Maximum Marks :70*

(Write your Roll No. on the top immediately on receipt of this question paper.)

*Attempt any **five** questions.*
Assume suitable missing data, if any.

1. a) Draw an impedance diagram for the system shown in Fig. 1, expressing all values as per - unit values. *07*

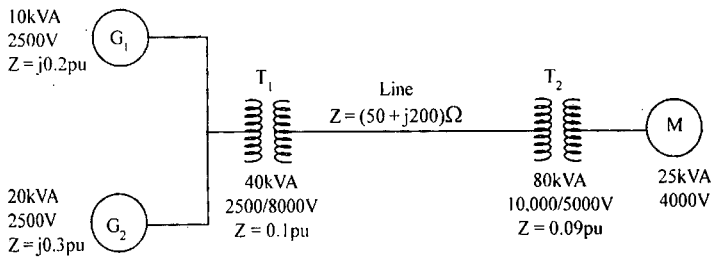

Fig. 1

b) A single - line diagram for a four - bus system is shown in fig 2. The line impedances are given in Table 1. Determine Y_{BUS}.

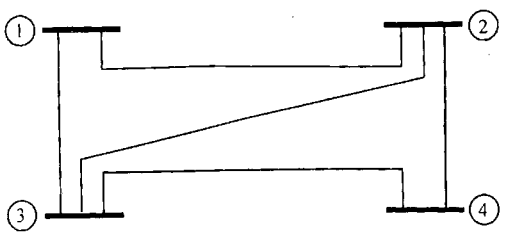

Fig. 2

Line (bus to bus)	R, pu	X, pu
1 - 2	0.05	0.15
1 - 3	0.10	0.30
2 - 3	0.15	0.45
2 - 4	0.10	0.30
3 - 4	0.05	0.15

Table 1.

2 a) Explain Z_{BUS} Building Algorithm. *07*

b) Find Z_{BUS} for the system shown in Fig 3. All impedances are per unit values. *07*

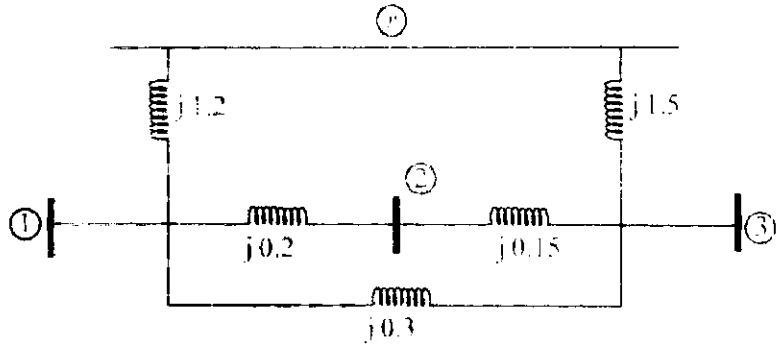

Fig. 3

3 a) Draw and explain the approximate model of a symmetrical fault on a no load synchronous machine. *07*

b) An incremental generator - reactor system is shown in Fig. 4. The base values for the given percent reactances are the ratings of the individual pieces of equipment. A three phase short - circuited occurs at point F. Determine the fault current and fault kVA if the bus bar line - to line- voltage is 11kV. *07*

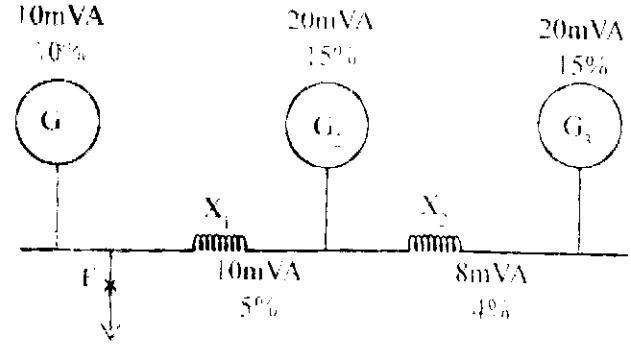

Fig. 4

4 a) Derive the Swing equation of synchronous machine. *07*

b) A 50Hz four pole turbogenerator rated 20MVA. 13.2kV has an inertia constant of H = 9.0kW.sec/kVA. Determine the K.E. stored in the rotor at synchronous speed. Determine the acceleration if the input less than rotational losses is 25000HP and the electric power developed is 15000kW. 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 rpm at the end of 15 cycles. Assume that the generator is synchronized with a large system and has no accelerating torque before the 15 cycle period begins. *07*

5 a) Explain the equal ame criteria and critical clearing time. *07*

b) Figure 5 shows a generator connected to an infinite bus through high voltage lines. Breaker adjacent to a fault on both sides are arranged to clear simultaneously. Determine the critical clearing angle for the generator for a 3 - phase fault at the point P when the generator is delivering 1.0pu power. Assume voltage behind transient reactance is 1.2pu for the generator and the voltage at the infinite bus is 1.0pu. *07*

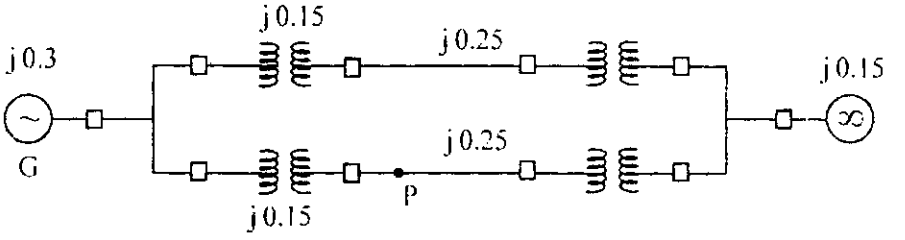

Fig. 5

6 a) Explain Steady State stability and Transient stability. *07*

b) Develop the expression for real and reactive power flow and hence develop the power angle curve. *04*

c) Find the steady state power limit of a system consisting of a generator equivalent reactance 0.50pu connected to an infinite bus through a series reactance of 1.0pu. The terminal voltage of the generator is held at 1.20pu and the voltage of the infinite bus is 1.0pu. *03*

7 a) Explain the point by point method of solution of surring equation. *07*

b) Explain the methods of improving steady-state and transient state stability. *07*