Duration – 3 Hours Total Marks - 80

N.B.: - (1) Question No.1 is compulsory.
(2) Attempt any Three questions from Q2. to Q6.
(3) Assume suitable data if necessary and justify the same.
(4) Figures to right indicate full marks

Q1. Answer the following questions

A) Discuss the various reliability considerations in economic system operation. **05**

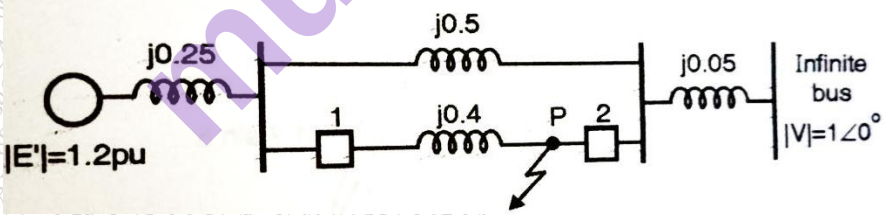
B) State assumption made in transient stability studies. **05**

C) What is the significance of load flow analysis in a power system? **05**

D) Explain Y_{BUS} formation by singular transformation. **05**

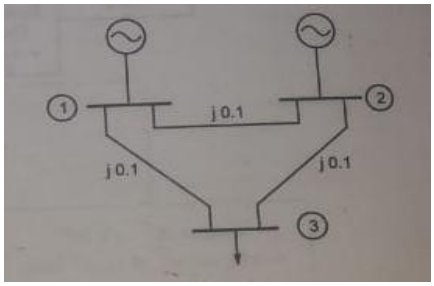
Q2 a) Explain the swing equation which describes the rotor dynamics for a synchronous machine. **10**

Q2 b) A three phase fault is applied at the point P (at the end of one of the parallel line) as shown in figure. Fault is cleared by simultaneous opening of the breakers 1 and 2. The reactance values of various components are indicated on the diagram. The generator is delivering 1.0 pu power at the instant preceding the fault. Find the critical clearing angle for clearing the fault. **10**



Q3 a) Discuss the various assumptions in decoupled and fast decoupled load flow method. **10**

Q3 b) Using Gauss-Seidel load flow method, find bus voltage at the end of one iteration for the following bus system. Line reactances are shown in figure. Ignore resistance and line charging. Assume initial voltage at all buses to 1.0<0°. Use 1.0 as acceleration factor. The bus data is given in the table below: **10**



Bus No.	Specified P(pu)	Injections Q (pu)	Specified V(pu)
1	----	----	1.0
2	0.3	----	1.0
3	0.5	0.2	----_

Q4 a) A system consists of two plants connected by tie line and load is located at plant 2. When 100MW are transmitted from plant 1, a loss of 10MW takes place on the tie line. Determine the generation schedule at both the plants and power received by the load when λ for the system is Rs. 25 per MWhr and the incremental fuel cost (IC) are given by equation. **10**

$IC_1 = 0.03P_1 + 17$ Rs/MWhr

$IC_2 = 0.03P_2 + 19$ Rs/MWhr

Q4 b) Derive formula for B_{mn} Coefficients in transmission loss formula. **10**

Q5 a) Explain dynamic response of load frequency controller with and without integral control action. **10**

Q5 b) Two generators rated 200MW and 400MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at 50 Hz sharing the full load of 600 MW in the ratio of their ratings. If the load reduces to 400MW how will it be shared among the generators and what will be the system frequency be? Assume free governor operation. **10**

Q6 a) Draw and explain importance of P-V and Q-V curves. **10**

Q6 b) Explain the concepts of Capacity and diversity interchange **10**
