Duration: 3 Hours **Total Marks: 80**

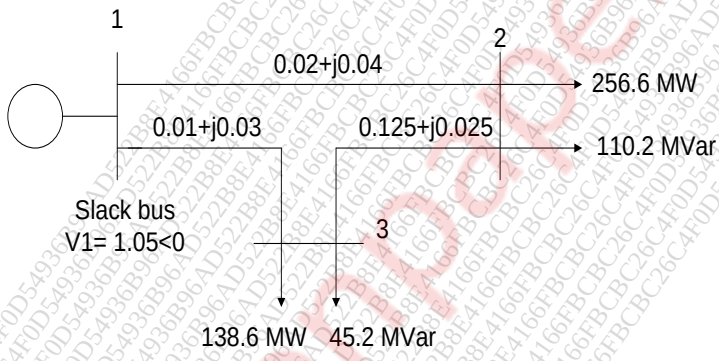
Note: 1. **Q. 1** is **compulsory.**
2. Solve any **3** questions out of remaining questions.
3. Assume suitable data if necessary.

Q.1 Solve any four [20]

a. Write assumptions made for obtaining approximate load flow equations
b. What is the importance of power pool in interchange of energy?
c. What is an equal area criterion?
d. What are the assumptions made in Fast decoupled load flow studies?
e. Draw heat rate and write its importance for economic load dispatch

Q2

a. For the given diagram of 3 bus system, line impedances are marked in pu on a 100MVA base, voltage at slack bus and scheduled loads are given at buses 2 and 3. Use GS method to calculate voltage at bus 2 and 3, after first iteration. [10]



b. Derive the swing equation for a synchronous machine that describes the rotor dynamics. [10]

Q3

a. Explain formation of Y bus by singular transformation. [10]

b. A two bus system is considered. If a load of 125MW is transmitted from plant 1 to load a loss of 15.635MW is increased. Determine generation schedule and load demand if cost of received power is Rs 24MW/hr. Solve the problem using coordination equations and penalty factor approach. The incremental production costs of plants are

$\frac{dF_1}{dP_1} = 0.025P_1+15$ $\frac{dF_2}{dP_2} = 0.05P_2+20$ [10]

Q4

a. Derive the expression for the exact coordination equation. [10]

b. Explain dynamic response of load frequency controller with and without integral control action. [10]

Q5

a. A 60Hz generator is delivering 50% of maximum permissible power through a transmission system to an infinite bus. A fault occurs and causes transfer reactance to increase to 400 % of the value before fault. When the fault is isolated and the maximum power transfer is 75% of the original maximum value. Determine the critical clearing angle using equal area criterion. [10]

b. Explain the load frequency control by turbine speed governing system and derive the speed governing model. [10]

Q. 6 Write short notes on [20]

a. Optimal Unit commitment and reliability considerations.
b. P-V curve for voltage stability analysis
