Q.P. Code :22962

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

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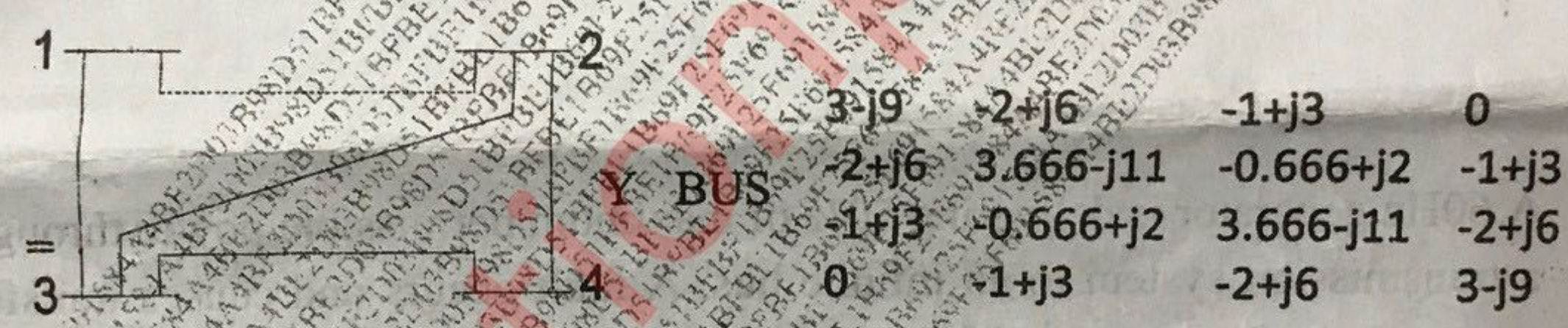2. Solve any **3** questions out of remaining questions.
3. Assume suitable data if necessary.

Q.1   [20]
- a. What are the assumptions made in transient stability studies?
- b. What is an equal area criterion?
- c. What are the assumptions made in Fast decoupled load flow studies?
- d. Draw and explain heat rate curve and input output curve.

Q2
- a. For the system of figure the generators are connected at all the four buses while loads are at buses 2 and 3. Values of real and reactive powers are listed in table given below. All buses other than the slack are PQ type. Assuming a flat voltage start, find the voltages and bus angles at the three buses at the end of the first GS iteration.   [10]

Y BUS

3-j9	-2+j6	-1+j3	0
-2+j6	3.666-j11	-0.666+j2	-1+j3
-1+j3	-0.666+j2	3.666-j11	-2+j6
0	-1+j3	-2+j6	3-j9

BUS	P pu	Q pu	V pu
1			1.04∠0°
2	0.5	-0.2	-
3	-0.1	0.5	-
4	0.3	-0.1	-

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

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Q3

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

b. The incremental fuel costs for 2 units of a plant are

$$dF_1/dP_1 = 0.01P_1 + 11$$
$$dD_2/dP_2 = 0.012P_2 + 8$$

Find saving in Rs/hr. for economical distribution of load compared with equal load sharing when total output is 750 MW. [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. Power pool and transactions

b. Optimal Unit commitment and reliability considerations.

c. P-V curve for voltage stability analysis

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