June 6, 2024 10:30 am - 01:30 pm 1T00837 - B.E.(Electrical Engineering)(SEM-VII) (Choice Base Credit Grading System)(R- 2019-20)(C Scheme) / 42272 - Electrical Power System III QP CODE: 10054925

Duration: 3hrs **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1. Answer any Four from the following [20]

a. Draw and explain heat rate curve and input-output curve in power system?

b. What are the methods to improve transient stability power limit?

c. What are the assumptions made in fast decoupled load flow studies?

d. What is control area? Draw block diagram of single area control system.

e. Draw and explain the interconnection between each operating state in a power system

Q 2. A. Explain conditions for steady state stability in power system. What is steady state stability power limit? [10]

B. Derive the expression for economic load dispatch considering transmission losses (Exact Coordination equation). [10]

Q 3. A. Compare NR and GS load flow methods in a power system. [10]

B. A single area consists of two generating units, rated at 400 and 800 MW, with speed regulation of 4 percent and 5 percent on their respective ratings. The units are operating in parallel, sharing 700 MW. Unit 1 supplies 200 MW and unit 2 supplies 500 MW operating at a frequency of 60 Hz. The load is increased by 130 MW. Find the steady-state frequency deviation and the new generation on each unit. [10]

Q 4 A. Derive Swing equation for a synchronous machine that describes rotor dynamics. [10]

B. Three generating units of a power system are having the following cost curves: [10]

$F_1 = 0.004P_1^2 + 7.2P_1 + 350 \quad Rs/Hr$

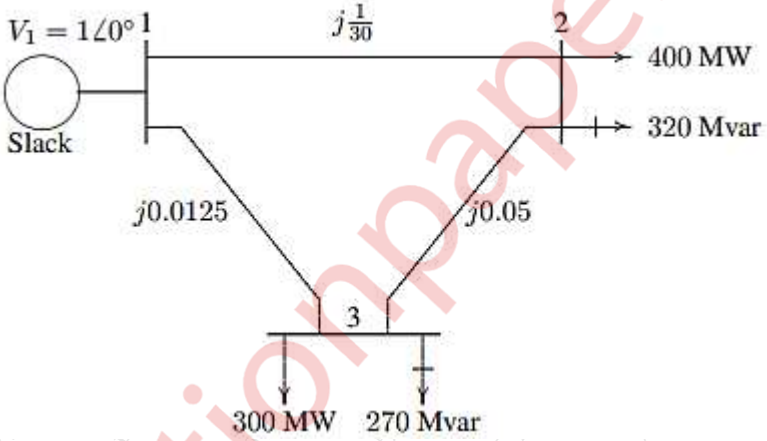
$F_2 = 0.0025P_2^2 + 7.3P_2 + 500 \quad Rs/Hr$

$F_3 = 0.003P_3^2 + 6.74P_3 + 600 \quad Rs/Hr$

P1, P2 and P3 are in MW. Determine the economic dispatch for the units for a total load of 450 MW, neglecting the transmission lines losses. Also find the savings for operation on Economic dispatch compared to equal load sharing.

Q 5 A. Explain the load frequency control by turbine speed governing system and draw complete block diagram of the speed governing model. [10]

B. Figure shows the one-line diagram of a simple three-bus power system with generation at bus 1. The voltage at bus 1 is $V_1 = 1.06\angle 0°$ per unit. The scheduled loads on buses 2 and 3 are marked on the diagram. Line impedances are marked in per unit on a 100 MVA base. Line resistances and line charging susceptances are neglected. Using Gauss-Seidel method determine V_2 and V_3 for first iteration assuming flat voltage start. [10]



Q 6. A. Explain the different types of energy transactions and interchanges in power system. [10]

B. Consider a power system where a single machine tied to an infinite bus through two parallel lines. If a sudden short circuit occurs at sending end of one of the parallel lines, explain equal area criteria for stability of the system. The maximum power transmitted under pre fault, duringfault and post fault is P_{maxI}, P_{maxII}, P_{maxIII}. [10]

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