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GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170901 **Date:25/01/2021**

Subject Name:Inter Connected Power System

Time:10:30 AM TO 12:30 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	State the purpose of load flow study. What information is available from load flow study?	**03**
	(b)	In a power system consisting of two generating stations the incremental costs in Rs/MWh are IC1 = $0.15P_1 + 35$, IC2 = $0.20P_2 + 28$. The plant supplies a load of 150 MW. Neglecting losses determine the most economical division of load.	**04**
	(c)	From the first principles, derive the swing equation for synchronous machine	**07**
Q.2	**(a)**	What is meant by interconnected power system? State its advantages	**03**
	(b)	Discuss flat frequency method for frequency control	**04**
	(c)	For a 3-bus system, the line impedances in p.u. are given below Line (bus to bus) — Impedance 1-2 — 0.06 + j0.18 1-3 — 0.03 + j0.09 2-3 — 0.08 + j0.24 Determine Y_{BUS} matrix	**07**
Q.3	**(a)**	Is FDLF method superior to NR method of load flow? Comment.	**03**
	(b)	A power system has two generating stations and power is being dispatched economically with P_1 = 150 MW and P_2 = 275 MW. The loss coefficients are B_{11} = 0.001 MW^{-1}, B_{12} = -0.0001 MW^{-1} , B_{22} = 0.0013 MW^{-1}. Find the penalty factor of plant 1.	**04**
	(c)	Derive the transmission loss formula explaining current distribution factors. Clearly state all assumptions made in above derivation.	**07**
Q.4	**(a)**	An alternator having an induced emf of 1.6 pu is connected to an infinite bus having voltage of 1.0 pu. If the bus bus bar has reactance of 0.6 pu and the alternator has reactance of 0.2 pu, find the steady state stability limit in pu	**03**
	(b)	Write short notes on Tie line load bias control	**04**
	(c)	Describe the turbine speed governing system for controlling the real power flow in power system	**07**

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Q.5	**(a)**	Define steady state stability and transient stability	**03**
	(b)	A synchronous generator of reactance 0.4 pu is connected to an infinite bus (|V| = 1.0 pu) through transformers and transmission line having total reactance of 0.2 pu. The generator no load voltage is 1.2 pu and inertia constant H = 5 sec. Calculate the frequency of natural oscillations if generator is loaded to 60% of its maximum power transfer limit. Assume f = 60 Hz	**04**
	(c)	Explain how existing Z_{BUS} matrix is modified when a link is added between two old buses (Type 4 modification)	**07**
Q.6	**(a)**	Discuss equal area criteria of stability	**03**
	(b)	What is synchronizing coefficient? How it helps in determining system stability?	**04**
	(c)	State and explain different methods of voltage control	**07**
Q.7	**(a)**	Explain the phenomena of cascade tripping in power systems	**03**
	(b)	Discuss the tasks carried out by Load Dispatch Centre	**04**
	(c)	Explain the method of numerical solution of swing equation	**07**
Q.8	**(a)**	Explain the reclosure case of equal area criterion showing the critical clearing angle δ_{cr} and angle of reclosure δ_{rc}	**03**
	(b)	Two generators operate in parallel and supply a total load of 400 MW. The capacities of the machines are 200 MW and 500 MW and both the generators have droop characteristics of 4% from no load to full load. Calculate the load taken by the each machine assuming free governor action. Also find the system frequency at this load. No load frequency is 50 Hz.	**04**
	(c)	A generator is delivering 60% of its maximum power to an infinite bus through a transmission line. A fault occurs such that the reactance between the generator and the infinite bus is increased to 3 times its pre-fault value. When the fault is cleared the maximum power that can be delivered is 80% of the original maximum value. Determine the critical clearing angle	**07**

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