Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160920 Date:30-05-2025

Subject Name: Inter Connected Power System

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is meant by interconnected power systems? Explain in brief, the advantages of interconnection	**03**
	(b)	What is cascade tripping? Which conditions can lead to cascade tripping? Also explain the concept of islanding	**04**
	(c)	What is bus admittance matrix? Why bus admittance matrix is generally sparse? Discuss the formulation of bus admittance matrix using singular transformation method	**07**
Q.2	**(a)**	Discuss load flow problem and hence derive static load flow questions.	**03**
	(b)	Derive the criteria for most economic dispatch neglecting transmission losses	**04**
	(c)	Explain why frequency control is important in power system? Give valid reasons and explain which component of power system would be adversely affected when frequency deviates significantly from its normal value? Discuss tie line load bias method of frequency control	**07**
		OR	
	(c)	Discuss the different methods of voltage control employed in power systems	**07**
Q.3	**(a)**	How FDLF differs from NR method? Comment	**03**
	(b)	The following data for a certain power system is available Bus code Impedance Line charging Ypq 1-2 0.02 + j0.08 j0.08 1-3 0.06 + j0.24 j0.06 Find Y_{11} and Y_{12}	**04**
	(c)	Derive transmission loss formula in terms of B-loss coefficients	**07**
		OR	
Q.3	**(a)**	What is penalty factor? Under which conditions its value is equal to 1?	**03**
	(b)	Incremental fuel costs in Rs/MWhr for two units in a plant are $dF_1/dP_1 = 0.1P_1 + 20$ and $dF_2/dP_2 = 0.12P_2 + 16$. Determine incremental fuel cost and allocation of load between units when the load is 150 MW. Neglect losses	**04**
	(c)	With the help of flowchart, explain GS method of load flow	**07**
Q.4	**(a)**	Define steady state, dynamic and transient stability	**03**
	(b)	Discuss equal area criteria of stability	**04**
	(c)	Discuss the dynamics of synchronous machine and hence derive the swing equation	**07**
		OR	
Q.4	**(a)**	In a certain power system the sending and receiving end voltages are $\|Vs\| = 1.5$ pu, $\|Vr\| = 1.0$ pu and $X = 1.2$ pu. If operating angle $\delta = 30^0$, find the electrical power transferred.	**03**

	(b)	Discuss the transient model of synchronous machine tied to an infinite bus when mechanical input is suddenly increased	**04**
	(c)	Explain in detail the factors affecting transient stability	**07**
Q.5	**(a)**	What is acceleration factor in load flow? How it affects load flow solution?	**03**
	(b)	A 100 MVA synchronous generator operates initially at no load at 3000 rpm, 50 Hz. A 25 MW load is suddenly applied to the machine. Due to time lag in the governor system, the steam valves commence to open after 0.6 seconds. Determine the frequency of the system before the steam flow commences to increase to meet the new load. Assume H = 5 MW-sec/MVA	**04**
	(c)	Discuss numerical solution of the swing equation	**07**
		OR	
Q.5	**(a)**	Explain what is meant by synchronizing coefficient or electrical stiffness of the machine	**03**
	(b)	For the purpose of load flow analysis, classify different types of buses in power system	**04**
	(c)	What is meant by LDC? Explain the functions carried out by LDC	**07**

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