Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160920 Date:17-12-2022

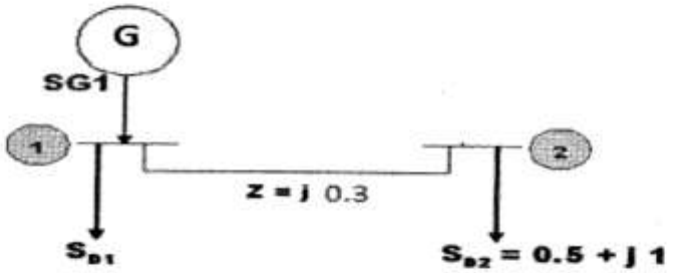
Subject Name:Inter Connected Power System

Time:02:30 PM TO 05:00 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)	State objectives of Load flow Studies.	03
	(b)	Define following terms regarding power system network with suitable examples. 1} Bus 2} Branch 3}Links 4} Tree and co-tree	04
	(c)	State and derive swing equation for the synchronous machine connected to infinite bus as well as explain significance of swing equation.	07
Q.2	(a)	List out input data requirement for load flow analysis.	03
	(b)	Define voltage controlled bus, load bus and slack bus. Explain need of slack bus in power flow analysis.	04
	(c)	Obtain voltage at bus 2 for the system shown in Fig given below using G-S Method.	07



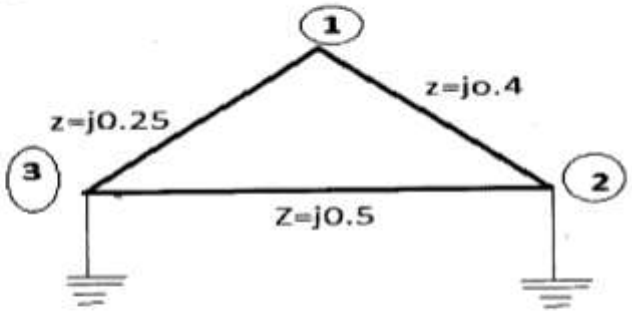
OR

	(c)	Develop algorithm for solution of load flow equation in polar coordinates using Newton –Raphson method.	07
Q.3	(a)	State advantages of Interconnected power system	03
	(b)	Discuss function of load dispatch center.	04
	(c)	Find Y-bus for the system given below.	07

From	To	Resistance	Reactance
1	2	0	0.35
2	3	0	0.45
1	3	0	0.3
GND	2	0	0.25
GND	3	0	0.1

OR

Q.3	**(a)**	Explain the Primitive network	**03**
	(b)	Write scenario of recent Indian power system	**04**
	(c)	Find Y – Bus of the given system using singular transformation method.	**07**



Q.4	**(a)**	Explain β- coefficient.	**03**
	(b)	Derive the necessary condition for optimal operation of thermal power plants with the transmission losses considered.	**04**
	(c)	A generator is supplying a load. An incremental change in load of 5 MW requires generation to be increased by 7 MW. The incremental cost at the plant bus is Rs 30 /MWh. What is the incremental cost at the receiving end?	**07**

OR

Q.4	**(a)**	Draw and describe significance of heat rate curve and Incremental fuel rate curve	**03**
	(b)	Write basic criterion for economical division of load between units within a plant?	**04**
	(c)	The fuel cost of two unit plants are given by $C1 = 1.5 + 20P_1 + 0.1\ P_1^{2;}\quad C2 = 2 + 30P_2 + 0.1\ P_2^2$ where P_1 and P_2 in MW. The plant supplies a load of 250 MW. Find economic load scheduling of two unit and find incremental fuel cost, neglecting losses.	**07**

Q.5	**(a)**	Define critical clearing time and critical clearing angle as well as write equation of its in context of power system stability analysis.	**03**
	(b)	List Out the assumptions that are made in order to simplify the computational task in stability studies.	**04**
	(c)	Draw block diagram of AGC and Explain its Application	**07**

OR

Q.5	**(a)**	Explain significance of frequency control. Write component of power system which are more affected by frequency deviation.	**03**
	(b)	Describe various methods for voltage control which is adopted in power system.	**04**
	(c)	A 50Hz,4 pole turbo alternator rated 100MVA, 11KV has an inertia constant of 6 MJ/MVA. Find 1}. The energy stored in the rotor at synchronous speed. 2}. The rotor acceleration if the mechanical input is suddenly raised to 120 MW for an electric load 90MW.	**07**