Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160920 Date:13-12-2023

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)**	Explain cascade tripping in power system.	**03**
	(b)	Describe network islanding phenomenon.	**04**
	(c)	Discuss advantages and disadvantages of Inter connected power system.	**07**
Q.2	**(a)**	Define following terms (1) Oriented graph (2) Tree (3) Planner and non-planner graph	**03**
	(b)	Explain properties of Y-bus matrix. Why it is a sparse matrix?	**04**
	(c)	A three Bus, three line systems is shown in Figure-1, each line has as series impedance of (0.05+j0.15) p.u., and the shunt admittance is neglected. Find $Y_{BUS.}$ If a new bus (bus 4) is added with bus no.3 through transmission line of impedance (0.1+j0.3) p.u., obtain New $Y_{BUS.}$	**07**

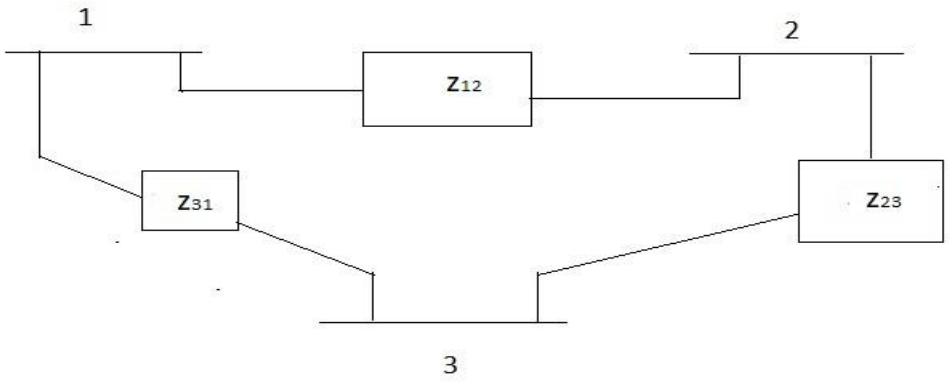

Figure-1

OR

	(c)	Explain following (1) Bus incidence matrix (2) Primitive network	**07**
Q.3	**(a)**	Classify types of buses in power system for load flow analysis.	**03**
	(b)	By using Gauss-Seidel method determine the voltages V_1 and V_2 of following set of linear equation: $10V_1+2V_2 = 10$; $4V_1+7V_2 = 15$	**04**
	(c)	Describe Flow chart and Algorithm of load flow solution using Newton-Raphson method for all type of buses.	**07**

OR

Q.3	**(a)**	What is importance of slack bus in power system?	**03**
	(b)	Discuss Input –output curve and heat rate curve of generating unit with proper label.	**04**
	(c)	Write short notes on unit commitment and penalty factor.	**07**

Q.4 **(a)** What is flat frequency control method to be used for controlling frequency? **03**

(b) A power system has two generating plants and power is being dispatched economically with P_1 =200 MW and P_2= 300 MW. The loss coefficient are: **04**

$B_{11}= 0.10\times10^{-2}$ MW^{-1} ; $B_{12}= -0.10\times10^{-3}$ MW^{-1} ; $B_{22}= 0.13\times10^{-2}$ MW^{-1}

To raise the total load on system by 1 MW, an additional cost of 200 Rs/hour will be incurred.

Find (1) The penalty factor of plant: 1

(2) The additional cost per hour to increase the output of plant: 1 by 1 MW.

(c) Explain turbine speed governing mechanism for frequency control & derive a mathematical model of turbine speed governing system. **07**

OR

Q.4 **(a)** What is power system stability? Classify power system stability **03**

(b) Discuss Equal area criterion of stability. **04**

(c) A 100 MVA, 2 pole, 60 Hz generator has a moment of inertia 50×10^3 $Kg.m^3$ **07**

(1) What is energy stored in the rotor at rated speed?

(2) What is corresponding angular momentum?

(3) Determine the inertia H.

(4) If the input to generator is suddenly increased by 25 MW, determine the rotor acceleration.

Q.5 **(a)** List out the assumptions which are made to carry out approximate load flow study. **03**

(b) Discuss Automatic Generation control (AGC) with block diagram. **04**

(c) Describe the comparison of GS method & Newton-Rapson Method with Fast Decoupled Load Flow method. **07**

OR

Q.5 **(a)** Explain the importance of voltage control in power system. **03**

(b) Discuss various methods to improve steady state stability. **04**

(c) Describe following **07**

(1) Power angle curve.

(2) Critical clearing angle.

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