Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 170901 **Date: 09/05/2017**

Subject Name: Inter Connected Power System

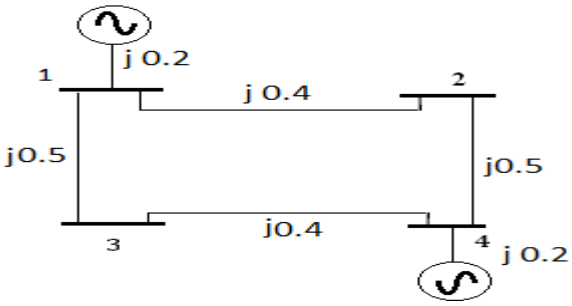
Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Derive the Static power flow equations and also discuss the types of buses **07**

(b) Formulate Y_{bus} using Singular Transformation Method **07**



Q.2 **(a)** What is power system islanding? Why it is needed? What is ideal procedure to restore the grid? Discuss the effects of islanding **07**

(b) Explain the Fast Decoupled load flow method with necessary assumptions **07**

OR

(b) A 200 MVA, 11kV, 50 Hz, 4 pole turbo generator has an inertia constant of 6 - MJ/MVA. 1) Find the stored energy in the rotor at synchronous speed 2) machine operating at load of 120 MW and the load suddenly increases to 160 MW. Find the rotor retardation. Neglect losses. 3) If the retardation is maintained for 5 cycles, find the change in power angle and rotor speed in rpm at the end of the period. **07**

Q.3 **(a)** **07**

Bus to Bus	1-2	1-3	2-3	2-4	3-4
G(pu)	2	1	0.66	1	2
B(pu)	-j8	-j4	-j2.664	-j4	-j8

Bus & Type	P_{gen}	Q_{gen}	P_{dem}	Q_{dem}	Bus Voltage
1 Slack	?	?	0	0	1.04
2 PQ	0	0	0.5	0.2	?
3 PQ	0	0	0.4	0.3	?
4 PQ	0	0	0.3	0.1	?

For a given power system data, obtain first iteration voltages at bus no 2, 3 and 4 using Gauss – Seidal method

(b) Compare GS method with NR Method of load flow study **07**

OR

Q.3	**(a)**	What is steady state stability also discuss the synchronizing power coefficient and methods to improve the SSS limit	**07**
	(b)	Discuss the step by step method of solution of swing equation	**07**
Q.4	**(a)**	With the help of a neat diagram explain turbine speed governing mechanism	**07**
	(b)	What is penalty factor? Discuss the criteria for economic dispatch when losses of the system are considered	**07**

OR

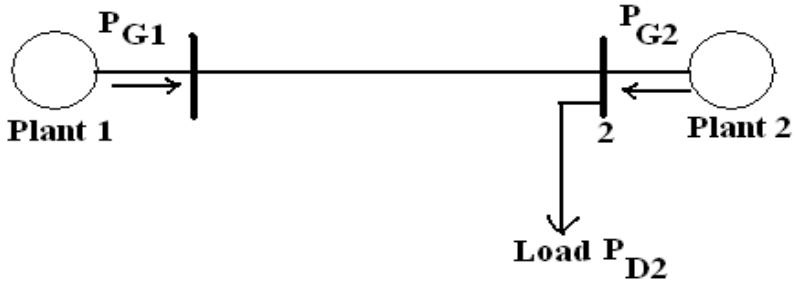
Q.4	**(a)**	Discuss the algorithm for formulating Z_{BUS} matrix of system	**08**
	(b)	Explain the Unit Commitment using Dynamic programming method	**06**
Q.5	**(a)**	Explain Load Frequency Control Method	**07**
	(b)	Explain Equal Area Criterion with suitable example	**07**

OR

Q.5	**(a)**	Derive Transmission line loss formula using KRON's method	**07**
	(b)	A two bus system is shown in figure. A load is located at bus 2.If 100 MW is transmitted from plant 1 to the load, a transmission loss of 10 MW is incurred. Find the required generation for each plant and the power received by the load when the system λ is Rs 25 /MWhr. The incremental fuel costs of the two plants are given below:	**07**

$$\frac{dC_1}{dP_1} = 0.03P_1 + 17$$

$$\frac{dC_2}{dP_2} = 0.06P_2 + 19$$



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