Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022**

**Subject Code:3160920 Date:10/06/2022**

**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 Islanding? Elaborate the need of Islanding | **03** |
| | **(b)** | Discuss the main functions of Load Dispatch Centre and its grid arrangement. | **04** |
| | **(c)** | Form Y bus using data given in figure-1. Impedance of transmission line connected between two buses is shown in figure-1. | **07** |
| **Q.2** | **(a)** | Derive (i) Elements of Primitive Matrix and (ii) size of incidence matrix using figure-1. | **03** |
| | **(b)** | List out the methods used for formation of Ybus. Derive the equation of Ybus using singular transformation method. | **04** |
| | **(c)** | The governor speed regulation of Gen-1 and Gen-2 is of the order of 6.0 and 5.0 percent from no-load to full-load, respectively. The generation capacity of Gen-1 and Gen-2 is 250 MW and 350 MW, respectively. They are operating in parallel and share a load of 600 MW. Assuming free governor action and no-load operating frequency of generator is 50 Hz. determine the load shared by each unit. | **07** |
| | | **OR** | |
| | **(c)** | List out the methods of Load Frequency Control and discuss (i) Selective Frequency Control and (ii) Tie Line Load Bias Control | **07** |
| **Q.3** | **(a)** | Discuss the need of load flow study and discuss importance of slack bus in load flow study. | **03** |
| | **(b)** | Derive the static load equations for active and reactive power | **04** |
| | **(c)** | Elaborate flow chart for load flow study using Newton-Rapson method. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | List out the assumptions which are made to carry out approximate load flow study | **03** |
| | **(b)** | Discuss Bus classification for load flow study and mention specified quantities and quantities to be obtained on each of them. | **04** |
| | **(c)** | Discuss the comparison of Decoupled Load Flow method & Fast Decoupled Load Flow Method with Newton-Rapson Load Flow Method | **07** |
| **Q.4** | **(a)** | Discuss Incremental Rate curve | **03** |
| | **(b)** | Discuss Penalty factor | **04** |
| | **(c)** | A power system network consist of two plant is shown in Figure-2. The load is connected only at Bus-2. In this case, it is observed that 100 MW power flows from plant-1 to plant-2 which causes 10 MW power loss in transmission. The incremental costs of plants are given below<br>dC1/dP1=0.2P1+22<br>dC2/dP2=0.15P1+19<br>Calculate the economic loading of plant 1 and 2 when λ (Lamda)=49. Also | **07** |

calculate transmission line total load demand.

**OR**

| | | | |
|---|---|---|---|
| **Q.4** | **(a)** | Discuss Incremental Rate Curve | **03** |
| | **(b)** | Discuss Optimal operation by co-ordination equation. | **04** |
| | **(c)** | Derive equation for transmission loss formula | **07** |
| **Q.5** | **(a)** | List out methods used to improve transient stability and elaborate (i) Single pole Switching (ii) Breaking resistors. | **03** |
| | **(b)** | The value of inertia constant for 500 MVA and 900 MVA synchronous machine is of the order of (H1) 5.0 MJ/MVA and (H2) 3.0 MJ/MVA, respectively. Both of these units are operated in parallel with each other. Determine the equivalent inertia constant (H) for two considering 100 MVA base. | **04** |
| | **(c)** | Discuss the application of Equal Area Criteria in brief and elaborate critical clearing angle and critical clearing time | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Discuss the factors affecting steady state stability. | **03** |
| | **(b)** | Compare steady state stability with transient stability | **04** |
| | **(c)** | Discuss numerical solution of swing equation | **07** |

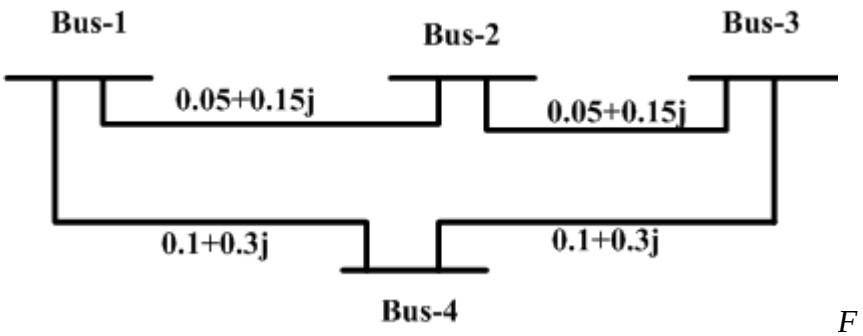


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**Figure-1**

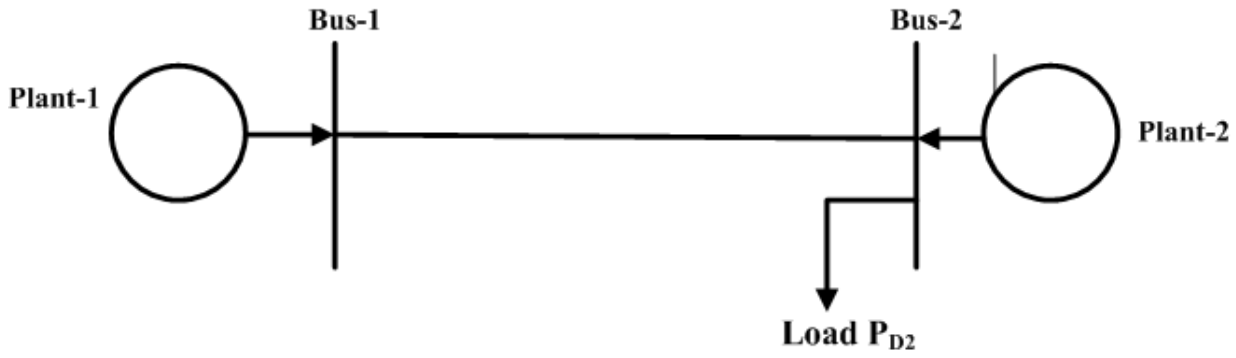


**Figure-2**