Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EE2014** | **Duration :** | **3hrs** |
| **Sub. Name :** | **POWER SYSTEM ANALYSIS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A Simple power system is shown in the fig. given below. Redraw this system where the per unit impedance of the components are represented on a common 5000VA base and common system base voltage of 250 V.  Generator G1: 1000 VA, 250 V, Z=0.2j  Generator G2: 2000 VA, 250 V, Z=0.3j  Transformer T1: 4000 VA, 250/800 V, Z=0.2j  Transformer T2: 8000VA 1000 /500V, Z = 0.06j  Line: 40+150j  Load: 2500 VA , 400V | CO1 | 14 |
| b. | Write down the significance of Per Unit representation. | CO1 | 06 |
| **(OR)** | | | | |
| 2. | a. | Draw the p.u. impedance diagram for the power system shown below. Neglect resistance and use a base of 100MVA, 220kV in 50Ω line. The ratings of the generator, motor and transformer are:  Generator : 40MVA, 25kV, X = 20%  Motor : 50MVA, 11kV, X = 30%  Υ - Υ Transformer : 40MVA, 33/220kV, X = 15%  Υ - Δ Transformer : 30MVA, 11Δ / 220ΥkV, X = 15%  jpeg\Power System Analysis.jpg | CO1 | 14 |
| b. | Briefly write the following:    i) Short circuit studies  ii) Symmetrical and Unsymmetrical Fault analysis. | CO1 | 06 |
|  |  |  |  |  |
| 3. | a. | For the three bus network shown in figure. Build Z-bus using Z-bus building algorithm. | CO1 | 14 |
| b. | Derive an expression for fault current when Line to Line fault occurs in a power system. | CO1 | 06 |
| **(OR)** | | | | |
| 4. | a. | Obtain the ZBus for the sample system shown in figure using Zbus building algorithm. | CO1 | 20 |
|  |  |  |  |  |
| 5. | a. | The following is the system data for a load flow solution. Determine the  voltage at the end of first iteration using gauss seidal method.  Take α=1.6   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | System Data | |  | Load flow Data | | | | | | Bus code | Admittance | Bus code | P | Q | V | Remark | | 1-2 | 2-8j | 1 | - | - | 1.06 | Slack | | 1-3 | 1-4j | 2 | 0.5 | 0.2 | 1+j0 | PQ | | 2-3 | 0.666-2.664j | 3 | 0.4 | 0.3 | 1+j0 | PQ | | 2-4 | 1-4j | 4 | 0.3 | 0.1 | 1+j0 | PQ | | 3-4 | 2-8j | | CO2 | 20 |
| **(OR)** | | | | |
| 6. | a. | Explain the step by step computational procedure for the Newton Raphson method in load flow studies with appropriate expression. | CO2 | 14 |
| b. | Differentiate between gauss seidal and newton raphson method used in solving power flow equations. | CO2 | 06 |
|  |  |  |  |  |
| 7. | a. | Assume that the fuel cost expression for units 1 and 2 are given by  F1=0.024P12+8P1+80 Rs/hr  F2=0.04P22+6P2+120 Rs/hr  The maximum and minimum loads on the units are 100 MW and 10 MW respectively. Determine the minimum cost of generation when the following load is supplied. | CO3 | 10 |
|  | b. | Write short notes on Hydro Thermal Scheduling. . | CO3 | 06 |
| **(OR)** | | | | |
| 8. | a. | Write short notes on Unit commitment and list out various constraints. | CO3 | 10 |
| b. | Derive the loss formula coefficient in economic load dispatch. | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Describe the equal area criterion for transient stability analysis of a system. | CO3 | 06 |
| b. | Write short notes on importance of power quality and its international standard. | CO3 | 06 |
| c. | Explain the Runge-kutta method of analyzing multi machine power system for stability with a neat flow chart. | CO3 | 08 |