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06EE71

# Seventh Semester B.E. Degree Examination, June/July 2018
## Computer Techniques in Power System Analysis

Time: 3 hrs. Max. Marks:100

**Note:** *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
*2. Missing data, if any, may be suitably assumed.*



### PART – A

1 a. Define the following : i) oriented graph ii) tree iii) bus frame of reference. **(06 Marks)**

b. Obtain the oriented connected graph for the given power system network shown below Fig.Q1(a). Hence obtain basic loop incidence matrix and augmented loop incidence matrix. **(08 Marks)**

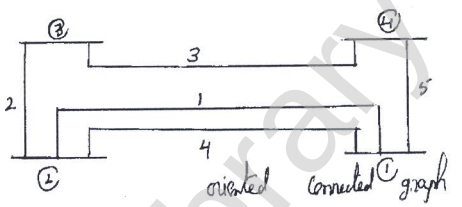


Fig.Q1(a)

c. Explain the significance of primitive network in power system. **(06 Marks)**

2 a. Form the $Y_{Bus}$ by using singular transformation for the network shown in Fig.Q2(a). **(12 Marks)**

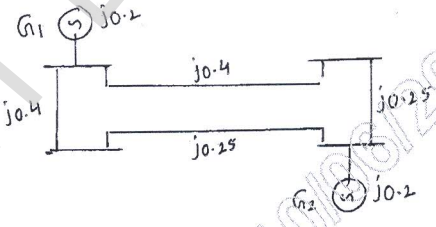


Fig.Q2(a)

b. Derive an expression for modification of $Z_{BUS}$ when a link element is added between two emitting buses. **(08 Marks)**

3 a. The following is the system data for load flow solution. The line admittances :

| Bus code | Admittance |
|---|---|
| 1 – 2 | 2 – j8.0 |
| 1 – 3 | 1 – j4.0 |
| 2 – 3 | 0.666 –j2.664 |
| 2 – 4 | 1 – j4.0 |
| 3 – 4 | 2 – j8.0 |

The schedule of active and reactive powers :

| Bus code | P | Q | V | Remarks |
|---|---|---|---|---|
| 1 | – | – | 1.06 | Slack |
| 2 | 0.5 | 0.2 | 1 + j0.0 | PQ |
| 3 | 0.4 | 0.3 | 1 + j0.0 | PQ |
| 4 | 0.3 | 0.1 | 1 + j0.0 | PQ |

Determine the voltage at the end of first iteration using Gauss-Seidal method. Take $\alpha = 1.6$. **(12 Marks)**

b. What are the different types of buses considered during power system load flow analysis? Explain in brief. **(08 Marks)**

4 a. Compare the various methods of load flow studies. **(06 Marks)**

b. Explain a detailed flow chart describing the procedure for load flow analysis using Newton-Raphson method. **(08 Marks)**

c. Explain decoupled and fast decoupled load flow methods. **(06 Marks)**

## PART – B

5 a. Explain the method of equal incremental cost for the optimum load dispatch including transmission losses. **(08 Marks)**

b. The fuel input per hour of plants 1 and 2 are given as

$F1 = 0.2 P_1^2 + 40 P_1 + 120$ Rs/hour

$F_2 = 0.25P_2^2 + 30P_2 + 150$ Rs/hour.

Determine the economic operating schedule and the corresponding cost of generation if the maximum and minimum loading on each unit is 100 MW and 25MW the demand is 180MW, and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained by loading the units as per equal incremental production cost. **(12 Marks)**

6 a. Explain optimal scheduling of hydrothermal system. **(10 Marks)**

b. For the system shown in Fig.Q6(b) which has number 1 as the slack with voltage $1.00 \angle 0°$ p.u. Find the loss formula coefficients $B_{mn}$ if the load current $I_{L_1}$, $I_{L_2}$ and the line current $I_{21}$ are given as :

$I_{L_1} = (1.00 - j0.20)$p.u $\quad I_{L_2} = (0.50 - j0.10)$p.u $\quad I_{21} = (0.25 - j0.05)$p.u

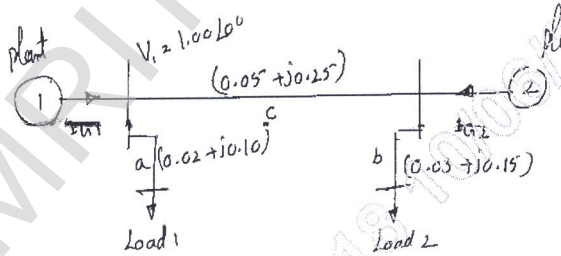


Fig.Q6(b)

Assume the value of line impedance as shown in Fig.6(b) in p.u. If the bars in 100 MVA, what will be the magnitudes of $B_{mn}$ coefficients in reciprocal MU. **(10 Marks)**

7 a. Explain the method of finding the transient stability of given power system with the help of a flowchart by using modified Euler's method. **(10 Marks)**

b. Explain Runge –Kutta method in connection with transient stability studies. **(10 Marks)**

8 a. Explain step – by – step solution of the SWING CURVE. **(10 Marks)**

b. Discuss the representation of loads for transient stability studies. **(10 Marks)**

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