CBCS SCHEME

USN | | | | | | | | | | 15EE71

# Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
## Power System Analysis – II

Time: 3 hrs. Max. Marks: 80

**Note:** ***Answer FIVE full questions, choosing ONE full question from each module.***



### Module-1

1 a. Define the primitive network. Give the representation of primitive network in impedance and admittance form. **(06 Marks)**

b. The primitive admittance of lines are as shown in Fig.Q1(b). Form the $Y_{BUS}$ using Singular Transformation Method.

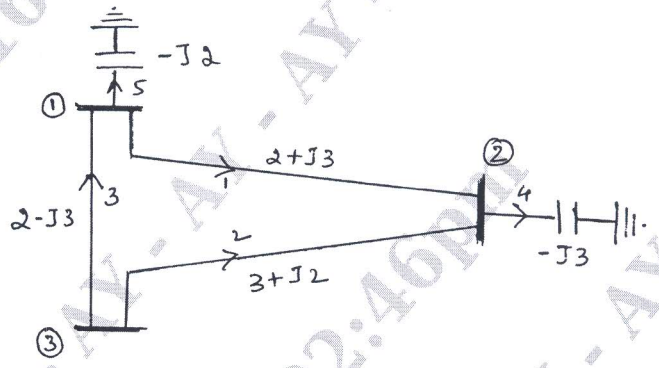


Fig.Q1(b) **(10 Marks)**

**OR**

2 a. Explain the following terms with an example :
i) Tree ii) Co-tree iii) Basic cutsets. **(06 Marks)**

b. In the power system shown in Fig.Q2(b), the line 1 – 2 has the series impedance of (0.04 + J0.12)pu with neglible line charging. The generation and load data is in the table.

| Bus no. | Type | Generation (pu) | | Load in pu | |
|---|---|---|---|---|---|
| 1 | Slack | – | – | – | – |
| 2 | PV | 0.3 | – | 0.6 | 0.2 |

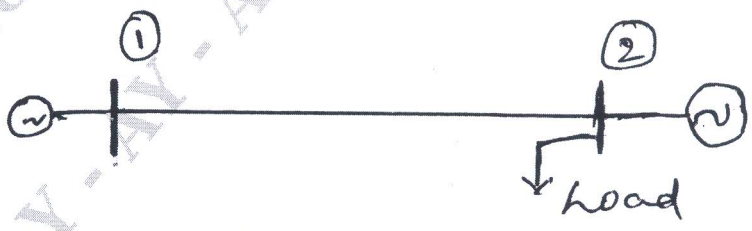


Fig.Q2(b)

The slack bus in 1|0 . The voltage at bus 2 is to be maintained at 1.05pu and the generation at this bus has Q – generation limits between 0 and 0.5pu. Determine voltage at bus 2 at the end of first iteration, using GS load flow method. **(10 Marks)**

## Module-2

3 a. Explain the algorithm for fast decoupled load flow analysis, clearly starting the assumptions made. **(08 Marks)**

b. For power system shown in Fig.Q3(b). Using NR method, write the Jacobbian matrix.

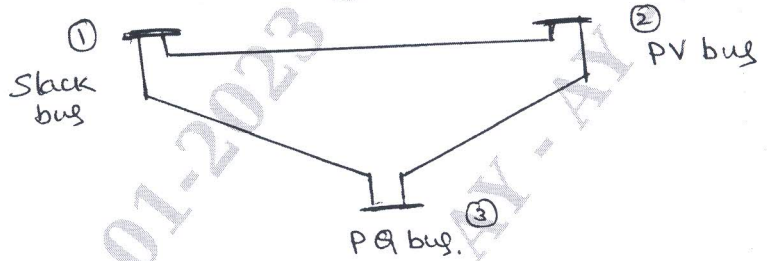


Fig.Q3(b) **(08 Marks)**

**OR**

4 a. Explain the algorithm procedure for load flow analysis using Newton – Raphson's (NR) method. **(08 Marks)**

b. Compare Gauss – Seidal and Newton – Rampson method of load flow analysis. **(08 Marks)**

## Module-3

5 a. With the help of neat diagram, explain the performance curves of generating unit. **(08 Marks)**

b. Incremental fuel cost in rupees per hour for a plant consisting of two units are :

$$\frac{dC_1}{dP_1} = 0.20\,P_1 + 40 \text{ Rs} \mid \text{MW}$$

$$\frac{dC_2}{dP_2} = 0.25\,P_2 + 30 \text{ Rs} \mid \text{MW}$$

Assume that both units are operating at all times and total load varies from 40MW to 250 MW. The maximum and minimum loads on each units are to be 125MW and 20MW respectively. How will load be shared between the two units as system load varies over a fuel range? For 150MW, what are the corresponding values of each plants and its incremental cost. **(08 Marks)**

**OR**

6 a. Describe dynamic programming method for computation of optimal unit commitment. **(08 Marks)**

b. With a usual notations, derive the generalized transmission loss formula and B – co-efficient. **(08 Marks)**

## Module-4

7 a. Explain power system static security level classification. **(08 Marks)**

b. Discuss the problem formation and procedure of optimal scheduling for hydro thermal plant. **(08 Marks)**

**OR**

8 a. Explain with the help of flow chart, optimal load flow solutions. **(08 Marks)**

b. Explain the state space method used for power system reliability evolution. Explain loss of load probability. **(08 Marks)**

## Module-5

9 a. Explain the modified Euler's method used in solution of swing equation for transient stability studies. **(08 Marks)**

b. Form the $Z_{BUS}$ for the power system shown in Fig.Q9(b) using $Z_{BUS}$ building algorithm. Select ground node as reference. The line reactance are in pu.

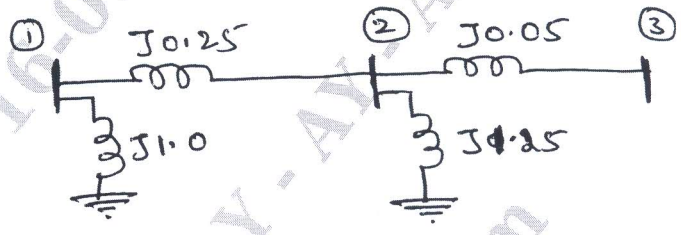


Fig.Q9(b) **(08 Marks)**

**OR**

10 a. Derive the generalized algorithm for finding the elements of bus impedance matrix when a link is added. **(08 Marks)**

b. Discuss the steps for determining multi machine stability. **(08 Marks)**

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