R16

Code No: 136DK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

POWER SYSTEMS ANALYSIS

(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define tree and co-tree.	[2]
b)	What are the uses for formation Y_{BUS} by direct inspection method?	[3]
c)	Give importance of acceleration factor in Gauss seidal method.	[2]
d)	Give the bus classification.	[3]
e)	Compare all load flow methods.	[2]
f)	Give the limitations of fast decoupled method.	[3]
g)	What is symmetrical component analysis?	[2]
h)	Write the applications of series reactors.	[3]
i)	Distinguish between steady state and dynamic stability of a power system.	[2]
j)	What is critical clearing time? Give its significance.	[3]

PART – B

(50 Marks)

2. Derive the expressions for bus admittance matrices by singular transformation method. [10]

OR

3.a) Discuss the steps for modification of existing Z_{BUS}, when a branch Zb is added from existing bus(k) to the reference bus.
b) What is the necessity of graph theory in power systems? [7+3]

4.a) Describe the Newton Raphson method for the solution of power flow equations in power systems by deriving necessary equations.
b) Write differences between with and with out voltage control buses in power flow studies. [6+4]

OR

5.a) Compare the Gauss seidal and Newton - Raphson methods with reference to number of iterations, memory requirements and arithmetic operations involved.
b) What are the uses of Jacobian matrix over other matrixes? [6+4]

6. Develop the power flow model using decoupled method and explain the assumptions to arrive at the fast decoupled load flow method. [10]

OR

7. Briefly discuss about DC load flow method and its merits and demerits. [10]

8.a) Derive an expression for the fault current for a line-to-line fault at an unloaded generator.

b) A 20MVA, 11KV, 3-Φ, 50HZ generator has its neutral earthed through a 5% reactor. It is in parallel with another identical generator having isolated neutral. Each generator has a positive sequence reactance of 20%, Negative sequence reactance of 10% and zero sequence reactance of 15%. If a line to ground short circuit occurs in the common bus-bar, determine the fault current. [5+5]

OR

9. A three phase fault with a fault impedance of 0.16 p.u. occurs at bus 3, for which Z_{BUS} is given by

$$Z_{BUS} = \begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} j0.016 & j0.8 & j0.12 \\ j0.08 & j0.24 & j0.16 \\ j0.12 & j0.16 & j0.34 \end{bmatrix} \end{array}$$

Compute the fault current, the bus voltages and the line currents during the fault. Assume prefault bus voltages 1.0 per unit. [10]

10.a) Explain the application of equal area criterion for studying the transient stability of a system.

b) What are the steps to between followed for determining multi machine stability? [5+5]

OR

11.a) Explain the methods to improve the steady state stability.

b) Obtain the expression for swing equation. [5+5]

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