Code No: R1632022 **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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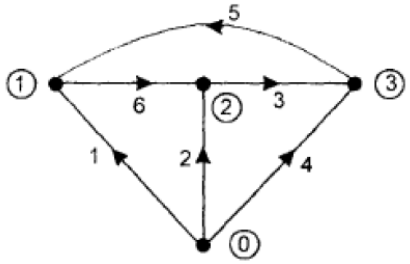
PART –A (14 Marks)

1. a) Explain the tree of a graph. [2M]
   b) What is the purpose of the Load flow study? [2M]
   c) Why Z_{bus} is used for short circuit studies? [2M]
   d) What are the methods used to reduce the short circuit current? [3M]
   e) Explain symmetrical components. [3M]
   f) Define steady-state and transient stabilities. [2M]

PART –B (56 Marks)

2. a) Derive the bus admittance matrix of a system using singular transformation. [7M]
   b) Obtain the cut-set matrix for the following graph: [7M]



3. a) List and justify the various assumptions considered in the formation of $B^{'} and\ B^{"}$ matrices used in the Fast Decoupled load flow methods. [4M]
   b) With the help of the flow chart, explain the procedure used to solve the load flow using the Newton-Raphson method using a polar form. Assume all types of buses are there in the system. [10M]

4. a) Derive the expression for adding a branch element with mutual inductance between two buses of a system while forming Z_{bus} . [10M]
   b) Briefly explain about primitive network, primitive impedance matrix, and primitive admittance matrix of a power system. [4M]

5. a) A 3-phase, 25 MVA, 11 Kv alternator has an internal reactance of 6.5%. Find the external reactance per phase to be connected in series with the alternator so that the short circuit current under steady-state should not exceed 5 times the full load current. [8M]
   b) Briefly explain the representation of power systems for short circuit studies. [6M]

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6. a) Explain the significance of Symmetrical Components. [7M]
   b) Derive the expression for fault current and terminal voltage for a line to ground fault at the terminals of an unloaded three-phase alternator. Assume that the alternator neutral is solidly grounded. [7M]

7. a) Derive the expression for critical clearing angle for a system having a generator feeding a large system through a double circuit line. [8M]
   b) Explain Transfer reactance and Inertia constant related to power system stability studies. [6M]

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