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

III B. Tech II Semester Supplementary Examinations, April - 2021

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)

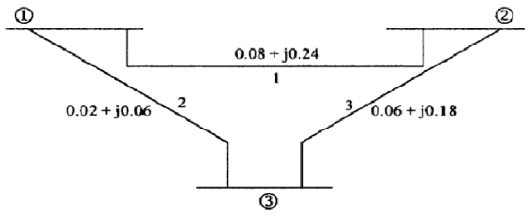
1. a) What are benefits of pu system? [2M]
   b) What is the effect of removing one line on the Y_{bus} of the system? [2M]
   c) Describe the representation of elements in primitive impedance form. [2M]
   d) Give the classification of reactors in short circuit MVA calculations. [3M]
   e) Write the equation for power in symmetrical components. [3M]
   f) List out the applications of equal area criterion. [2M]

PART –B (56 Marks)

2. a) What is meant by primitive network in power systems? [5M]
   b) Show that for any power system $Y_{bus} = A^t yA$. Where, Y_{bus} is the admittance matrix, A is the bus incidence matrix and y is the primitive admittance matrix. [9M]

3. a) Briefly explain the convergence pattern of Gauss-Seidel, Newton-Raphson and Fast Decouple load flow methods. [6M]
   b) Explain the procedure used to solve the load flow using Gauss-Seidel load flow method. Assume all types of buses are there in the system. [8M]

4. a) Explain the merits and demerits of Z_{bus} building algorithm. [5M]
   b) For the system shown below, obtain the Z_{bus} matrix. [9M]



5. a) Discuss the transient behavior of 3-phase synchronous generator subjected to three phase symmetrical short circuit fault. Also explain the variations of reactance of synchronous machine for the above mentioned event at different incidents. [9M]
   b) What are the steps needed for symmetrical fault analysis? [5M]

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6. a) Derive the expressions for sequence impedances of a 3-phase synchronous alternator whose stator winding neural is solidly grounded. [7M]
   b) A 20 MVA, 11 kV, 3-Phase, 50 Hz generator has its neutral earthed through 6% 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 9%. If a line to ground short circuit occurs in the common bus bar, determine the fault current. [7M]

7. a) Derive the swing equation of single machine connected to infinite bus and also list out the assumptions in deriving the swing equation. [10M]
   b) Explain the terms critical clearing time and critical clearing angle related to transient stability of a power system. [4M]

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