Code No: RT32024 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations November - 2018

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. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1 a) What are the merits in formation of Y– bus matrix by direct inspection methods? [3M]

b) What are the advantages of Newton Raphson Method over Gauss Seidel method? [4M]

c) What are the steps are required to formation of Z–Bus using building algorithm. [4M]

d) Write the significances of Short circuit MVA calculations. [4M]

e) What are the physical significances of sequence networks? [4M]

f) What are the applications of equal area criterion? [3M]

PART -B

2 a) What are the advantages of representing all parameters in p.u. values? [6M]

b) A 150MVA, 12.6 kV, three phase generator has a subtransient reactance of 10%. The generator supplies two synchronous motors through a 50 km transmission line having transformers at both ends. In this, first transformer is a three phase, 100MVA, 12.6/220 kV, 10% reactance and second one is made of three single phase transformers of rating 100MVA, 127/10.5 kV, 10% reactance. Synchronous motors ratings are 100MVA and 50 MVA and both operating at 10.5kV with 20% subtransient reactance. Series reactance of transmission line is 0.3 ohm/ km. Draw the single line diagram with all marked in p.u. [10M]

3 Develop the Z_{Bus} using building algorithm for a power system whose element data is given in the following table: [16M]

Element No.	Connected between bus No.	Self reactance (p.u)
1	1-2	0.3
2	1-3	0.1
3	2-3	0.2
4	1-2	0.15

4 a) Develop an algorithm for G-S load flow method including PV buses in the power system. [8M]

b) Derive the generalized expressions for elements of Jacobian matrix for decoupled load method. [8M]

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5 A transformer rated at 50 MVA and having a short circuit reactance of 0.01 p.u is connected to the bus bar of a generating station which is supplied through two 11 kV feeders each having an impedance of (1+j 3) Ω. One of the feeder is connected to the generating station using generator capacity of 35 MVA connected to its bus bars having a short circuit reactance of 0.15 p.u and other feeder to a generator with 30MVA and having a reactance of 0.25 p.u. Determine the MVA supplied to the fault in the event of a short circuit occurring between the secondary terminals of the transformer. [16M]

6 a) Describe the sequence networks of three phase transformer and draw its sequence networks. [8M]

b) A generator rated 120MVA, 11kV has $X_1 = X_2 = 30\%$ and $X_0 = 15\%$. Its neutral is grounded through a reactance of 0.1 Ω. The generator is operating at rated voltage, load is disconnected from the system when double line to ground fault occurs at its terminals. Find the sub-transient current in the faulted phases and line to line fault current. [8M]

7. a) Explain the recent methods to improve the transient state stability. [8M]

b) A two pole, three phase, 50 MVA, 11 kV generator is supplying rated power at 0.8 lagging power factor to an 11 kV bus. Due to a fault the generator output is reduced to 30%. The KE stored in the moving parts of the generator is 120 MJ. Determine (i) acceleration power and (ii) acceleration at the time of fault. [8M]

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