Reg. No. | | | | | | | | | | | |

Question Paper Code : 51509

B.E./B. Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Electrical and Electronics Engineering

EE 2351/EE 61/10133 EE 601 – POWER SYSTEM ANALYSIS

(Regulations 2008/2010)

(Common to PTEE 2351/10133 EE 601 Power System Analysis for B.E. (Part-Time) Fourth Semester Electrical And Electronics Engineering Regulations 2009/2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Sketch the classic model of a synchronous generator.

2. State the limitation of formation of Y-bus by inspection method.

3. How the buses are classified in load flow analysis ?

4. Write the load flow equation for N – R method.

5. Define subtransient reactance.

6. What do you mean by summetrical fault ?

7. Identify the fault if $I_B = I_C = 0$, $Va = 0$.

8. Compute in polar form $a^2 - 1$, $1 - a - a^2$.

9. What are the assumptions made in equal area criterion ?

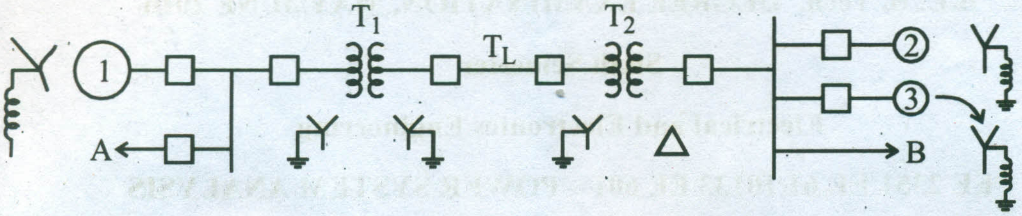
10. Why swing equation is non-linear ?

PART – B (5 × 16 = 80 Marks)

11. (a) Write the step by step method of formulating Y-bus matrix by singular transformation with suitable example. **(16)**

OR

(b) Obtain the per unit impedance diagram of the power system shown below : **(16)**



Data :

Gen No. 1 : 30 MVA, 10.5 kV, $x'' = 1.6\ \Omega$

Gen No. 2 : 15 MVA, 6.6 kV, $x'' = 1.2\ \Omega$

Gen No. 3 : 25 MVA, 6.6 kV, $x'' = 0.56\ \Omega$

T_1 (3–ψ) : 15 MVA, 33/11 kV, $x = 15.2\ \Omega$/ph on HT side

T_2 (3–ψ) : 15 MVA, 33/6.2 kV, $x = 16\ \Omega$/ph on HT side

T.L : 20.5 Ω / ph

Load A : 15 MW, 11 kV, 0.9 lag p.f.

Load B : 40 MW, 6.6 kV, 0.85 lag p.f.

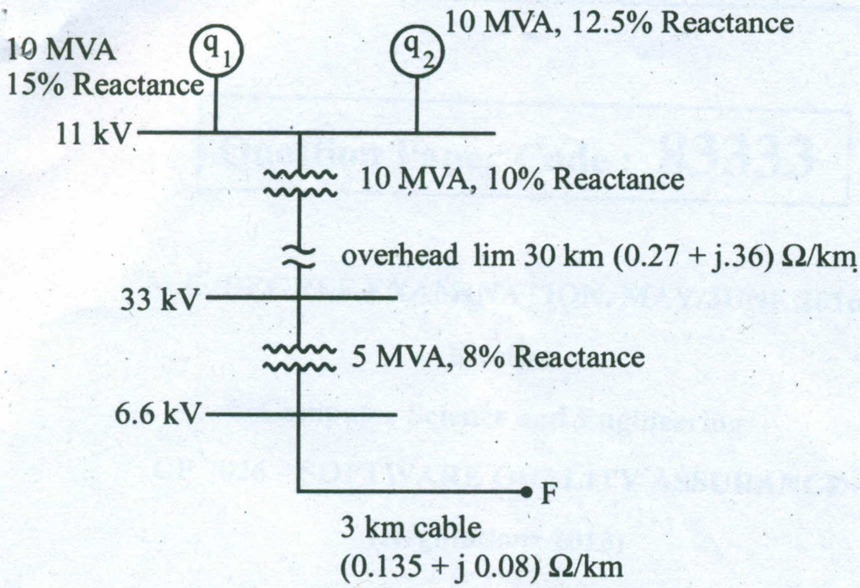
12. (a) Derive fast decoupled load flow algorithm and give the procedure for implementing this algorithm. **(16)**

OR

(b) (i) Derive the static load flow equations for a n-bus system. **(8)**

(ii) Compare the performance of G – S and N – R method for load flow solutions using nodal admittance approach. **(8)**

13. (a) For the radial network shown below a 3 - Ψ fault occurs at F. Determine the fault current and the line voltages at 11 kV bus under fault conditions. **(16)**



OR

(b) Give step by step algorithm for the analysis of three phase balanced fault in a power systems using Z-bus. **(16)**

14. (a) Derive the equation for average three phase power in terms of symmetrical components. Explain how the source impedance of the rotating machine can be determined. **(16)**

OR

(b) Derive the necessary equation to determine the fault current for a L – L – G fault on an unloaded synchronous machines with a fault impedance Z_f. Also draw the interconnection of sequence networks. **(16)**

15. (a) (i) Discuss the importance of stability in power system design and operation. **(8)**

(ii) Derive the swing equation from the basic principles. State the assumptions made in deriving the equation. **(8)**

OR

(b) Develop an algorithm and draw the flow chart for the solution of swing equation by modified Euler's method. **(16)**