D 70192 (Pages : 3) Name.....

Reg. No.....

SEVENTH SEMESTER B.TECH. (ENGINEERING) (09 SCHEME) DEGREE EXAMINATION, NOVEMBER 2014

EE/PTEE 09 701—POWER SYSTEM ANALYSIS

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

Each question carries 2 *marks.*

1. What is primitive network ?
2. Give the role of slack bus in load flow analysis.
3. What is unit commitment in power system ?
4. What is the short circuit capacity of a bus ?
5. Define the steady state stability of a power system.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

Each question carries 5 *marks.*

6. Obtain the relation, $Y_{BUS} = K - LM^{-1} L^T$ with usual notations.
7. Explain the importance of load flow studies in power systems. How a load flow study is performed ?
8. With help of neat diagram briefly explain automatic load dispatch.
9. Two generators rated 200 MW and 400 MW are operating in parallel. The drop characteristics of their governors are 4 % and 5 %, respectively from no load to full load. Assuming that the generators are operating at 50 Hz at no load, how would a load of 600 MW be shared between them ? What will be the system frequency at this load ? Assume free governor operation
10. Draw and explain the sequence network of an unloaded alternator.
11. Write a short note on voltage stability.

(4 × 5 = 20 marks)

Turn over

Part C

12. For the network given in Fig. 1, obtain the complex bus voltage at the end of first iteration using G-S method. Bus 1. is a slack bus with $V_1 = 1.0 < 0°$. Take $P_2 + j\,Q_2 = -5.96 + j\,1.46$ $P_3 - 6.02$ and $V_3 = 1.02$. Assume $V_3° = 1.02 < 0°$ and $V_2°) = 1<0°$.

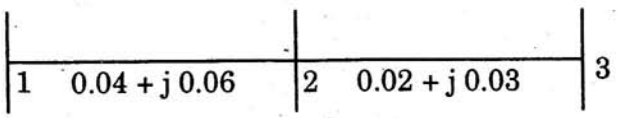

Fig. 1 (Line impedances are in p.u.)

Or

13. Find the bus impedance matrix for the system whose reactance diagram is given in Fig. 2, all the impedances in PU.

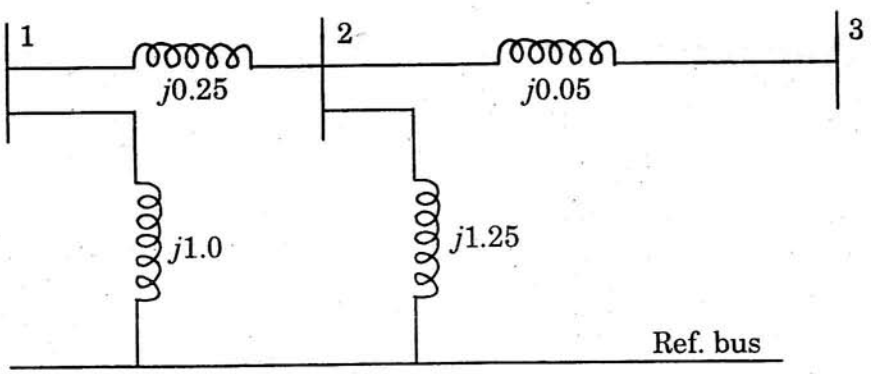

Fig. 2

14. Derive the exact transmission loss formula from bus powers and the system parameters.

Or

15. Obtain the model of speed governing system in a turbo generator.

16. A 3-phase star connected generator with $X_1 = j0.3$, $X_2 = j0.2$ and $X_0 = j0.1$ P.U. is connected through a transmission line with $X = j\ 0.1$ and $X_0 = j0.2$ to a synchronous motor with $X_1 = j0.2$ and $X_2 = j0.1$ whose neutral is isolated. The system is no load. Determine the currents in the machine and the fault current when a line to ground fault occurs at the middle of the transmission line. The generator neutral is solidly grounded through a reactance of 0.1 p.u.

Or

17. Derive an expression for fault current due to a double Line to ground fault on an unloaded alternator. Also draw the sequence network.

18. Explain the effect of clearing time on stability using equal area criterion.

Or

19. With help of flow hart explain the multi machine stability using Euler's method.

(4 × 10 = 40 marks)