G 1196 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2016

Eighth Semester

Branch : Electrical and Electronics Engineering

POWER SYSTEM ANALYSIS (E)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

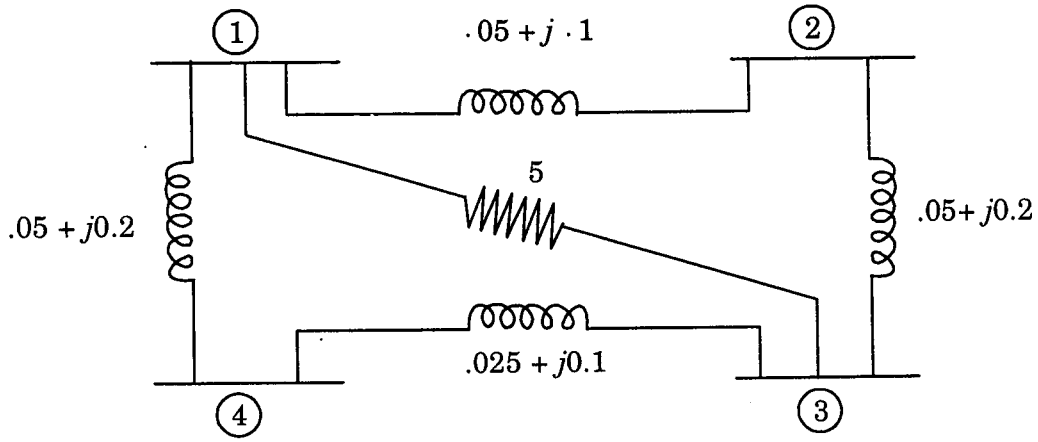
1. Explain the General structure of a power system.
2. Draw the zero sequence network of Delta-Delta transformer.
3. Classify various types of buses in a power system for load flow studies.
4. Compare Gauss-Seidel and Newton-Raphson methods of load flow solution.
5. Explain analytical approach to determine the economic operation of thermal units without considering line loss.
6. Develop an iterative algorithm for solving the optimum despatch equation of a n bus system taking into account the effects of system losses.
7. The line currents in amperes in phases a, b and c are $500 + j\,150$, $100 - j\,600$ and $-300 + j\,600$ respectively referred to the same vector. Find the symmetrical component of current.
8. Explain how the fault analyses is carried using bus impedance matrix.
9. List the methods of improving transient stability.
10. Derive Swing equation and discuss its application in the study of power system stability.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Figure shows a four bus system. Assuming bus 1 to be the reference bus. Find Z bus :



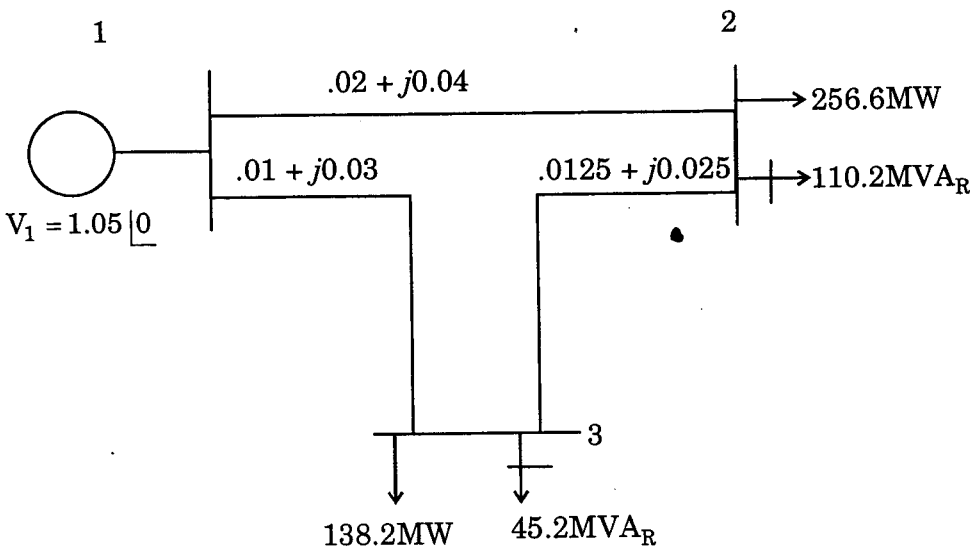
Or

12. Draw and explain the zero sequence network of :

    (a) Star delta with neutral of star ground.

    (b) Delta-Delta transformer.

13. Figure shows the one line diagram of a simple three bus power system with generation at bus 1. The magnitude of voltage at bus 1 is adjusted to 1.05 p.u. The scheduled loads at buses 2 and 3 are marked on the diagram. Line impedances are marked in p.u. on a 100 MVA base and the line charging susceptance are neglected :



Using Gauss-Seidel method, determine the phasor values of voltage at the load buses 2 and 3.

Or

14. Explain Newton-Raphson method of load flow analyses when :

    (a) System has load buses only.

    (b) System has both generator and load buses.

15. Develop an iterative algorithm for solving optimum despatch equation of an n bus system taking into account the effect of system losses.

Or

16. The fuel inputs per hour of plant 1 and 2 are given as :

$$F_1 = 0.2p_1^2 + 40\ P_1 + 120 \text{ Rs./hr.}$$
$$F_2 = 0.25p_2^2 + 30\ P_2 + 150 \text{ Rs./hr.}$$

Determine the economic operating schedule and the corresponding cost generation if the maximum and minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW and the transmission losses are neglected. If the load is equally shared by both the units determine the savings obtained by loading the units for equal incremental production cost.

17. A 25 MVA, 13.2 KV alternator with solidly grounded neutral has a subtransient reactance of 0.25 p.u. The negative and zero sequence reactance are 0.35 p.u. and 0.1 p.u. respectively. A single line to ground fault occurs at the terminals of an unloaded alternator. Determine the fault current and the line voltage. Neglect resistances.

Or

18. Explain various methods of analysing three-phase faults.

19. Discuss the methods to improve steady state and transient stability limit.

Or

20. Define the power angle equation of a synchronous machine connected to an infinite bus and also the expression for maximum power transferable to the bus.

(5 × 12 = 60 marks)