S4 EE (NEW)

G 1631 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2015

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 801—POWER SYSTEM ANALYSIS (E E)

(New Scheme—2010 admission onwards)

[Regular/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. List the advantages of per unit system in power system analysis.
2. What are B-coefficients ?
3. What is PI control ?
4. List the symmetrical components.
5. List the types of power system stability.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Draw the one-line diagram of a typical power system showing all details.
7. Explain economic dispatch neglecting losses.
8. Briefly explain turbine and generator—load model.
9. Draw and explain the connection of sequence network for a double line to ground fault.
10. Derive an expression for swing equation of the synchronous machine.

(5 × 5 = 25 marks)

Turn over

Part C

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

11. A 15 MVA, 8.5 KV 3 Φ generator has a subtransient reactance of 20%. It is connected through a delta-star transformer to a high voltage transmission line having total series reactance of 70 Ω. The load end of the line has Y – Y step down transformer. Both the transformer banks are composed of 1 Φ transformer connected for 3 Φ operation. Each of 3 Φ transformer composing 3 Φ bank is rated 6667 KVA, 10/100 KV with a reactance of 10%. The load represented as impedance is drawing 10 MVA at 12.5 KV and 0.8 p.f. lagging. Draw single line diagram of the network. Choose base of 10 MVA, 12.5 KV in the load circuit and determine reactance diagram. Determine the voltage across the terminals of the generator.

Or

12. With flow-chart explain load flow analysis by Gauss Siedel method using YBW.

13. (a) Derive the transmission loss formula. (8 marks)

    (b) What are the system constraints ? (4 marks)

Or

14. The fuel input per hr of plants 1 and 2 are given as :

    $F1 = 0.2\ Pl^2 + 40\ Pl + 120$ Rs./hr

    $F2 = 0.25\ Pl^2 + 30\ P2 + 150$ Rs./hr

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

15. Explain with block diagrams single area load frequency control.

Or

16. Explain load frequency control with generation rate constraints.

17. A 25 MVA, 13.2 KV alternator with solidly grounded neutral has a subtransient reactance of 0.25 p.u. Negative and zero sequence reactance are 0.35 p.u. and 0.1 p.u. respectively. A L – L fault occurs at the terminals of an unloaded alternator. Determine the fault current and L – L voltages. Neglect resistances.

Or

18. (a) A L – L fault occurs at the terminals of an unloaded generator. Derive the expression for the fault current and also draw the sequence network.

(8 marks)

(b) Explain how the unbalanced phasor is drawn using three symmetrical components ?

(4 marks)

19. (a) Explain equal area criterion for stability. What is the effect of clearing time on stability ?

(8 marks)

(b) Derive an expression for critical clearing angle. (4 marks)

Or

20. (a) A 50 Hz, 4-pole turbo-generator rated 100 MVA, 11 KV bus has an inertia constant of 8.0 MJ/MVA.

(i) Find the stored energy in the rotor at synchronous speed.

(ii) If the mechanical input is suddenly raised to 80 MW for an electrical load of 50 MW, find rotor acceleration neglecting mechanical and elecrical losses.

(7 marks)

(b) Discuss about multimachine stability. (5 marks)

[5 × 12 = 60 marks]