F 6639 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2017

Eighth Semester

Branch : Electrical and Electronics Engineering

EE 010 801—POWER SYSTEM ANALYSIS [EE]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Define per unit value of an electrical quantity. Write equation for base impedance with respect to 3-phase system.
2. Define the economic load dispatch problem.
3. What is load frequency control ? Explain.
4. What are symmetrical components ? What are its applications ?
5. What is the difference between steady state and transient stability ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. How are buses classified ? Explain.
7. What are system constraints ?
8. Explain the turbine model.
9. How are circuit breaker ratings chosen ? Explain.
10. Obtain the swing equation of a generator supplying power to an infinite bus.

(5 × 5 = 25 marks)

Turn over

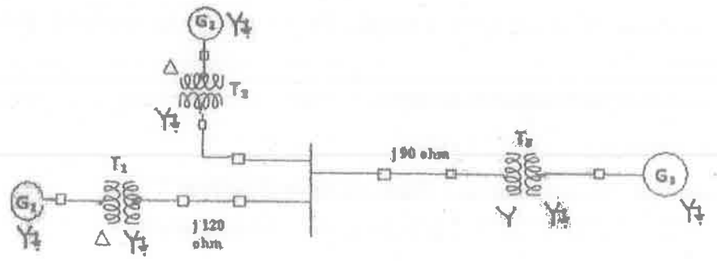
Part C

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

11. Explain the step by step procedure for power flow analysis in system with PQ and PV buses with Gauss-Siedel method.

Or

12. The single line diagram of a simple power system is shown in Fig. The rating of the generators and transformers are given below: Generator 1 : 25 MVA, 6.6 KV, X = 0.2 p.u ; Generator 2 : 15 MVA, 6.6 KV, X = 0.15 p.u ; Generator 3 : 30 MVA, 13.2 KV, X = 0.15 p.u ; Transformer 1 : 30 MVA. 6.9 Δ / 115 Y KV, X = 10 % ; Transformer 2 : 15 MVA, 6.9 Δ /115Y KV, X = 10 %. Transformer 3 : Single phase units each rated 10 MVA, 6.9/69 KV, X = 10 % Draw an impedance diagram and mark all in p.u. choosing a base of 30 MVA, 6.6 KV in the generator 1 circuit.



13. Explain in detail about the physical interpretation of co ordination equations ? What are β coefficients ?

Or

14. The fuel inputs per hour of plants 1 and 2 are as given :

F1 = 0.2 P12 + 40 P1 + 120 Rs./hr.

F2 = 0.25 P12 + 30 P1 + 150 Rs./hr.

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

15. What is area control error and Control area ? Obtain the state space model of single area frequency control.

Or

16. Explain the model of speed governor system. What is speed governor dead band and what is its effect on automatic generation control ?

17. A generator is connected through a transformer to a synchronous motor. The subtransient reactance of generator and motor are 0.15 p.u and 0.35 p.u respectively. The leakage reactance of the transformer is 0.1 p.u . All the reactance are calculated on a common base. A three phase fault occurs at the terminal of the motor when the terminal voltage of the generator is 0.9 p.u .The output current of generator is 1 p.u and 0.8 p.f. leading. Find the subtransient current in p.u in the fault, generator and motor. Use the terminal voltage of generator as reference vector.

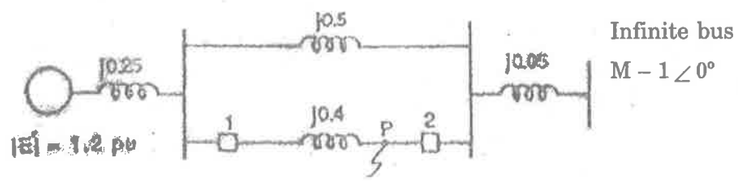
18. Derive the expression for fault current in double line to ground fault on unloaded generator. Draw an equivalent network showing the inter connection of networks to simulate double line to ground fault.

Or

19. Describe the equal area criterion for transient stability analysis of a system.

Or

20. A three phase fault is applied at the point P as shown below. Find the critical clearing angle for clearing the fault with simultaneous opening of the breakers 1 and 2. The reactance values of various components are indicated in the diagram. The generator is delivering 1.0 p.u. power at the instant preceding the fault.



(5 × 12 = 60 marks)