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**Question Paper Code : Q 2220**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Sixth Semester

(Regulation 2004)

Electrical and Electronics Engineering

EE 1352 — POWER SYSTEM ANALYSIS

(Common to B.E. (Part-Time) Fifth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. What is the need for system analysis in planning and operation of power system?
2. Draw the single line diagram showing the essential parts in the power system network.
3. Explain why one of the bus in the system is taken as slack bus in the load flow studies.
4. State at least four applications of power flow studies in the planning and operation of electric power systems.
5. Explain the following terms :
   (a) momentary current
   (b) interruption current.
6. The Z-bus method is very suitable for fault studies on large systems. Why?
7. Write down the equations to convert symmetrical components into phase quantities.
8. Write the relative frequency of occurrence of various types of faults.
9. Define the term "transient stability".
10. State equal area criterion.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the $\Pi$ model for a transformer with off-nominal tap-ratio. (8)

(ii) Sketch and explain electric power system and mark the voltage level at various points from generator to load. (8)

Or

(b) Describe the modern power system in detail.

12. (a) Describe the power flow problem. Explain the step-by-step computational procedure to solve the power flow problem using the Gauss-seidal method. (16)

Or

(b) Derive Newton-Raphson load flow algorithm and explain the implementation of this algorithm. (16)

13. (a) With the help of a detailed flow-chart, explain how a symmetrical fault can be analysed using Z-bus. (16)

Or

(b) A synchronous generator and motor are rated for 30000 kVA, 13.2 kV and both have subtransient reactance of 20%. The line connecting them has a reactance of 10% on the base of machine ratings. The motor is drawing 20000 kW at 0.8 pf leading. The terminal voltage of the motor is 12.8 kV. When a symmetrical three-phase fault occurs at motor terminals, find the subtransient current in the generator, motor and fault point.

14. (a) Derive the relationship for fault currents in terms of symmetrical components when there is a LL-G fault. (16)

Or

(b) Draw the Zero sequence equivalent circuits for the various possible transformer connections. (16)

15. (a) Explain the modified Euler's method of analysing power system stability, with neat flow chart. (16)

Or

(b) Describe a procedure to simultaneously solve for state variables and network variables of a system subjected to a transient disturbance. (16)