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Question Paper Code: 55302

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fifth Semester

Electrical and Electronics Engineering

15UEE502 - POWER SYSTEM ANALYSIS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Single line diagram does not represent _____ CO1- R
(a) Star connection of transformer winding (b) Delta connection of transformer winding
(c) Neutral wire of transmission line (d) Rating of machines
2. Impedance diagram is used for analysis of _____. CO1- R
(a) Load flow (b) Alternator (c) Fault (d) Transmission line
3. Which among these quantities are to be determined in slack bus? CO2- R
(a) P and Q (b) Q and $|V|$ (c) $|V|$ and δ (d) Q and δ
4. What percentage of buses in the power system are generator buses? CO2- R
(a) 5 % (b) 25 % (c) 70 % (d) 10 %
5. The most severe fault is _____. CO3 R
(a) Single line to ground fault (b) Double line to ground fault
(c) Symmetrical fault (d) Line to line fault

6. In which portion of the transmission system the occurrence of the fault is more common? CO3- R
- (a) Alternators (b) Transformers
(c) Transmission lines (d) Underground cables
7. What is the value of zero sequence impedance in line to line faults? CO4- R
- (a) $Z_0 = 1$ (b) $Z_0 = \infty$ (c) $Z_0 = 3 Z_n$ (d) $Z_0 = 0$
8. What happens if the neutral is not grounded in case of the single line to ground fault? CO4- R
- (a) Only the zero sequence impedance will be zero
(b) Zero sequence impedance will be infinite
(c) Fault current will be zero
(d) Both (b) and (c)
9. By using which component the transient stability limit of a power system can be improved? CO5- R
- (a) Series resistance (b) Series capacitor (c) Series inductor (d) Shunt resistance
10. The stability of the power system is not affected by _____. CO5- R
- (a) Line losses (b) Generator reactance
(c) Excitation of generators (d) All of these

PART – B (5 x 2= 10 Marks)

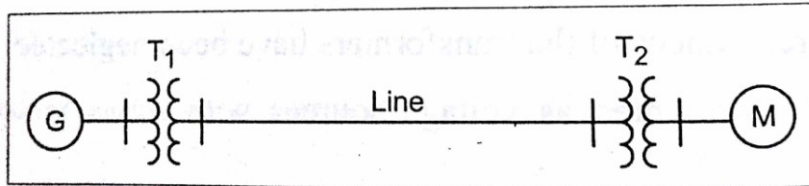
11. Mention the functions of power system analysis. CO1- R
12. How the buses in the power system are classified? CO2- R
13. Define short circuit capacity of power system. CO3- R
14. List the causes of unsymmetrical faults. CO4- R
15. State infinite bus. CO5- R

PART – C (5 x 16= 80 Marks)

16. (a) Draw the structure of an electrical power system and describe the components of the system with typical values. CO1- App (16)

Or

- (b) The three phase power and line-line voltage rating of the electric power system are shown in figure. CO1- App (16)



G_1 : 60 MVA, 20 kV, $X'' = 9\%$

T_1 : 50 MVA, 20 / 200 kV, $X = 10\%$

T_2 : 50 MVA, 200 / 20 kV, $X = 10\%$

M : 43.2 MVA, 18 kV, $X'' = 8\%$

Line : 200 kV, $Z = 120 + j 200 \Omega$

Draw an impedance diagram showing all impedances in p.u. on a 100 MVA base. Choose 20 kV as the base voltage for generator.

17. (a) Explain the step-by-step computational procedure for the Gauss-Seidal method of load flow studies with flow chart. CO2-Ana (16)

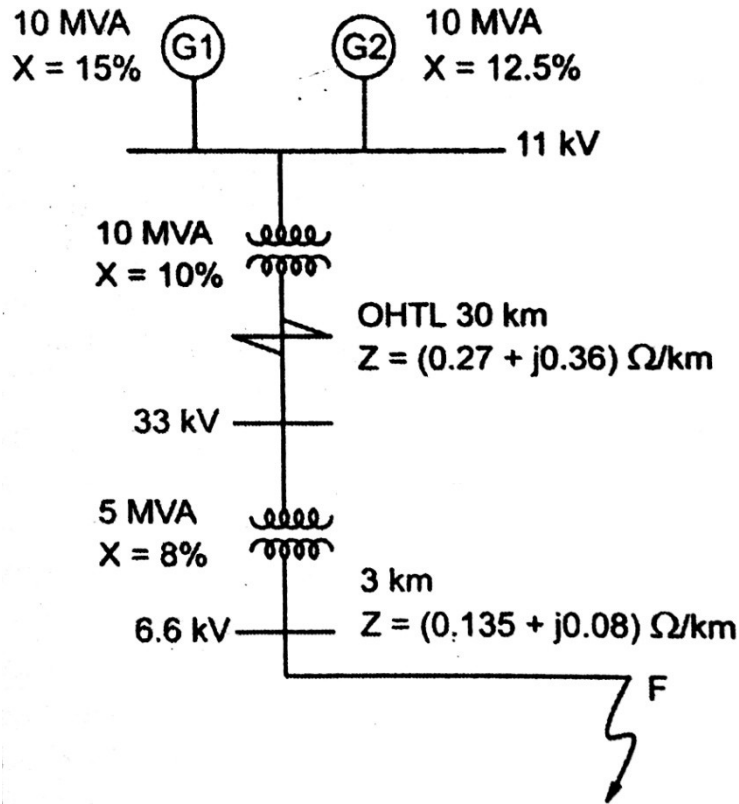
Or

- (b) Derive load flow algorithm using Newton – Raphson method with flow chart and discuss the advantages of the method. CO2 Ana (16)

18. (a) Illustrate how a symmetrical fault can be analyzed using Z_{bus} , with a neat flow chart. CO3- Ana (16)

Or

- (b) For the radial network shown, a three phase fault occurs at F. Determine the fault current and the line voltage at 11 kV bus under fault condition. CO3- Ana (16)



19. (a) Obtain an expression for fault current in line to line fault on an unloaded generator in terms of symmetrical components. CO4- U (16)

Or

- (b) (i) The currents flowing in the lines toward a balanced load connected in delta are $I_a = 100 \angle 0^\circ$, $I_b = 141.4 \angle 225^\circ$ and $I_c = 100 \angle 90^\circ$. Find the symmetrical components of the given line currents. CO4- App (8)
- (ii) Develop an expression of three power in terms of symmetrical components. CO4- Ana (8)
20. (a) (i) Enumerate the classification of power system stability. CO5- U (8)
- (ii) Derive swing equation for a synchronous machine. CO5- U (8)

Or

- (b) State and discuss 'equal area criterion' in connection with transient stability analysis. Also write its advantages and limitations. CO5- U (16)