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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (EEE) III Year I-Semester Main & Backlog Examinations, December-2017

Power Systems-II

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Why the Ferranti effect is significant only in medium and long lines?
2. Draw phasor diagrams of a nominal Π circuit and nominal T circuit of a transmission line.
3. How the base quantities are selected in per unit system?
4. What are the advantages of NR method over GS method?
5. What is meant by short circuit capacity of a bus?
6. Write the assumptions made in fault calculations.
7. Give the classification of faults.
8. Draw the sequence network of a solidly grounded unloaded alternator for L-G fault.
9. Draw the equivalent circuit of an alternator under (i) sub-Transient and (ii) Transient state conditions.
10. What do you mean by the terms reflection coefficient and refraction coefficient?

Part-B (5 × 10 = 50 Marks)

11. a) Describe the phenomenon of Corona. Discuss the factors which affect corona loss. [5]

    b) The constants of a 3-phase line are A=0.9 ∟2°, B=140 ∟70° Ω/ph. The line delivers 60 MVA at 132 kV and 0.8 pf lagging. Draw circle diagrams and find (a) Sending end voltage and power angle (b) Maximum power which the line can deliver with the above values of sending end and receiving end voltage. [5]

12. a) Determine Y bus for a four bus system having the following line data. [5]

Line Code	Impedance
Bus 1-2	0.08 + j0.24
Bus 2-3	0.02 + j0.06
Bus 3-4	0.06 + j0.18
Bus 1-4	0.04 + j0.12

b) The Bus specifications and values of injected powers are as under: [5]

Bus	P	Q	V	Bus Types
1	-	-	1.05pu	Slack
2	-0.1pu	0	-	Load Bus
3	-0.5pu	0.02pu	-	Load Bus
4	-0.4pu	0.05pu	-	Load Bus

Using line data of 12(a), find values of V_2, V_3 and V_4 after one iteration using G-S method.

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13. a) Discuss the steps for formation of Z bus for a system. [5]

    b) Three 6.6 kV generators of ratings 8 MVA, 2 MVA and 5 MVA have per unit reactances of 0.16, 0.08 and 0.12 respectively. They feed a line having a reactance of 0.125 Ω. A 3-phase fault occurs at far end of line. Find fault MVA. [5]

14. a) Why should Zn appears as 3Zn in zero sequence equivalent circuit? [4]

    b) A star connected, balanced load of 10 Ω each has the following voltages across its terminals; V_{ab}= 200 L0°, V_{bc}=220 L120°, V_{ca}=180 L-60°V. Calculate the symmetrical components of line and phase voltages. From the symmetrical components of line voltages, determine the line currents? [6]

15. a) Derive the reflected transmitted voltages and currents of an overhead transmission line if the line is terminated at an impedance. [5]

    b) A 500 kV surge travels on an overhead line of surge impedance 400 Ω towards its junction with a cable which has a surge impedance of 40 Ω. [5]
    Find (a) Transmitted voltage (b) transmitted current (c) reflected voltage and (d) reflected current.

16. a) Find the ABCD constants for nominal Π circuit of a transmission line. [5]

    b) Explain the FDLF method with a flow chart. [5]

17. Answer any *two* of the following:

    a) Discuss the behaviour of 3-phase alternator when sudden 3-phase fault occurs with necessary diagrams. [5]

    b) A 3-phase, 37.5 MVA, 33kV alternator having X_1=0.18 pu, X_2= 0.12 pu & X_0= 0.1 pu based on its rating is connected to a 33 kV overhead line having X_1=X2= 6.3 Ω and X_0=12.6Ω per phase. A single line to ground fault occurs at the remote end of the line. The alternator neutral is solidly grounded. Calculate the fault current? [5]

    c) Write short notes on Travelling wave theory. [5]

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