

Electrical Power System - I

P. Pages : 3

Time : Three Hours



NJR/KS/18/4473

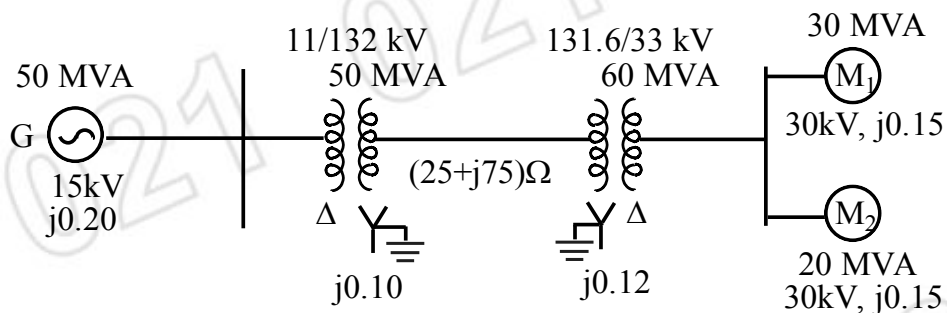
Max. Marks : 80

- Notes :
1. Solve Question 1 OR Questions No. 2.
 2. Solve Question 3 OR Questions No. 4.
 3. Solve Question 5 OR Questions No. 6.
 4. Solve Question 7 OR Questions No. 8.
 5. Solve Question 9 OR Questions No. 10.
 6. Solve Question 11 OR Questions No. 12.
 7. Due credit will be given to neatness and adequate dimensions.
 8. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.
 10. Use of non programmable calculator is permitted.

1. a) Compare Indoor and outdoor substations. 6
b) Draw and explain the single line diagram of power system with their voltage levels. 5
c) Draw the layout of 33 kV/11 kV substation with all necessary equipments. 3

OR

2. Write a short notes on :
i) Complex Power 5
ii) Voltage and frequency dependence of loads. 5
iii) Load and their characteristics. 4
3. a) Derive the expression for new per unit impedance in terms of old per unit impedance if MVA and kV bases are changed. 6
b) Draw the impedance diagram with all impedances marked in per unit. Select generator rating as the base values. 8



OR

4. a) Derive an expression for inductance of Unsymmetrical three phase line. Also draw its transposition cycle. 6
- b) A 750 kV line has a double – conductor circuit of a three phase line with horizontal spacing as shown in figure. 8

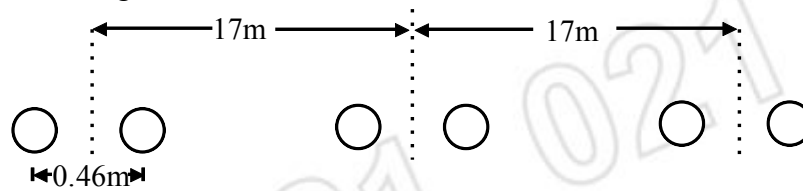


Fig. 4.b

Given that :

Spacing between the conductors = 17 m.

Spacing between the subconductors = 0.46 m

Radius of conductor = 35 mm.

5. a) Write a short notes on : 6
- Radial
 - Ring Main
 - Interconnected
- Schemes of distributed system.
- b) Two three phase parallel feeders connect a generating station and a balanced load of 2 MW at 33 kV. The load operates at 0.8 P.F. lagging. One of the feeder has resistance and reactance of 0.5Ω and 0.1Ω respectively. It delivers 0.5 MW at 0.9 PF lagging. Calculate the resistance per phase of the other feeders. 7

OR

6. a) Derive an expression for voltage distribution of a four disc insulator string. Also state the string efficiency. 6
- b) Each conductor of a 33 kV, 3 phase system is suspended by a string of three similar insulators. The capacitance of each disc is nine times the capacitance to ground. Calculate the voltage across each insulator. Determine the string efficiency. 7
7. a) Find ABCD parameters of a medium transmission line using nominal π method. 6
- b) 15000 KVA is received at 33 kV at 0.85 PF lagging over 8 km three-phase overhead line. Each line has $R = 0.29\Omega$ per km, and $X = 0.65\Omega$ per km. Calculate : 7
- The voltage at the sending end.
 - The power factor at the sending end.
 - The regulation and
 - The efficiency of the transmission line.

OR

8. a) Write a short notes on : 6
- Ferranti effect
 - Surge impedance
 - Propagation constant

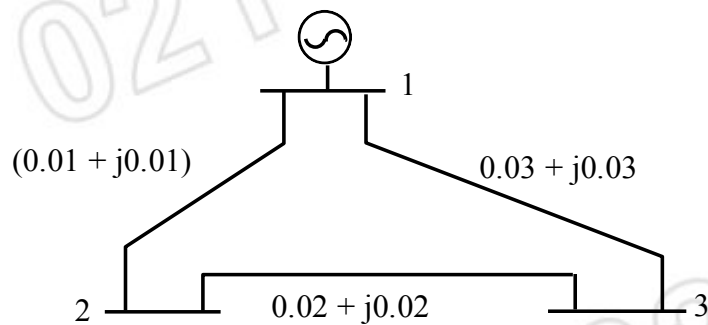
- b) Using nominal π method, Find V_s and voltage regulation for 250 km, 3-ph, 50 Hz transmission line delivering 25 MVA at 0.8 PF lagging to a balanced load at 132 kV. The line conductors are placed equilaterally 3 m apart. The conductor resistance is $0.11\Omega/\text{km}$ and effective diameter is 1.6 cm. 7

9. a) i) Discuss the advantages and limitations of interconnected system of power station. 5
 ii) What is the significance of slack bus? 3
 iii) Write a note on static load flow equations. (SLFE) in load flow studies. 5

OR

10. a) How the buses are classified in load flow studies? 6

- b) 7



Find the Y-Bus for the power system shown in above figure.

11. a) Explain Reactive Power sharing between two generators in parallel. 6
 b) Explain Automatic Voltage Regulator of Turbo generator. 7

OR

12. Write a notes on :

- a) Speed governing system of turbo generator. 5
 b) Load sharing between the generators. 4
 c) Reactive Power Compensation. 4
