

ELL303 Questions

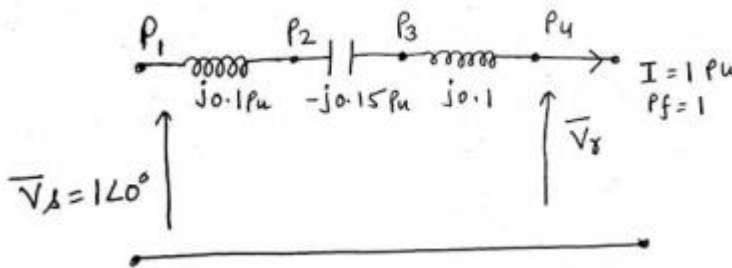
Full Marks-60, Time-60 minutes

1. Choose the correct answer and explain:

A long transmission line be represented by a (lumped/distributed) pi network. Explain the reason. **5 marks**

2. A generating station has a maximum demand of 20 MW, load factor of 60%, a plant capacity factor of 50%. What is the reserve capacity of the plant, if the plant, while running as per schedule, were fully loaded? **5 marks**

3. Consider the model shown in the figure of a transmission line with a series capacitor at its mid-point find at which point voltage will be maximum (Explain in detail).



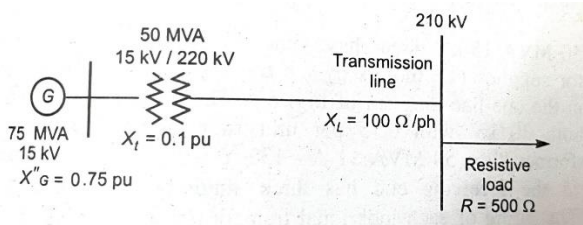
10 marks

4. A 220kV, 50 km long 3-phase transmission line has following A,B,C,D parameters $A=D=0.98\angle 2.5^\circ$, $B=60\angle 70^\circ$ ohm/phase, $C=0.54\times 10^{-4}\angle 96^\circ$ S/phase calculate its charging current per phase. **5 marks**

5. Determine the voltage regulation of a 3 phase 100km 50Hz short transmission line delivering 20MW at pf of 0.8 lagging at 66kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm/km, 1.5 m outside diameter, spaced equilaterally 2m between centres. **10 marks**

6. For the system shown in figure:

1. Calculate the per-unit reactance of the transformer, generator and transmission line shown in the figure. Also calculate the per-unit load current drawn by the resistive load. Consider the base voltage as 100kV and base power as 100 MVA.



10 marks

7. For the bus admittance matrix given in p.u. values, where the first, second, third and fourth row refers to bus 1, 2, 3 and 4 respectively, draw the reactance diagram indicating the values of inductive and capacitive reactance.

$$Y_{BUS} = j \begin{bmatrix} -6 & 2 & 2.5 & 0 \\ 2 & -10 & 2.5 & 4 \\ 2.5 & 2.5 & -9 & 4 \\ 0 & 4 & 4 & -8 \end{bmatrix}$$

10marks

8. A power system consists of 200 buses out of which 10 buses are generator buses, 25 buses are ones with variable reactive power support so as to maintain the bus voltage constant and 5 buses are the ones with fixed shunt capacitors. All the other buses are load buses. The size of the NR Jacobian matrix. Justify your answer

5 marks

