



THE UNIVERSITY OF ZAMBIA SCHOOL OF ENGINEERING

Department of Electrical & Electronic Engineering

MEC 3102

Assignment 2: Power Systems (Due on 06/09/22)

TUTORIAL AND ASSIGNMENT QUESTIONS

INSTRUCTIONS:

- i. Answer and submit only the highlighted question

1. You are tasked to choose an appropriate method of electric power generation. What factor do you need to consider before presenting your best method?[10]
2. What are the conventional and alternative methods of energy sources? [6]
3. What are the advantages and disadvantages of nuclear energy generation?[6]
4. In a nuclear power generation, explain the importance of the control rods?[4]
5. What are the disadvantages of conventional methods of power generation?[2]
6. What is a power system? [2]
7. Differentiate between Primary and Secondary power distribution. [2]
8. What are the advantages and disadvantages of A.C. power transmission? [6]
9. A three-phase delta-connected load, each phase of which has an inductive reactance of $40\ \Omega$ and a resistance of $25\ \Omega$, is fed from the secondary of a three-phase star-connected transformer which has a phase voltage of 230 V. Draw the circuit diagram of the system and calculate: [12]
 - (a) The current in each phase of the load;
 - (b) The potential difference across each phase of the load;
 - (c) The current in the transformer secondary windings;
 - (d) The total active power taken from the supply and its power factor
10. Non-reactive loads of 10, 6 and 4 kW are connected between the neutral and the red, yellow and blue phases respectively of a three-phase, four-wire system. The line voltage is 400 V. Find the current in each line conductor and in the neutral.[10]
11. Each phase of star connected load consists of non-inductive resistance of $50\ \Omega$ in parallel with a capacitance of $63.6\ \mu\text{F}$. Calculate:
 - i. The line current,
 - ii. Total power absorbed,
 - iii. Total kVA and
 - iv. The power factor when this load is connected to a 381 V (line voltage), 3-phase, 50Hz supply.

12. Three similar coils, connected in star, take a total power of 1.5 kW, at a power factor of 0.2, from a three-phase, 400 V, 50 Hz supply. Calculate:
- The resistance and inductance of each coil;
 - the line currents if one of the coils is short-circuited.
13. Two Wattmeters are used for measuring the power input and the power factor of an over-excited synchronous motor. If the reading of the meters are (-2.0 kW) and (+7.0 kW) respectively. Calculate the input power and power factor of the motor.