MEC 3102 – PRODUCTION ENGINEERING I AND ELECTRICITY & ELECTRONICS II

Department of Mechanical Engineering

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2nd Series Assignment [2]

1. You are tasked to choose an appropriate method of electric power generation. What factor do you need to consider before presenting you 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 disadvantage of A.C. power transmission? [6]
9. A three-phase delta-connected load, each phase of which has an inductive reactance of 40 Ω and a resistance of 25 Ω, 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 p.d 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 50Ω in parallel with a capacitance of 63.6μF. 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:
    i. The resistance and inductance of each coil;
    ii. 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.

NOTE: This assignment is due on the **06/08/2021**

Write your answers clearly for the highlighted questions and send scans/pictures of your answers.