**Centurion University of Technology and Management, Paralakhemundi**

**Course: Basic Electrical Engineering (CUTM 1057)**

**Numerical Questions:**

1. Calculate the current flowing through a resistor with a resistance of 10 ohms when a voltage of 20 volts is applied across it.
2. A circuit consists of two resistors in series, R1 = 4 ohms and R2 = 6 ohms. Calculate the total resistance of the circuit.
3. A 12 V battery is connected to a circuit with a total resistance of 8 ohms. Calculate the current flowing through the circuit.
4. A 220 V power supply is connected to a light bulb with a resistance of 110 ohms. Calculate the power consumed by the bulb.
5. A capacitor has a capacitance of 20 microfarads and is charged with a voltage of 100 volts. Calculate the energy stored in the capacitor.
6. An inductor has an inductance of 0.5 henries and a current of 2 amperes flowing through it. Calculate the energy stored in the inductor.
7. Calculate the power factor of a circuit with a resistance of 10 ohms and a reactance of 5 ohms.
8. A circuit has a power factor of 0.8 and a resistance of 6 ohms. Calculate the reactance of the circuit.
9. A transformer has 100 turns on the primary coil and 200 turns on the secondary coil. If the primary voltage is 120 V, calculate the secondary voltage.
10. Calculate the power output of a generator that produces a current of 10 amperes at a voltage of 220 volts.
11. Define magnetic reluctance and explain how it relates to magnetic circuits. Provide an equation to calculate magnetic reluctance.
12. Compare and contrast magnetic circuits and electric circuits. Highlight the key similarities and differences between the two.
13. Explain the concept of magnetic flux and how it is related to magnetic circuits. Discuss the factors that affect magnetic flux in a magnetic circuit.
14. Describe the role of a magnetic core in a magnetic circuit. What are the advantages of using a magnetic core in an electromagnetic device?
15. Discuss the significance of the relative permeability of a magnetic material in magnetic circuits. Explain how the relative permeability affects the magnetic flux and magnetic field intensity in a magnetic circuit.
16. A balanced three-phase wye-connected source has a line voltage of 400 V. Calculate the phase voltage.
17. In a balanced three-phase circuit, each phase has a load impedance of 10 + j5 ohms. Calculate the line current.
18. A three-phase delta-connected source has a line current of 20 A. If the load impedance is (8 + j6) ohms, calculate the line voltage.
19. In a balanced three-phase circuit, the line voltage is 480 V, and the line current is 40 A. Determine the power factor if the total apparent power is 30 kVA.
20. In a three-phase system, the line-to-line voltage is 440 V, and the line current is 30 A. Calculate the total apparent power if the power factor is 0.9.

**Comprehensive Questions:**

1. Explain Ohm's Law and its significance in electrical circuits.
2. Describe the difference between alternating current (AC) and direct current (DC).
3. What is the purpose of a fuse in an electrical circuit? How does it protect the circuit?
4. Explain the concept of power factor and its importance in electrical systems.
5. Describe the operation of a three-phase induction motor.
6. What is the difference between a resistor and a capacitor? How do they behave in a circuit?
7. Explain the working principle of a transformer and its applications.
8. Describe the characteristics and applications of a diode.
9. Discuss the advantages and disadvantages of using solar power as a renewable energy source.
10. Explain the basic principles of electrical safety and the measures to be taken to prevent electrical hazards.
11. Define magnetic reluctance and explain how it relates to magnetic circuits. Provide an equation to calculate magnetic reluctance.
12. Compare and contrast magnetic circuits and electric circuits. Highlight the key similarities and differences between the two.
13. Explain the concept of magnetic flux and how it is related to magnetic circuits. Discuss the factors that affect magnetic flux in a magnetic circuit.
14. Describe the role of a magnetic core in a magnetic circuit. What are the advantages of using a magnetic core in an electromagnetic device?
15. Discuss the significance of the relative permeability of a magnetic material in magnetic circuits. Explain how the relative permeability affects the magnetic flux and magnetic field intensity in a magnetic circuit.
16. Describe the difference between a delta connection and a wye connection in three-phase circuits. Include advantages and disadvantages of each.
17. Explain the concept of power factor in three-phase circuits. How does power factor affect the efficiency of a system?
18. What is meant by a balanced three-phase circuit? How can you determine if a three-phase circuit is balanced or unbalanced?
19. Discuss the advantages of using a three-phase system over a single-phase system. Give examples of applications where three-phase power is commonly used.
20. Describe the method of measuring power in a three-phase circuit using two-wattmeter method. Explain the necessary connections and calculations involved.