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DEPARTMENT OF SCIENCE AND HUMANITIES

FIRST YEAR- SECOND SEMESTER

COMMON TO CIVIL & MECHANICAL ENGINEERING

GE6252 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT-I / ELECTRICAL CIRCUITS & MEASUREMENTS

PART-A

1. Find the effective value of the cosine wave $V_m\cos(\omega t + \Phi)$.
2. It is required to convert a 5mA meter with 20Ω internal resistor into 5A ammeter. Calculate the value of shunt resistance required and multiply factor of the shunt.
3. State the Ohm's Law. List any three types of indicating instruments.
4. Define: Power Factor.
5. What are the advantages of electromechanical measuring instruments?
6. State the Kirchoff's Voltage and Current Law.
7. State the different types of instruments based on their operating principles.
8. Define: RMS value.
9. A 120Ω resistor has a specified maximum power dissipation of 1W. Calculate the maximum current level.
10. Three inductive coils each with a resistance of 15Ω and an inductance of 0.03H are connected in star to a 3Φ 400 V, 50 Hz supply. Calculate the phase voltages.
11. Two resistances of 4Ω and 6Ω are connected in parallel across a 10 V battery. Determine the current through 6Ω resistance.

PART-B

1. With the help of a neat diagram, explain the construction and working of a **Permanent Magnet Moving Coil (PMMC)** type instrument.

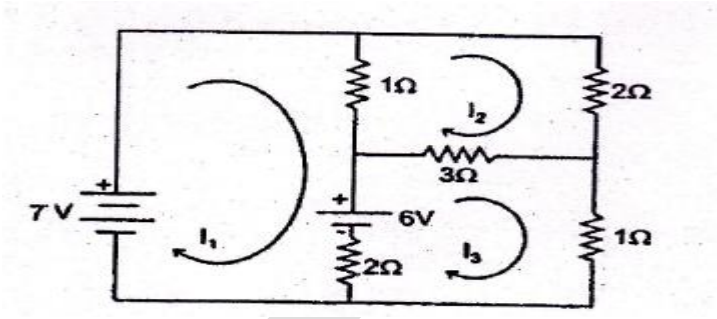
2. Explain the principle of operation of **Attraction-type and Repulsion-type of Moving Iron Instruments** with neat sketches.

3. With the help of a neat diagram, explain the construction and operation of an **Induction type Energy meter.**

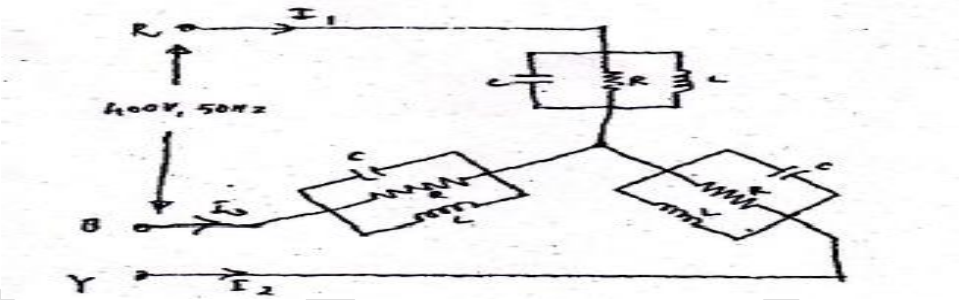
4. Explain the construction and and principle of operation **Electrodynamometer type Wattmeter**.

5. Derive the expression for phase angle in the **R-L series circuit, R-C series circuit and R-L-C series** circuit.

6. Using **Mesh Analysis**, find the current through various branches in the circuit of figure shown below



7. For the circuit shown below, calculate the line current, the power and the power factor. The values of R, L and C in each phase are 10Ω, 1H, and 100μF respectively



8. **(i)** A series R-C circuit with R = 20 Ω and C = 127 μF has 160 V, 50 Hz supply connected to it. Find the impedance, current and power factor.

(ii) A coil of resistance 5.94Ω and inductance of 0.35H is connected in series with a capacitance of 35 μF across a 200 V, 50 Hz supply. Find the impedance (Z), current and the phase difference between the voltage and current (φ).

UNIT-2/ELECTRICAL MECHANICS

PART-A

1. What is the greatest advantage of DC Motors?

2. What is leakage flux?

3. What is the purpose of yoke in a DC machine?

4. Name the methods adopted to make the single phase induction motors self start?

5. What is Back EMF?

6. What are the types of transformers based on construction?

7. Sketch the circuit diagram for separately excited DC generator.

8. What is a Transformer?

9. Define: Transformation ratio of a transformer.

10. A DC shunt generator supplies a load of 10 kW at 220 V through feeders of resistance 0.1Ω. The resistance of armature and shunt field windings is 0.05 Ω and 100 Ω respectively. Calculate the terminal voltage.

11. In a single phase transformer, N_P = 350 turns, N_S = 1050 turns, E_P = 400 V. find E_S.

12. Write the principle of DC motor.

13. Why a single phase induction motor is not self starting?

PART-B

1. With neat sketches, explain the construction and the working principle of **D.C. Generator**. Also derive the **EMF equation**

2. Explain the operation and principle of a **DC motor**

3 Explain the principle of operation of **single phase transformer**

4. Derive the **EMF equation of a transformer**

5. Explain the working principle of various **types of single phase (1φ) Induction Motor** with neat diagram.

UNIT-3/SEMICONDUCTOR DEVICES AND APPLICATIONS

PART-A

1. What is junction capacitance?

2. For a certain transistor I_C=5.505 mA, I_B=50μA, I_{CO}=5μA, determine the value of β and I_E.

3. Write the difference between PN junction diode and Zener Diode.

4. Give the biasing conditions for a transistor to operate as an amplifier.

5. State the advantages of bridge rectifier.

6. State what is 'Early Effect' in transistors?

7. Define peak inverse voltage of a PN junction diode.

8. Define: Current amplification factor for CE configuration in transistors.

9. What is meant by Zener Effect?

10. Give the applications of Zener Diode.

11. What are the different modes of Transistor operation?

12. Write any two salient points on a P-N junction.

13. When should a transistor be biased? Name two common biasing circuits.

PART-B

1. Explain the **V-I characteristics** of a **Diode**.

2. Explain the mechanism of **Avalanche Breakdown** and **Zener Breakdown**.

3. With the help of relevant circuit and V-I characteristics, show how a **Zener Diode** is used as a **voltage regulator.**

4. With the help of sketches of circuits and waveforms, explain the **working of Half-wave and Full wave Rectifier.**

5. Obtain **the expressions** for DC (Average) Output Voltage, RMS voltage, Ripple factor, Efficiency, Transformer Utilization Factor, Form Factor and Peak Factor **for Half-wave and Full wave Rectifiers**.

6. Explain the **Operation of PNP and NPN** Transistors.

7. Explain the various **characteristics of BJT** in **Common Emitter Configuration** with neat diagram. (Common Base and Common Collector configurations may also be asked)

UNIT IV - DIGITAL ELECTRONICS

PART-A

1. What is a decade counter?

2. Name four different flip flops commonly available.

3. Draw the symbol of AND gate and write its truth table.

4. What are Universal Gates? Why do we call them so?

5. What is a shift register? How is it classified?

6. Mention two types of D/A converters.

7. Find the following binary difference: 1011010 – 0101110

8. An active high S-R latch has an 'l' on the S-input and '0' on the 'R' input. What state is the latch in?

9. What are the basic properties of Boolean algebra?

10. Write a short note on counters.

11. Why divide-by-n counter called so?

12. Write the truth table of an Exclusive-OR gate.

13. Express the following binary numbers in its equivalent decimal numbers: 110010_2, 14_8, $5AC_{16}$

PART-B

1. Draw and explain the Logic diagram of all types of **Gates** with suitable truth tables

2. **Design a Full Adder and Half Adder**, construct the truth table, simplify the output equations and draw the logic diagram.

3. Explain in detail about **D-Flip-Flop, T- Flip-Flop** and **JK Flip-Flop**.

4. Explain working principle of **D/A and A/D converters**.

UNIT V/FUNDAMENTALS OF COMMUNICATION ENGINEERING

PART-A

1. What is meant by Modulation?
2. Write the advantages of Optical Fiber communication.
3. As related to amplitude modulation, what is over modulation, under modulation and 100% modulation?
4. Why are digital signals said to be noise immune?
5. State any two differences between analog and digital signals.
6. State the functions of a satellite transponder.
7. State the basic characteristic of an analog signal, with an example.
8. Give typical values of uplink frequency and downlink frequency in satellite communication.
9. Define the term 'Demodulation'.
10. Sketch the block diagram of basic communication system.
11. Mention any two advantages of modulation when compared to transmission of unmodulated signal.
12. What is the basic function of a communication satellite?
13. What are the applications of microwave?
14. Mention the need of modulating the information signals.
15. Define Total Internal Reflection.

PART-B

1. Explain the principles of **Amplitude Modulation** and **Frequency Modulation**.

2. With the help of suitable block diagram, explain the various functional blocks of **TV Transmitter** and **TV receiver**.

3. Draw the block diagram arrangement and explain the operation of an **AM transmitter** and **FM Transmitter.**

4. With a neat block diagram, explain the principle of operation of **Microwave Communication** and **Optical Fiber Communication** systems.

5. Discuss the usage of **Satellite for long distance communication** with a neat block diagram of basic satellite transponder.

Prepared by

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