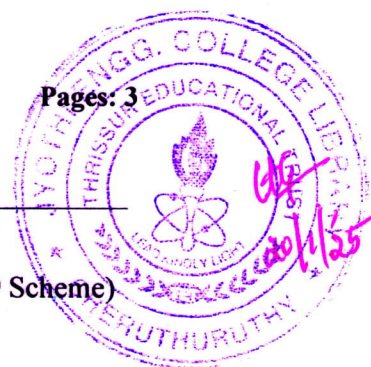Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S, FE) S2 (S, FE) Examination December 2024 (2019 Scheme)

Course Code: EST130

Course Name: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(2019 Scheme)

Max. Marks: 100   Duration: 3 Hrs

- Use separate answer sheets for Part 1 and Part 2
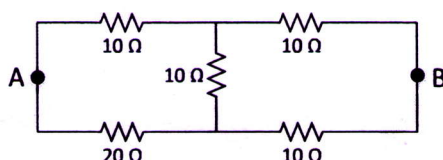- No separate minimum marks are required to pass.

PART I: BASICS OF ELECTRICAL ENGINEERING

PART A

Answer all questions, each carries 4 marks   **Marks**

1. Determine the resistance between points A and B in the circuit given below.   (4)

2. Derive the expression for mutual inductance and mutually induced emf in an electromagnetic circuit.   (4)

3. Compare electric and magnetic circuits.   (4)

4. Define phase sequence in three phase ac system with an example   (4)

5. Derive an expression for total active power in three phase delta connected system in terms of line voltages and line currents.   (4)

PART B

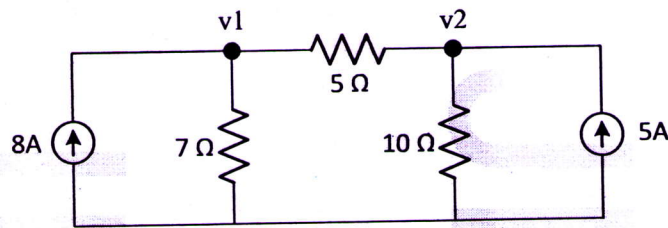*Answer one full question from each module, each question carries 10 marks.*

MODULE 1

6. Perform mesh analysis and obtain currents i_1, i_2, i_3. Also obtain the power dissipated in 2Ω resistor for the circuit below.   (10)
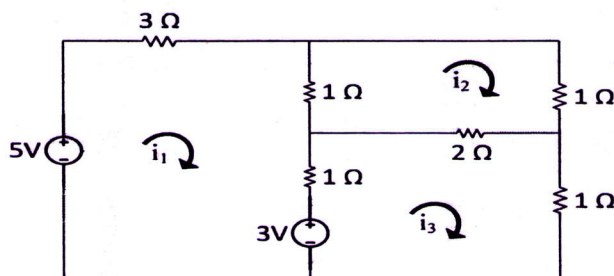
OR

7   Find the node voltages v_1 and v_2 using node analysis. Also find the power   (10)
    dissipated in 5Ω resistor.

MODULE 2

8   a   An alternating sinusoidal voltage is applied to a half wave diode rectifier. Sketch   (7)
        the rectified output waveform and derive the expression for average value, RMS
        value and form factor of the output waveform.

    b   A conductor of length 2m is placed in a magnetic field of strength 2wb/m². (3)
        Calculate the emf induced in the conductor if it moves with a velocity 40m/s,
        i) perpendicular to the field ii) 45° inclined to the field and iii) identify the nature
        of emf induced.

OR

9   a   An iron ring has a cross-sectional area of 400 mm² and a mean diameter of 25 cm. (6)
        It is wound with 500 turns. If the value of relative permeability is 250, find the
        total flux set up in the ring. The coil resistance is 474Ω and the supply voltage is
        240 V.

    b   Write the mathematical expression for a 50 Hz sinusoidal voltage of peak value   (4)
        80 V. Sketch the waveform versus time.

MODULE 3

10 Explain with phasor diagram instantaneous power when ac is supplied through a   (10)
    series R-C circuit. Also draw the impedance triangle and write an expression for
    active, reactive and apparent power in the R-C circuit.

OR

11 A 230 V, 50 Hz ac supply is applied to a coil of 0.06 H inductance and 2.5 ohm   (10)
    resistance connected in series with a 6.8 microfarad capacitor. Calculate (i)
    impedance (ii) current (iii) phase angle between current and voltage (iv) power
    factor and (v) power consumed.

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PART 2: BASICS OF ELECTRONICS ENGINEERING

PART A

Answer all questions, each carries 4 marks

Marks

1	Describe the principle of Avalanche breakdown.	(4)
2	What are the different types of capacitors? Write down the differences between paper capacitor and mica capacitor.	(4)
3	Differentiate Amplitude Modulation and Frequency Modulation.	(4)
4	What is meant by frequency reuse with regard to cellular communication?	(4)
5	Explain the block diagram of a DC Power supply system.	(4)

PART B

Answer one full question from each module, each question carries 10 marks.

MODULE 4

6   Discuss with relevant figures the input and output characteristics of a transistor in   (10)
Common Emitter configuration.

OR

7   Explain the working of a PN junction diode under forward and reverse biased   (10)
conditions and hence plot its VI characteristics

MODULE 5

8   With a neat circuit diagram and waveforms, describe the working of a full wave   (10)
bridge rectifier with a capacitor filter

OR

9   Draw the circuit diagram of a voltage regulator circuit using a Zener diode and   (10)
explain its working.

MODULE 6

10   Describe with a neat block diagram, how the signal is retrieved in a receiver based   (10)
on the concept of superheterodyne principle.

OR

11   Explain with a block diagram, the following terms with respect to cellular   (10)
communication: (i) Handover (ii) Roaming (iii) BSC (iv) MSC

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