TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

EEP 2103 CIRCUIT THEORY II

DEEE2

SERIES: MAY 2016

Instructions

- This paper consists of FIVE questions
- Answer any THREE questions
- All Questions carry equal marks

QUESTION ONE

(a)   Explain the following terms:

      i.   Average value
      ii.   Instantaneous value
      iii. RMS value
      iv.   Form factor   (7 marks)

(b)   A coil of conductor is rotating within a magnetic field. Draw the sine wave and derive the equation
    of the generated emf.   (6 marks)

(c) (i)   Explain the term 'power factor'
  (ii) Draw the phasor diagrams for each of the following circuits:
      I.   Ac circuit having resistance only
      II.   Ac circuit having inductance only
      III. Ac circuit having capacitance only   (7 marks)

QUESTION TWO

(a)   A coil having resistance of 8Ω and inductance of 0.18H is connected in series with a capacitor of
    capacitance 80µF across a 200V, 50Hz supply. Draw the circuit diagram and calculate:
      i.   The current in the circuit
      ii.   Voltages V_R, V_L, and V_C
      iii. The phase angle and draw the phasor diagram   (12 marks)

(b) With the aid of diagrams explain the functions of the following in analogue instruments
      i.   Control device
      ii.   Eddy current damping device   (8 marks)
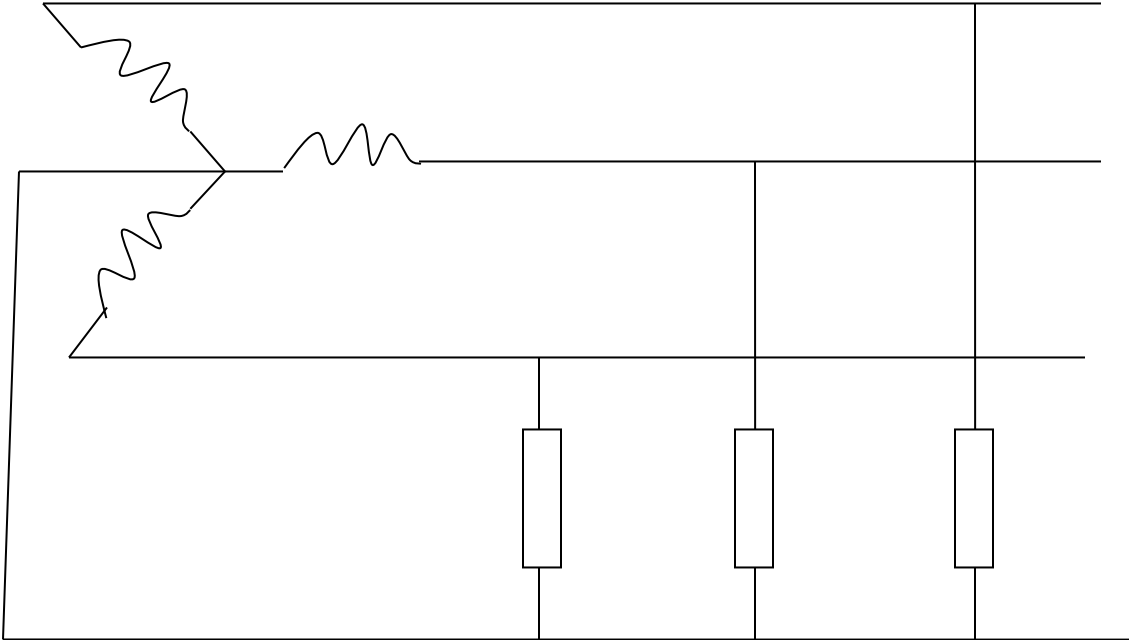
QUESTION THREE

(a)   A resistance of 25Ω, an inductance of 0.18H and a capacitance of 40µF are connected in parallel
    across a 200V, 50Hz supply. Calculate:
      i.   The current on each branch
      ii.   The supply current
      iii. The phase angle and draw the phasor diagram   (10 marks)

(b)(i) Distinguish between admittance and susceptance
  (ii) Explain the condition for resonance   (4 marks)

(c)   A resistance of 20Ω, an inductance of 0.12H and capacitance of 50µF are connected in series.
Calculate the impedance using:
      i.   Rectangular notation
      ii.   Polar notation   (6 marks)

QUESTION FOUR

(a) For the circuit of figure Q4a, calculate

      i.   Current in each line

      ii.   The current in the neutral conductor   (12 marks)

(b)   Draw the waveforms for three phase emfs and state expressions for line and phase currents in:

      i.   Star- connected supply

      ii.   Delta connected supply

                                                  (8 marks)

QUESTION FIVE

(a) With the aid of a diagram explain how deflection is achieved in a permanent magnet moving coil instrument.   (7 marks)

(b) (i) State the expression for power in a three phase system

   (ii) A three phase delta connected motor operating off a 415V system is developing 25kW at an efficiency of 0.9p.u. and a power factor of 0.88. Calculate:

      I.   The line current

      II.   The phase current   (6 marks)

(c) With the aid of a diagram explain the two-meter method of power measurement in three phase systems.   (7 marks)