

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 $80\mu\text{F}$ 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 $40\mu\text{F}$ 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 $50\mu\text{F}$ are connected in series. Calculate the impedance using:

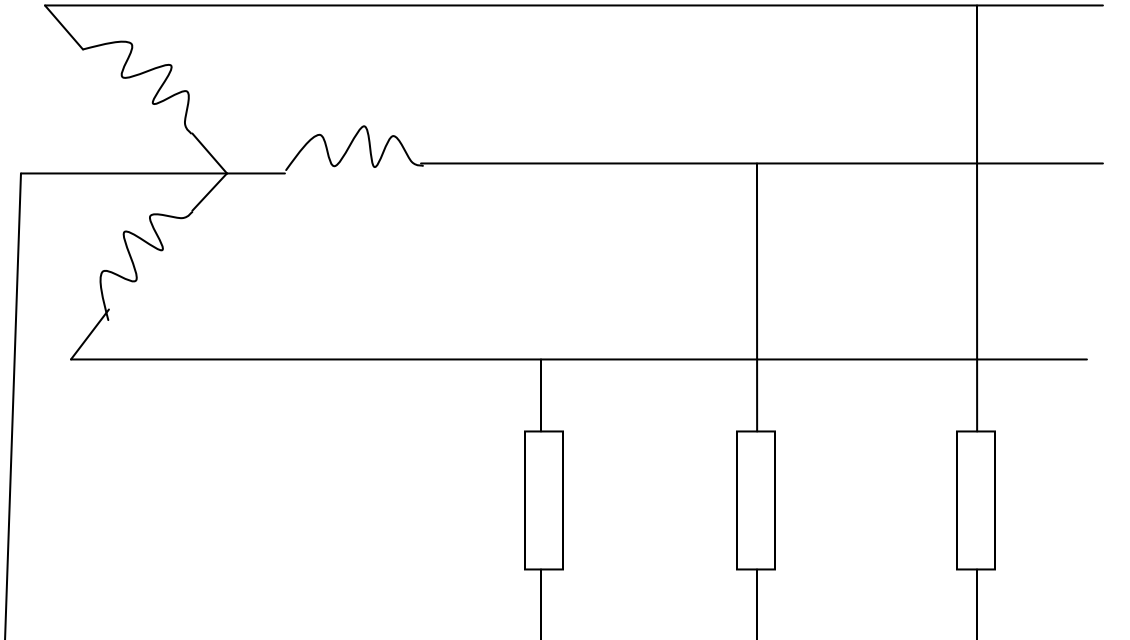
- i. Rectangular notation
- ii. Polar notation (6 marks)

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)