

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B. Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

- 7.1.a) State Super-position Theorem? [25 Marks]
- b) What are Ideal and Practical sources? [2]
- c) A 3μF capacitor is connected to a supply frequency of 1KHz and a current of 2.83∠90° flows. Determine the supply voltage. [3]
- d) The impedance of an electrical circuit is (30 -j50) ohms. Determine (i) the resistance, (ii) the capacitance, and (iii) the magnitude of the impedance, when the circuit is connected to a 240 V, 50 Hz supply. [2]
- e) Define regulation of a transformer? [3]
- f) Give the constructional details of a 1-φ transformer. [2]
- g) What are different types of DC generators? [2]
- h) What is slip and slip speed? [3]
- i) State the materials used for i) Pointer and ii) Springs. [2]
- j) Compare different damping torques required in measuring instruments? [3]

PART - B

7.2.a) Using Thevenin equivalent circuit for the circuit shown in figure 1 across x-y terminals, calculate the current flowing through the 5 Ω resistor. (50 Marks)

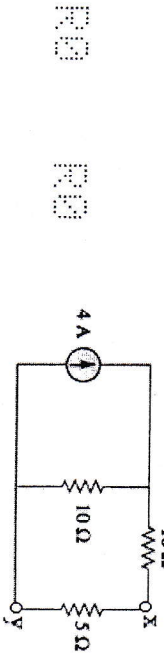


Figure: 1

b) Find the equivalent resistance  $R_{ab}$  in the circuit shown in figure 2. [7+3]

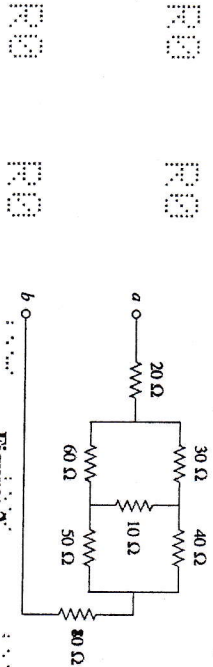


Figure: 2

OR

7.3.a) State and explain Kirchoff's laws. Determine  $i_1$  for the circuit shown in figure 3.

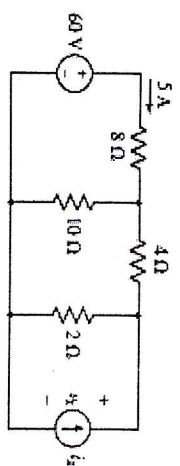


Figure: 3

c) Using Δ-Y or Y-Δ conversion, find the current I in the circuit shown in figure 4.

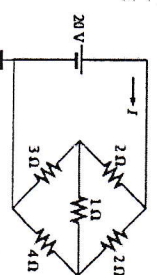


Figure: 4

7.4) Define the following with respect to sinusoidal quantity:  
 i) RMS Value ii) Average Value iii) Form factor iv) Peak factor.  
 A coil has a resistance of 4 Ω and an inductance of 9.55 mH. Calculate (i) the impedance, and (iii) the current taken from a 240V, 50 Hz supply also the phase angle between the supply voltage and current.  
 OR  
 Determine the average value, rms value and form factor of the current in figure 5.

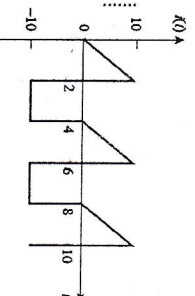


Figure: 5

7.5.a) A single - phase, 50 Hz transformer has 40 primary turns and 520 secondary turns. The cross-sectional area of the core is 270 cm<sup>2</sup>. When the primary winding is supplied with 300 volts, determine (i) the maximum value of flux density in the core, (ii) the voltage induced in the secondary winding.  
 Explain about various losses of Single phase transformer. How to minimize these losses?

OR

7.6) Briefly explain different tests performed on transformer with suitable circuit diagram. A single-phase transformer is rated at 40 kVA. The transformer has full-load losses of 800W and iron losses of 500W. Determine the transformer efficiency at 75% of load and 0.8 power factor.