Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.Sc.(Applied Sciences) in Engg.
END SEMESTER THEORY EXAMINATION- MAY/JUNE-2022
Elements Of Electrical and Electronics Engg. [IEE 121 - S2]

Marks: 50   **Duration: 180 mins.**

Answer all the questions.

Missing data, if any, may be suitably assumed

1)   Find the current I for the circuit shown in Fig.Q1A.   (3)
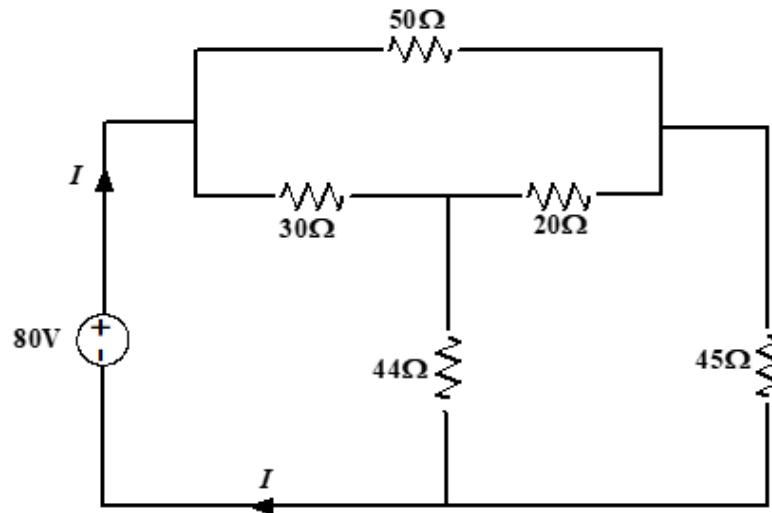
A)

Fig.Q1A

B)   Find the average value, RMS value, peak factor and form factor for the   (5)
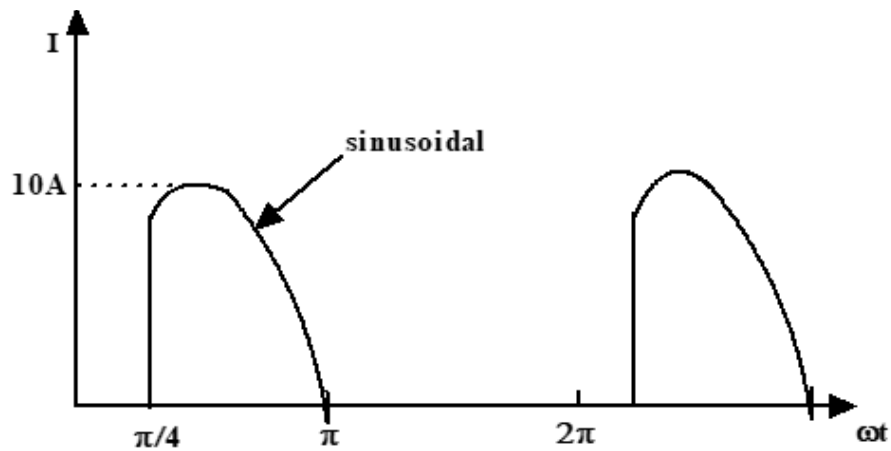   waveform shown in Fig.Q1B

Fig.Q1B

C) Draw to scale a vector diagram showing the following voltages: (2)

$$e_1 = 25 \sin \omega t, \quad e_2 = \sin\left(\omega t + \frac{\pi}{3}\right), e_3 = 30 \cos \omega t, and \ e_4 = 20 \sin\left(\omega t - \frac{\pi}{4}\right)$$

Find the resultant and draw to scale a vector diagram showing all the voltages.

2)

A) Derive the expression for instantaneous power and average power dissipated (5) by a pure inductor in an AC circuit. Plot the waveforms for inductor voltage, current and instantaneous power.

B) A series circuit has a resistance of 2Ω, an inductance of 0.25H, a variable (3) capacitance, connected across a 230V, 50Hz supply. Calculate
(a) The value of the capacitance for resonance.
(b) The voltage across the inductor and the capacitor at resonance.
(c) The Q factor of the circuit

C) A single phase transformer has 500 primary and 1000 secondary turns. The (2) net cross-sectional area of the core is 50cm^2. If the primary winding is connected to a 50Hz supply at 400V, calculate
(a) The peak flux density in the core
(b) The voltage induced in the secondary winding.

3)

A) A supply of 200V, 50Hz is connected to a 20Ω resistor in series with a choke (5) coil. The reading of the voltmeter across the resistor is 100V and across the coil is 150V. Calculate
(a) The power factor of the circuit
(b) The power consumed in the resistance
(c) The power consumed in the coil.

B) A resistance of 30Ω is connected in series with an inductance of 0.25H (5) across 230V, 50Hz supply. Find the

(a) Inductive reactance (b) Total impedance
(c) Current through the circuit (d)Voltage across resistance