PVP 14

Code: EC1T6

I B.Tech - I Semester – Regular / Supplementary Examinations
November 2017

INTRODUCTION TO ELECTRICAL CIRCUITS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22 M

1.

a) State Kirchoff's laws.
b) A Capacitor has a capacitance of 5μF.Calculate the stored energy in it if a voltage of 100V is applied across it.
c) Define reluctance and magnetic flux.
d) A 20H choke with a resistance of 180Ω has a 300V, 50Hz supply, Calculate the energy stored.
e) Define the average value and root mean square value of an alternating quantity.
f) The voltage applied to a series circuit is $100\sin(\omega t+10°)$ and the current is $10\sin(\omega t-30°)$. Find the circuit parameters.
g) A 4Ω resistor is connected to a 10mH inductor across a 100V, 50Hz voltage source. Find the impedance of the circuit and the input current.
h) What is power factor? What is its significance?

i) Define resonance and bandwidth.

j) A coil is at resonance at 10kHz with a capacitor. If the resistance and inductance of the coil are 200Ω and 5H, find the Q factor of the series RLC circuit.

k) A current 10A flows into a circuit consisting of 2Ω, 4Ω, 10Ω and 20Ω resistances respectively in parallel. Determine the total amount of power in the circuit.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2.a) Determine the current drawn by the circuit shown in figure 1. 10 M

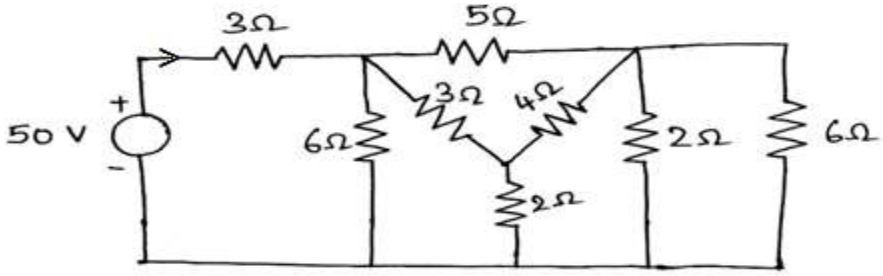

Figure1

b) Determine the current through 6Ω resistor in the figure 2. 6 M

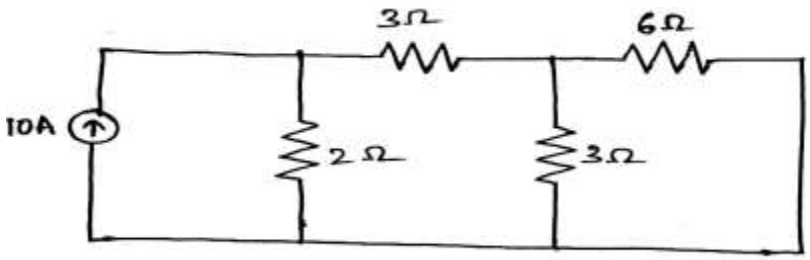

Figure 2

3.a) Determine the average value, R.M.S value of the waveform shown in figure 3. 10 M

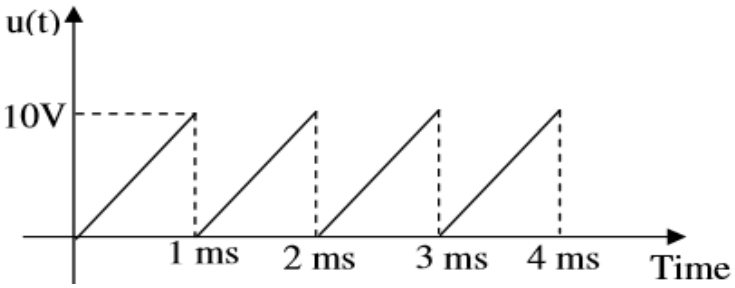

Figure 3

b) Obtain the R.M.S value, average value, peak factor and form factor of the sinusoidal current whose amplitude is 10A. 6 M

4.a) Derive the relation between self-inductance, mutual inductance and coefficient of coupling. 8 M

b) An iron ring of 8cm diameter and 14cm^2 in cross- section is wound with 250 turns of wire for a flux density 1.8Wb/m^2 and permeability 450. Find the exciting current, the inductance and stored energy. Find the corresponding quantities when there is a 1.8 mm air gap. 8 M

5.a) An inductive coil takes 10A and dissipates 1000W when connected to a supply of 250V, 25Hz. Calculate

(i) The impedance (ii) The effective resistance

(iii) Reactance (iv) Inductance

(v) The power factor. 8 M

b) Derive an expression for current response in R-L series circuit with a sinusoidal source. 8 M

6.a) A series RLC circuit consists of a 50Ω resistance, 0.2H inductance and 10μF capacitor with an applied voltage of 20V. Determine the resonant frequency. And also, find the Q factor of the circuit. Calculate the lower and upper frequency limit and also the bandwidth of the circuit. 8 M

b) A series resonating circuit has R=1kΩ, half power frequencies of 10kHz and 90kHz. Determine the bandwidth and the resonant frequency. Calculate the inductance and capacitance of the circuit. 8 M