PVP 14

Code: EC1T6

I B.Tech - I Semester – Regular Examinations - January 2015

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) What are the different types of dependent sources?
   b) A 100 watts, 250V lamp is connected in series with a 100watts, 200V lamp across 250V supply. Calculate circuit current.
   c) The air gap in a magnetic circuit is 1.5 mm long and 2500 mm^2 in cross section. Calculate the reluctance of the air gap.
   d) If two coils have a mutual inductance of 300 μH, calculate the emf induced in one coil when the current in the other coil varies at a rate of 4000 A/sec.
   e) Determine RMS value of the voltage for voltage function V(t)=10+5Sin(314t).
   f) An alternating current of frequency 50Hz has maximum value of 100A.Calculate its value 1/600 seconds after the instant the current is zero and its value is decreasing there afterwards.
   g) The current in a circuit is 6 + j14 A when the applied voltage is 120 + j180V. Determine the phase angle between the voltage and the current.

h) An ac voltage v is represented as v= 100 sin (1256t) A. Determine the time taken from t= 0 for the voltage to reach a value of 60 V for a second time.

i) 100 V AC at 50 Hz is applied across a coil having resistance R and inductance The current observed to be 10 A and when the same voltage is applied at 60 Hz frequency the current is measured to be 8 A. Find the resistance an inductance of the coil.

j) A series RLC is connected to a fixed voltage &fixed frequency supply. The inductance is varied to get maximum voltage across it. Determine the value of inductance.

k) At resonance in an RLC series circuit 20A of current is flowing .What is the current in the same circuit at half power frequencies.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Determine the equivalent resistance seen by the source of the circuit shown in Figure-1 by combining resistors in series and in parallel. Find V_1, I_1, I_2. 8 M

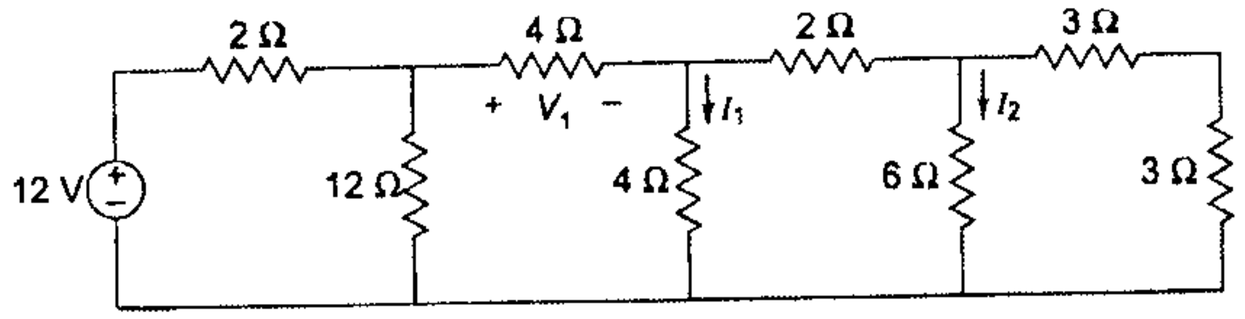

Figure-1

b) Determine the resistance between the points A and B of the network shown in Figure-2. 8 M

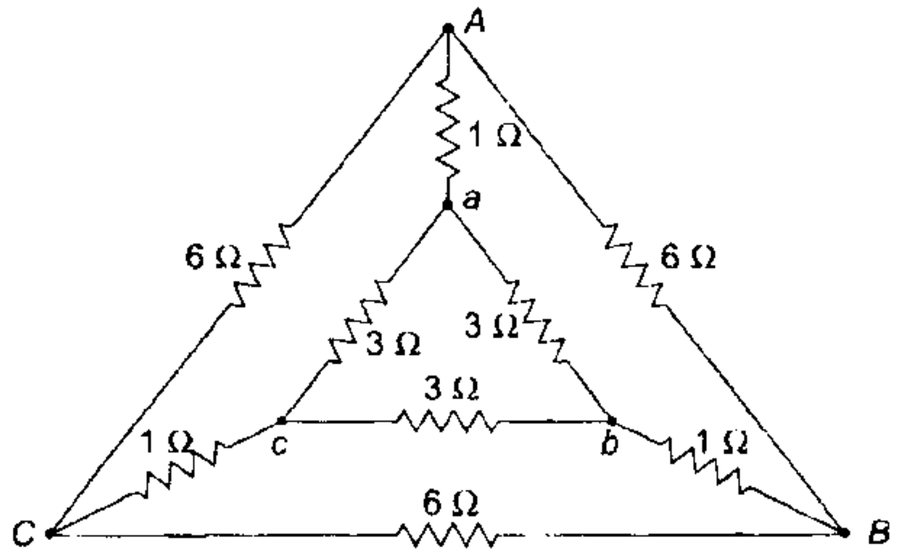

Figure-2

3. a) A magnetic core made of cast steel is shown in Figure-3. The core is symmetrical about the Y-axis and its central limb carries a coil of 600 turns. Compute the magnitude of the exciting current to produce a flux of 25 μWb in either of the side limbs of the core. Assume a square cross section of 1.0 cm x 1.0 cm and a relative permeability of 200 for cast steel. 8 M

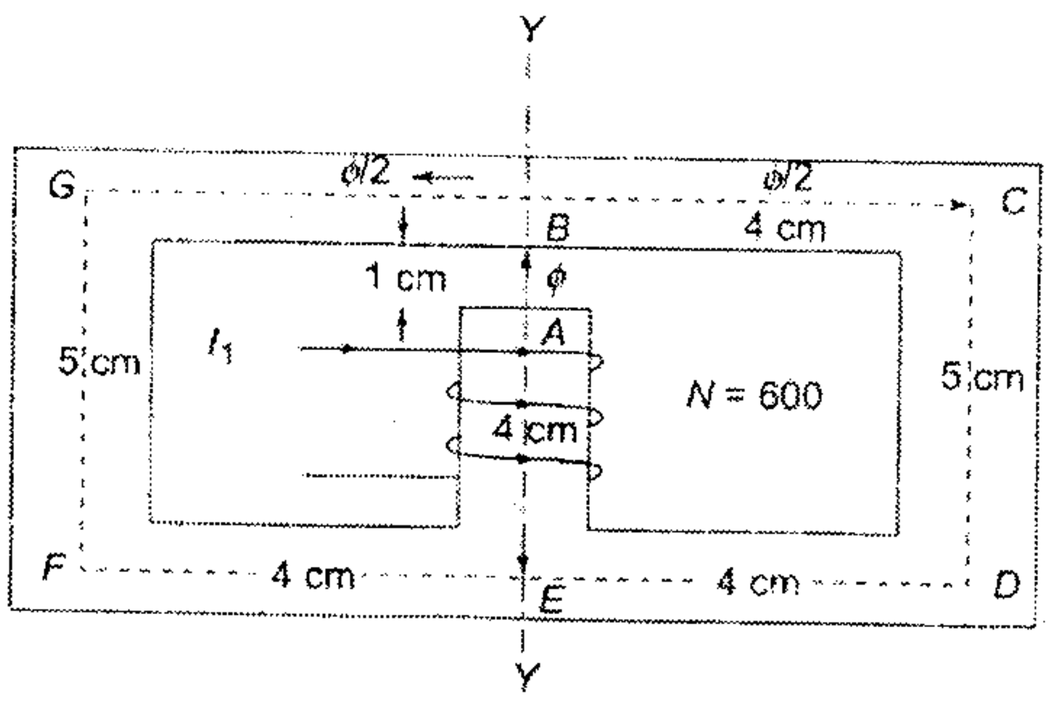

Figure-3

b) A circular wooden ring of cross section 600 sq mm and mean circumference 500mm is wound with a coil of 250 turns. If the coil carries a current of 4A, compute (i) magnetic field intensity, (ii) flux density, and (iii) flux in the ring. If the wooden ring is replaced by an iron ring of relative permeability 600, calculate the new values of magnetic field intensity, flux density, and flux in the ring. 8 M

4. a) A triangular voltage wave has a periodic time of 0.05 sec. for the first 0.03 sec of each cycle, it increases uniformly at the rate of 2000 V/sec, while for the last 0.02 sec, it falls away uniformly to zero. Find its (i) average value, (ii) rms value, and (iii) form factor. 8 M

b) Obtain the Form factor for full wave sinusoidal wave form. 8 M

5. a) When a sinusoidal voltage of 230 V rms is applied to a series RL circuit, it is found that there occurs a power dissipation of 2300 W and a current flow given by $i(t)=28.28 \sin(314t-\theta)$. Find (i) the circuit resistance in ohms and (ii) the circuit inductance in henry. 8 M

b) A series combination of R and C is in parallel with a resistance of 20Ω. At a source frequency of 60 Hz, the total current of 7.02 A (amplitude) divides so that the 20.0 Ω resistor takes 6.0 A and the RC branch 2.3 A (amplitudes). Evaluate R and C of the circuit and source voltage. 8 M

6. a) A series connected RLC circuit has R=20Ω, L=30mH & C=50μF.Determine the resonant frequency. At resonance, calculate the voltage drop and power across each element. The applied voltage is 50V. 8 M

b) A coil of 20Ω resistance and an inductance of 0.2H is connected in parallel with a capacitor of 100μF capacitance. Determine resonant frequency and input impedance at resonance. 8 M