PVP 14

Code: EE2T5

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

ELECTRICAL CIRCUIT ANALYSIS - I
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

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

11x 2 = 22 M

1.

a) Define Link and twig.

b) What is the difference between an ideal source and a practical source? Draw the relevant characteristics of the above sources.

c) Determine I_x in the circuit shown in Figure-1 by using nodal analysis

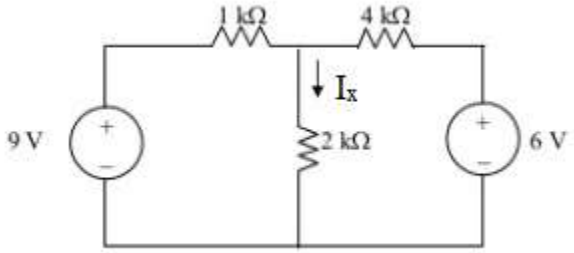

Figure-1

d) Determine V_o in the circuit shown in Figure-2 by using mesh analysis.

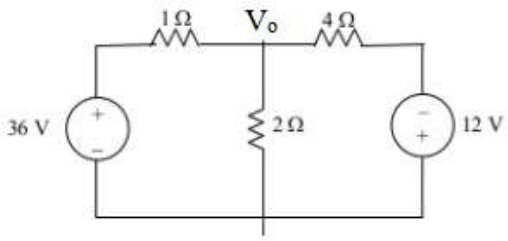

Figure-2

e) Find the r.m.s value of the voltage wave whose equation is, $v(t)=10+200\sin(\omega t-30^0)+100\cos 3\omega t - 50\sin(\omega t+60^0)$

f) Calculate the resistance and inductance or capacitance in series for each of the following impedances. Assume the frequency to be 60Hz. i) 12+j30 ii) -j60

g) Draw the locus diagram for the impedance in R-C series circuit with XC variable.

h) Define resonance in electrical circuit and write condition for resonance in RLC series circuit.

i) Write advantages of three phase system over single phase.

j) Give the relationship between line and phase voltages in star and delta connected 3-phase system.

k) Calculate equivalent resistance between P and Q in the circuit shown in Figure-3

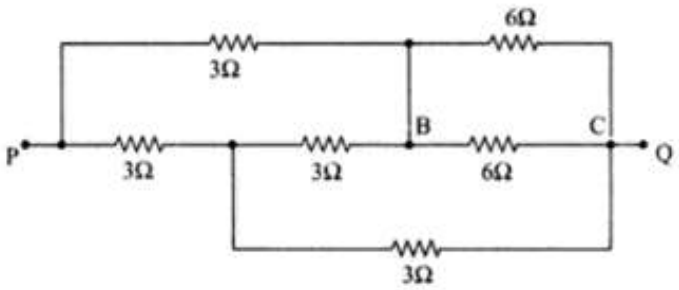

Figure – 3

PART – B

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

3 x 16= 48 M

2. a) The wave form of the current flowing through an inductor of 6 mH is as shown in Figure-4. Determine and sketch waveform of voltage and power. 8 M

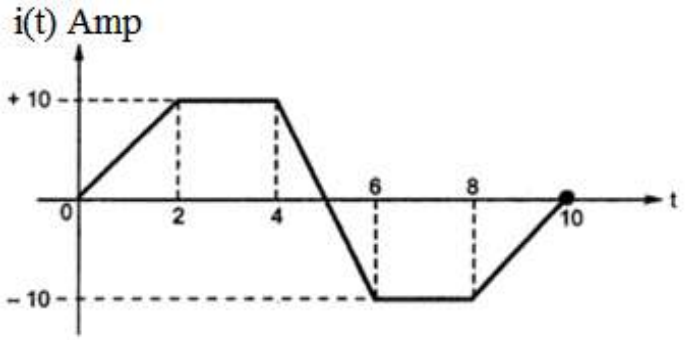

Figure-4

b) Calculate current I supplied by battery in circuit shown in Figure-5. 8 M

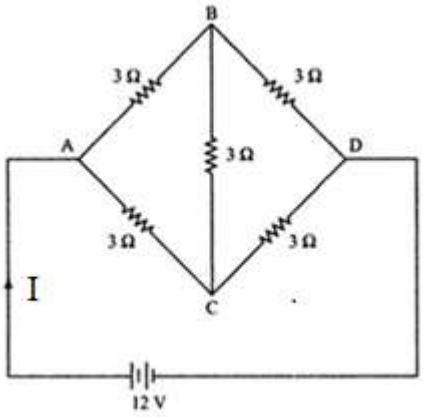

Figure-5

3. a) Find the node voltages in the circuit shown in Figure-6. 8 M

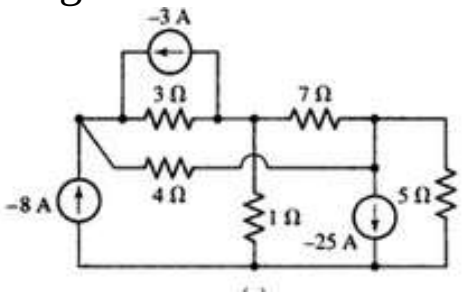

Figure-6

b) Determine current i_1 in the circuit of Figure-7. 8 M

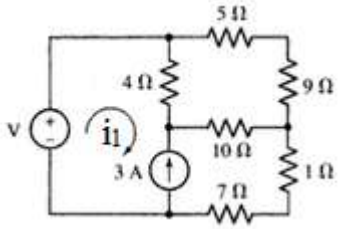

Figure-7

4. a) A 50 μF capacitor is connected in parallel with a choke coil which has a resistance of 20Ω and an inductance of 0.05 H across a 200V, 50 Hz supply. Calculate the total Current, branch current, power factor and active power of the circuit. 8 M

b) A series RLC circuit has an impedance of 40Ω at a frequency of 200 rad/s.When the circuit is excited by a 10V source of variable frequency, the circuit resonates at 250 rad/s. The current at resonance is 0.5A and quality factor at resonance is 10. Determine the circuit parameters. 8 M

5. a) Derive an expression for the total power input for a balanced 3-phase load in terms of line voltage, line current and power factor. 8 M

b) Three inductive coils each of resistance 10Ω and reactance 6Ω are delta connected to a three phase, 415 V, 50Hz supply. Calculate i) line current, ii)power factor iii)power input to the circuit. 8 M

6. a) Explain the method of analyzing three phase unbalanced circuits by star-delta transformation technique. 8 M

b) The following impedances are connected in the form of star connected unbalanced system and it is connected to a 400V, 3 phase supply; Z_R=40Ω, Z_Y=J24Ω, Z_B= - J15Ω. Calculate the line currents by using i) loop method ii) star-delta transformation technique. 8 M