POKHARA UNIVERSITY

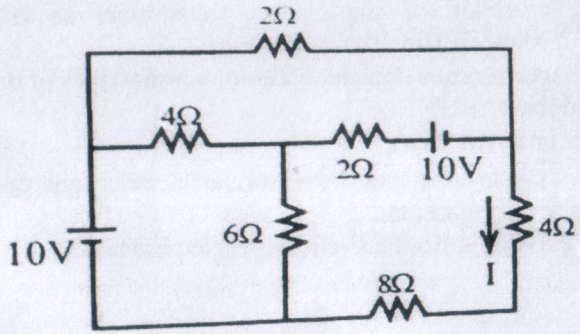
Level: Bachelor | Semester: Spring | Year : 2021
Programme: BE | Full Marks: 100
Course: Basic Electrical Engineering | Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

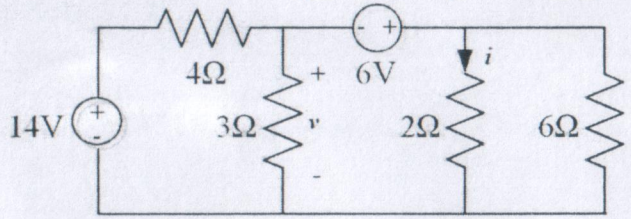
The figures in the margin indicate full marks.

Attempt all the questions.

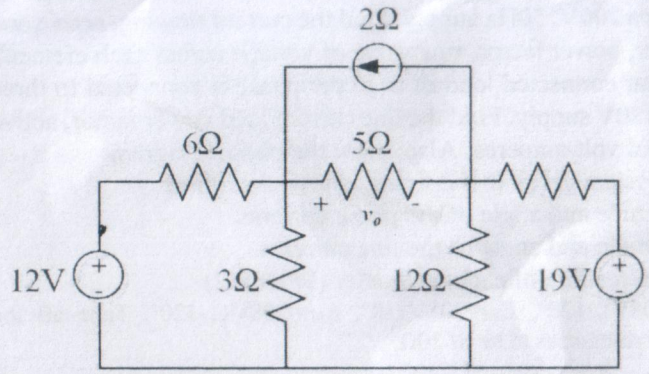
1. a) Utilizing Thevenin's theorem, find the current in 4-ohm resistance in the circuit given below. 8



b) Find v and i in the following circuit using nodal analysis. 7



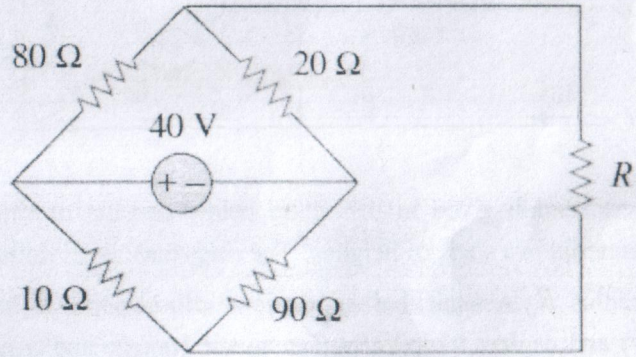
2. a) Determine v_o in the circuit below using the superposition principle. 8



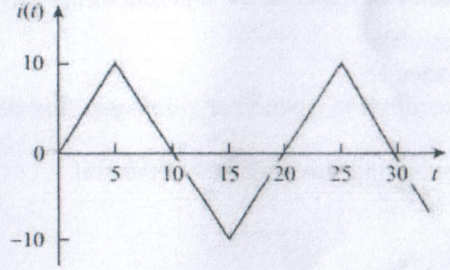
b) The variable resistor R in figure is adjusted until it absorbs the maximum power from the circuit. 7

i) Calculate the value of R for the maximum power.

ii) Determine the maximum power absorbed by R.



3. a) Calculate the average and rms values of the current waveform given below and the average power delivered to a 12Ω resistor when the current runs through the resistor. 8



b) A series RLC circuit having R=100Ω, L=0.12H and C=28.27μF is supplied from a 100V, 50Hz supply. Find the current flowing, active and reactive power, power factor, rms value of voltage across each element. 7

4. a) A balanced star connected load of 8+j6 per phase is connected to three phase 50Hz, 380V supply. Find the line current load power factor, active power and total volt-amperes. Also, draw the phasor diagram. 8

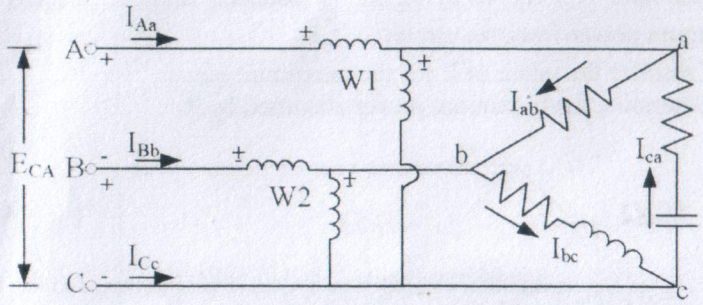
b) For the Y-Δ system given in the figure below, determine 7

i) the magnitude and angle of the phase currents

ii) the magnitude and angle of the line currents

iii) The power reading of each wattmeter (W1&W2)

Given: E_{CA}=208V∟120°, E_{AB}=208V∟0°, E_{BC}=208V∟-120°. Take all the resistances and reactances to be of 10Ω.



5. a) The magnetic circuit given in the figure below consists of rings of magnetic material in a stack of height *h*. The rings have inner radius R_i and outer radius R_o. Assume that the iron is of infinite permeability ($\mu \to \infty$) and neglect the effects of magnetic leakage and fringing. 7

For: $R_i = 3.4cm$, $R_o = 4.0cm$, *h*=2cm, g = 0.2 cm; Calculate:

i. the mean core length l_c and the core cross-sectional area A_c.

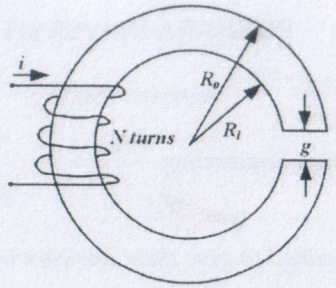
ii. the reluctance of the core $\Re_c$ and that of the gap $\Re_g$.

For N = 65 turns, calculate:

i. the inductance L.

ii. current *i* required to operate at an air-gap flux density of B_g = 1.35T.

iii. the corresponding flux linkages of the coil.



b) A transformer has 600 primary turns and 150 secondary turns. The primary and secondary resistances are 0.25 Ω and 0.01 Ω respectively and corresponding leakage reactance are 1.0 Ω and 0.04 Ω respectively. Determine 8

i) the equivalent resistance and reactance referred to primary side.

ii) Equivalent resistance and reactance referred to secondary side. Draw equivalent circuit of transformer in both cases i) and ii).

6. a) Explain the operation of single-phase transformer on NO-LOAD condition. Draw appropriate phasor diagram. 7

b) Illustrate the speed-torque characteristics of various types of dc motors. Also, explain them briefly. 8

7. Write short notes on: (**Any two**) 2×5

a) Generation, Transmission and Distribution of electrical energy in Nepal

b) Ohms law and its limitation

c) Resonance curve in series RLC circuit(single phase AC)