05 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Bhadra

Exam.	Regular / Back		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

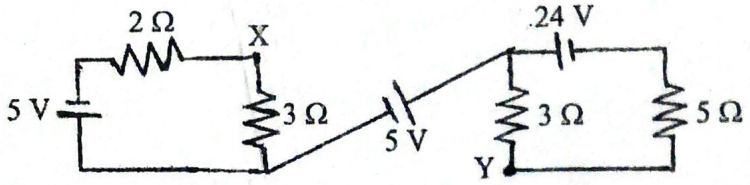
Subject: -Basic Electrical Engineering *(EE451)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

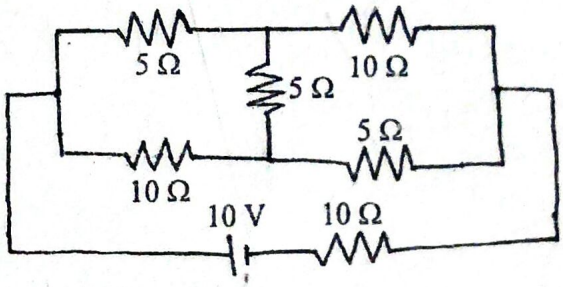
1. a) Define ideal current source. Show that if α_1 is the resistance temperature coefficient of a conductor at temperature t_1 °C then resistance temperature coefficient at t_2 °C is given by $\frac{\alpha_1}{1+\alpha_1(t_2-t_1)}$. [5]

   b) A coil has a resistance of 18 Ω when its mean temperature is 20°C and of 20 Ω when its mean temperature is 50°C. Find its mean temperature rise when its resistance is 21 Ω and the ambient temperature is 15°C. [5]

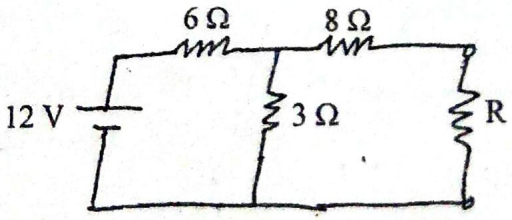
   c) Find V_{XY} in the figure. [5]



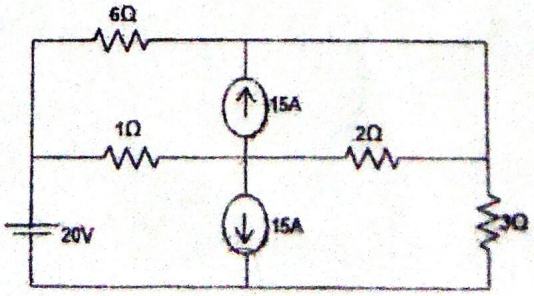
2. a) Find equivalent resistance of the given network. [5]



   b) Determine the value of R for maximum power to R and calculate the power delivered under this condition. [4]



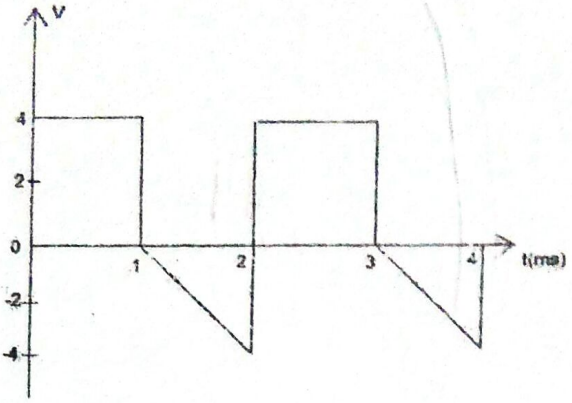
   c) Calculate the voltage drop across 3 Ω resistor using Superposition Theorem in the circuit given below. [6]



3. a) Explain super node and needs with suitable example. [4]

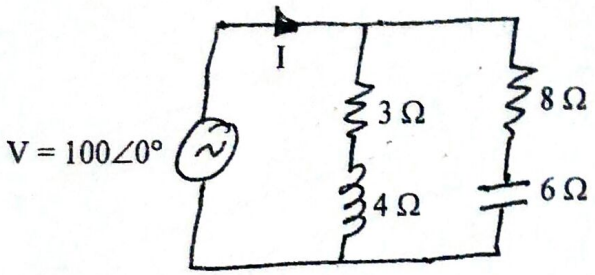
b) Define capacitance and inductance. Also classify the capacitors on the basis of geometrical shapes. [4]

c) Calculate the Rms value and Average value of the voltage wave given below and hence compute the form factor. [8]

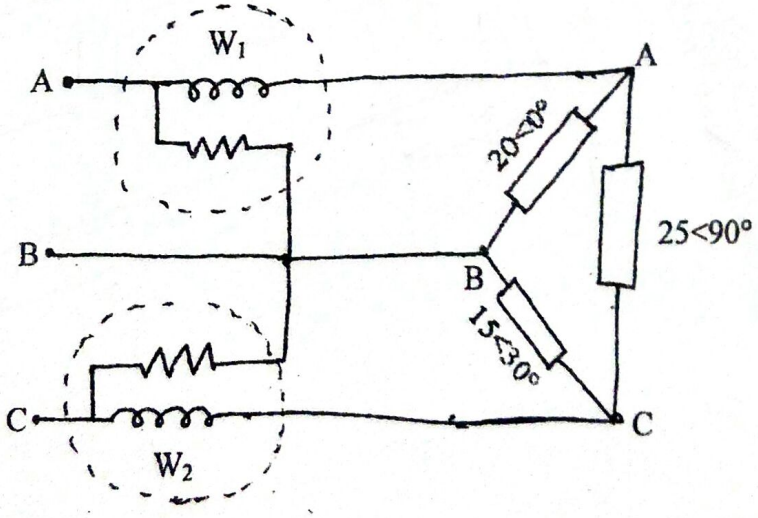


4. a) Explain the operation of purely capacitive circuit excited by a sinusoidal source and hence prove that average power consumed by such circuit is zero. Draw necessary waveforms. [6]

b) For the circuit given below, calculate the current I. Draw the phasor diagram of the circuit. [6]



c) The supply system is 230 V, 3-phase, 50 Hz. Determine the readings of wattmeters W_1 and W_2. Phase sequence is AB-BC-CA. [7]



5. a) Derive the equation for the instantaneous current when A.C. voltage is supplied to a series R-L circuit. Draw phasor diagrams and analyze power in the circuit. [6]

b) Calculate the amount of current through the neutral of a balanced 3-phase star connected circuit. Also verify with the phasor diagram. [3]

c) An electric circuit is being supplied by an a.c. source of 100 V rms. The circuit has a resistance of 10 Ω, inductor of 12 Ω reactance and capacitance of 8 Ω reactance connected in series. Compute the active power and power factor of the circuit. [6]

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