05 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Bhadra

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

Subject: - Basic Electrical Engineering *(EE451)*

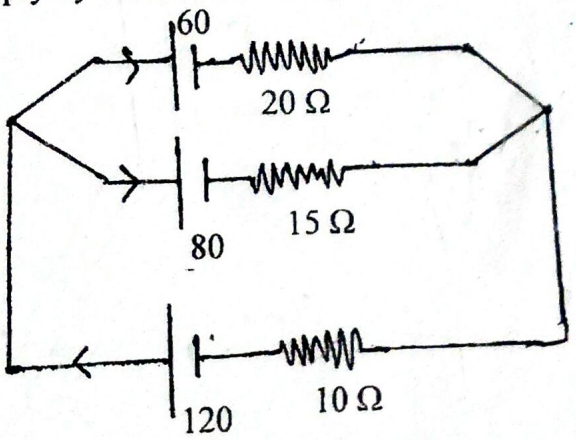
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) Define the terms of source transformation with suitable example. [4]

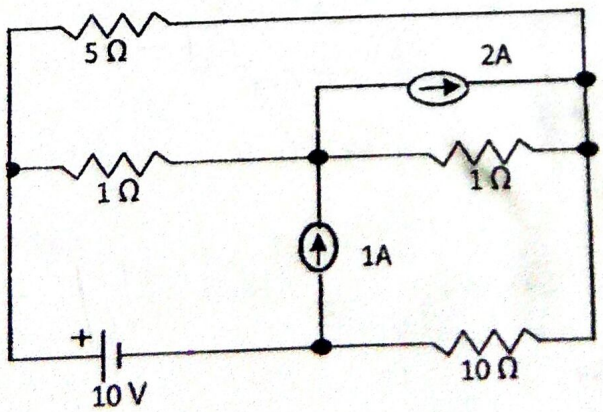
   b) The current in the field winding of a motor at 20°C is 2 A. After running the motor for 6 hrs at full load the current falls to 1.75 A. If the voltage applied across the field winding is 240 V, determine the temperature rise of the winding. The temperature coefficient of resistance of the copper winding at 0°C is 4.28×10^{-3}/K [6]

   c) A direct current circuit comprises two resistors, A value of 25Ω and B of unknown in series with the parallel group. The potential difference across C is found to 90V. If the total power in the circuit is 4320 w, Calculate value of unknown resistor. B, the voltage applied to the ends of the whole circuit and the current in each resistor. [6]

2. a) Find the current supply by each source using Kirchhoff's law. [6]

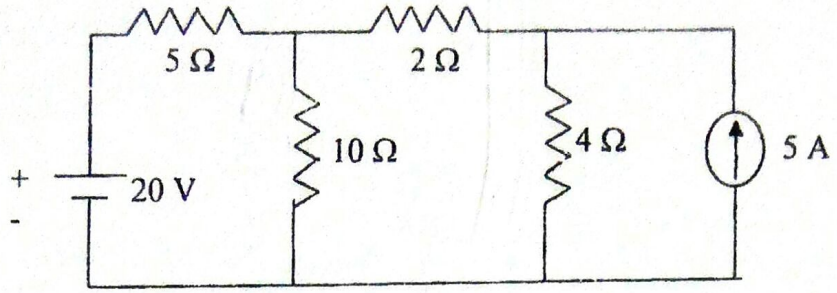


   b) Find the current in the 10 Ω resistor in the circuit below using Superposition theorem. [6]

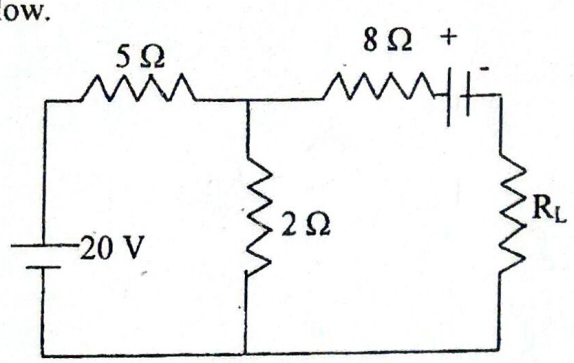


   c) Define capacitance and find the expression for capacitance in terms of physical dimension of capacitor also deduce energy stored in capacitor. [4]

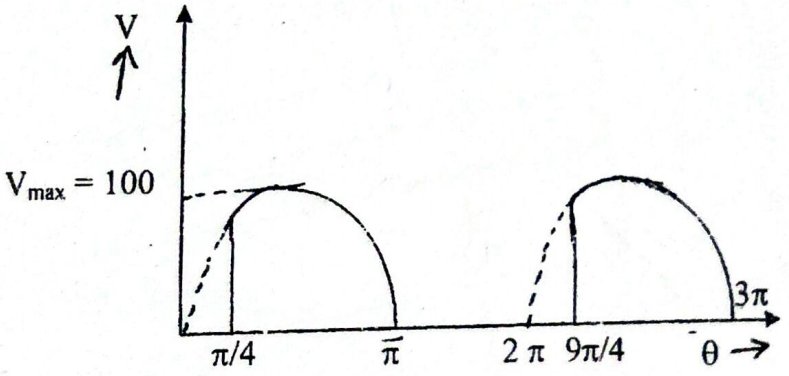
3. a) Use Norton's theorem to find the current through 10 ohm resistor for the network shown below. [8]



b) State the maximum power transfer theorem and find the value of R_L to obtain the maximum in R_L power and also find the value of this maximum power for the network shown below. [8]



4. a) Calculate the peak factor and form of the waveform shown below. [4]



b) A coil and non-inductive resistor are connected in series across a 200 V, 50 Hz supply. The voltage across the coil and resistor are 120 V and 140 V respectively. If the supply current is 0.5 A, calculate : (i) the resistance and inductance of the coil; (ii) the power dissipated in the coil; (iii) the power factor of the coil; (iv) the factor of the circuit. [6]

c) Two impedances given by $Z_1 = (10+j5)$ and $Z_2 = (8+j6)$ are joined in parallel across a voltage of $v = (200+j0)$ volts. Calculate the circuit its phase and the branch currents, total power consumed by the circuit. Draw the phasor diagram. [6]

5. a) Three phase loads $(6+j8)\Omega$, $(8+j6)\Omega$ and $(4-j3)\Omega$ are connected in delta to a 3 phase 110 V supply. Find the phase currents, line currents and total power consumed. [6]

b) Derive the relation between tan ϕ and the two wattmeter reading w1 and w2 for a balanced three-phase load having leading power factor. [6]

c) Show, with the aid of a phasor diagram, how the power factor of a load can be improved by connecting a capacitor in parallel with it. [4]

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