5 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 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)*

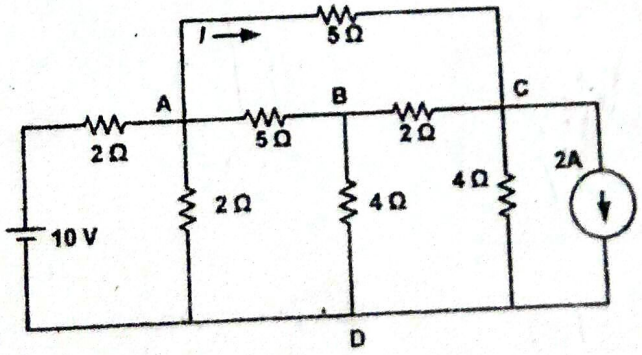
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) What do you mean by ideal and practical voltage source? Explain the effect of an internal resistance of a voltage source on its terminal characteristic. [4]

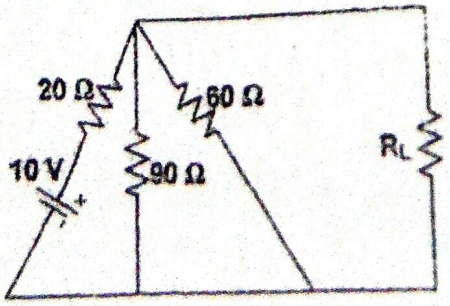
   b) Define temperature co-efficient of resistance. The field winding of a dc motor connected across 230 V supply takes 1.15 A at room temperature of 20°C. After working for some hours the current falls to 0.96 A, the supply voltage remaining constant. Calculate the final working temperature of field winding. Resistance temperature co-efficient of copper at 20°C is 1/254.5. [6]

   c) A direct current circuit comprises two resistors, A of value 25 Ω, and B of unknown value, connected in parallel, together with a third resistor C of value 5 Ω connected in series with the parallel group. The potential difference across C is found to 90 V. 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]

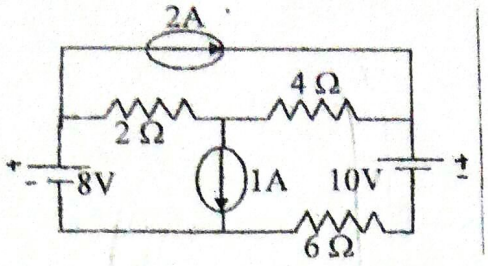
2. a) Calculate the current flowing in the 5Ω branch AC of the circuit shown in figure below using nodal analysis. [8]



   b) Calculate the value of R to receive maximum power and maximum power received by it for the circuit shown below. [8]



3. a) Use loop current method to calculate the current through the 4 Ω resistance for the network shown below. [8]



b) State and explain Norton Theorems with the help of suitable example. [4]

c) What is a parallel-plate capacitor? How do you define its capacitance? [4]

4. a) Derive the equation for inductance in terms of its physical dimensions. [4]

b) Derive the equation for instantaneous current flowing through a pure inductor when excited by AC sinusoidal voltage V = Vm Sinwt. Draw the waveform of voltage, current and power. Show analytically and graphically that it does not consume real power. [6]

c) A series circuit consists of a resistance equal to 4Ω and inductance of 0.01 H. The applied voltage is v = 283 sin (300t+90°) volts. Find [6]

(i) the power dissipated in the circuit,
(ii) the expression for i(t)
(iii)power factor

5. a) Define power factor and explain its significance. A single phase load of 5Kw operates at a power factor 0.6 lagging. It is proposed to improve the power factor to 0.95 lagging by connecting a capacitor across the load. Calculate the KVAr rating of the capacitor. [2+6]

b) A star connected alternator supplies a delta connected load. The impedance of the load branch is (8+j6) Ω. The line voltage is 230 volt. Determine [8]

(i) Current in the load branch
(ii) Power consumed by load
(iii) Power factor of the load
(iv) Reactive power of the load

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