TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2079 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL, BEX/BEI, BCT, BAM, BIE, BAG, BAS, BCH	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Basic Electrical Engineering (*EE 401*)

- ✓ 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.*

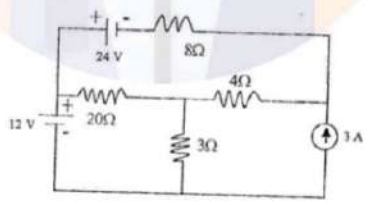
1. a) A coil is connected across a constant dc source of voltage 240V, draws a current of 12A at room temperature. After running 4 hours, temperature rises to 65° C and current reduces to 8A. Calculate the current when temperature increases to 80° C and the coefficient of resistance at 30°C and temperature coefficient of resistance at 40°C. [consider room temperature = 25°C] [6]

   b) Explain about ideal and practical current and voltage sources. [4]

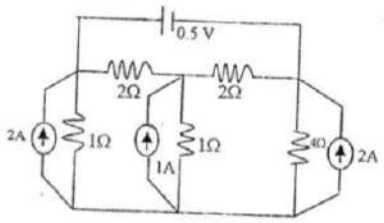
   c) A 100 W, 250 V bulb is connected in series with a 40 W, 250 V bulb across 500 V supply. What will be the current drawn? What will be the power consumed by each bulb? Will such a combination work normally? [6]

2. a) Prove that maximum power is transferred to the load when load resistance is equal to source resistance. [4]

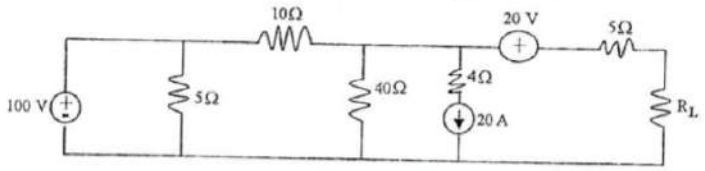
   b) Find the current flowing through the 20Ω resistor using by superposition theorem the circuit shown below. [8]



   c) Find power dissipated through 4Ω resistor, using nodal analysis. [4]



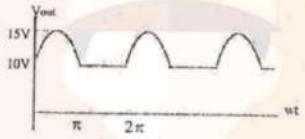
3. a) Find the max power through the load R_L of the circuit given below. [8]



b) The total capacitance of two capacitors is 0.25 μF, when connected in series and 0.15 μF, when connected in parallel. Find the capacitance of each capacitor. [4]

c) What is power factor? Write down the drawbacks of poor factor. Explain how connecting a capacitor across the load improves the power factor. [4]

4. a) Calculate the average and rms value of the voltage signal given below. Also find the form factor and peak factor. [6]



b) Two impedances (10+j5) and (8+j6) are connected in parallel an ac voltage source of V=200+j0. Calculate magnitude and power factor of circuit current and branch currents. Also find the total active power, reactive power, apparent power and draw the phasor diagram. [6]

c) An alternating current of 50 Hz, has a maximum value of 200 A. Reckoning time from the instant current is zero and is becoming positive, calculate: [4]

i) the instantaneous value after 2.5 m sec.

ii) the time taken for the current to reach 150 A for the first and second time.

5. a) Non-inductive loads of 8 kW, 6kW, and 4kW are connected between neutral and R,Y,B phase respectively of a 3-phase 4-wire system. The line voltage is 400 V. Find the current in each line conductor and neutral conductor. [8]

b) Show that $V_L = \sqrt{3}\ V_p$ for 3-phase star connected load. Derive an expression for power factor measurement of the load by two wattmeter method. [8]

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