TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Chaitra

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

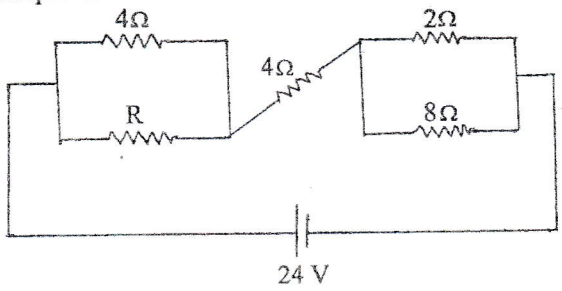
Subject: - Basic Electrical Engineering *(EE 401)*

- ✓ 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.*

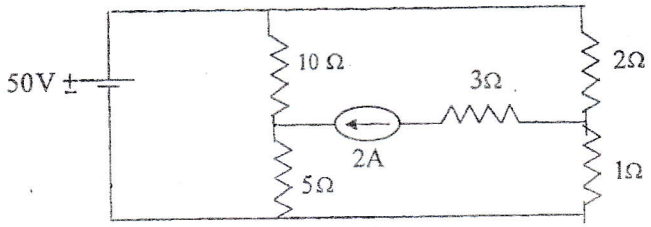
1. a) Discuss on brief voltage and current sources. Also justify the statement "terminal voltage goes on increasing on decreasing load current". [4]

   b) The resistance of the certain length of wire is 4.60 ohm at 20°C and 5.68 ohm at 80°C. Determine (i) the temperature coefficient of resistance of the wire at 0°C, (ii) the resistance of the wire at 60°C. [6]

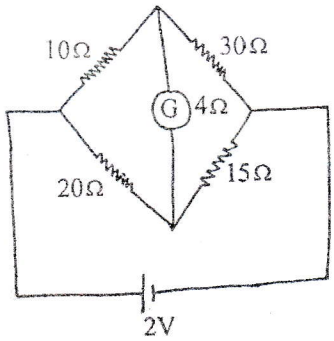
   c) State and explain Kirchoff's current laws. Determine the value of unknown resistance R and the total current drawn from the source in the circuit of figure. Also compute the total power dissipated in the circuit. [6]



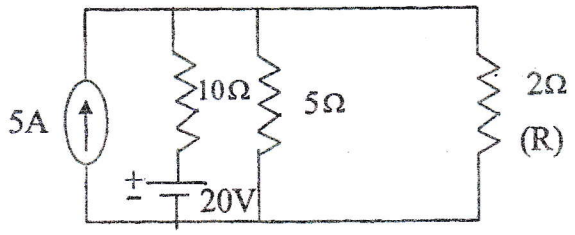
2. a) Use loop current method to calculate the current through the 5 Ω resistance for the network shown below. [8]



   b) Using delta/star transformation, find the galvanometer current in the Wheatstone bridge. [8]

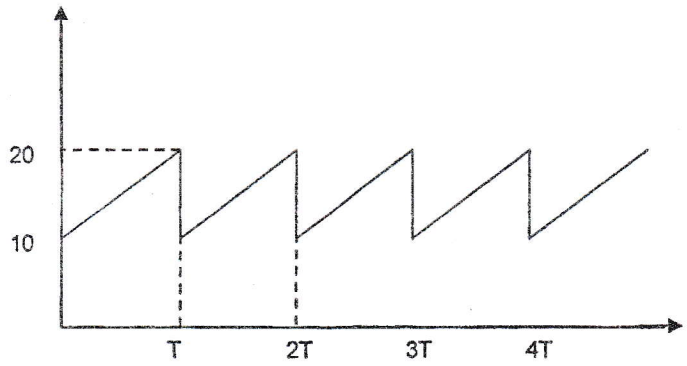


3. a) Find the current through R using thevenin's theorem. Also, find the value of R such that maximum power transfer takes place from the source to R in the network shown below. [8]



b) Derive an expression for the equivalent capacitance of a group of capacitors when they are connected in series. [4]

c) Calculate the form factor and peak factor of the following waveform. [4]



4. a) State and explain Norton's theorem with a suitable example. [4]

b) A resistance of 12 Ω, an inductance of 0.15 H and a capacitance of 130 μF are connected in series across a 100V, 50Hz supply. Calculate the impedance, current and phase angle and power factor. [4]

c) A parallel circuit consists of two branches, one containing a coil of resistances 5 Ω and inductance 38.2mH, the other a non-inductive resistance 16 Ω in series with a capacitor of 300 μF capacitance. The circuit is connected to a 240 V, 50 Hz supply. Determine (i) the current in each branch (ii) the total current (iii) the circuit phase angle (iv) the circuit impedance (e) the components of an equivalent circuit consisting of a resistance and reactance. [8]

5. a) Define power factor and explain causes of low factor. A single phase 240V, 50 Hz induction motor takes 20A at power factor of 0.75 lagging. It is desired to raise the power factor to 0.95 lagging by connecting a capacitor across the load. Calculate the capacitance of the capacitor to be used in parallel with induction motor. [2+6]

b) A three phase 400 V, 50 Hz power line has two loads connected to it. The first is delta-connected and draws 25 Kw at 0.70 power factor lagging. The second is wye-connected and draws 6.25 kVA at 0.8 power factor leading. What is the total line current and the combined power factor. [8]

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