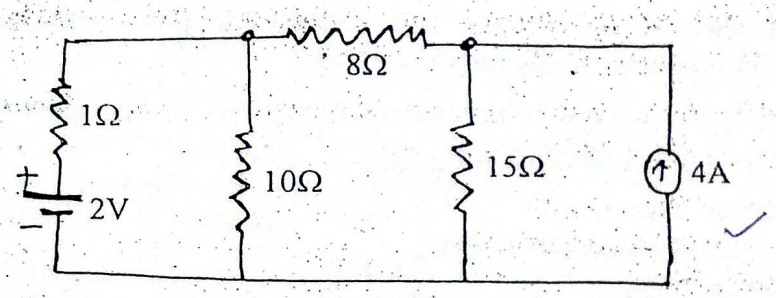
05 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2067 Chaitra

Exam.	New Back (2065 & Earlier Batch)		
Level	BE	Full Marks	80
Programme	BCE, BME	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

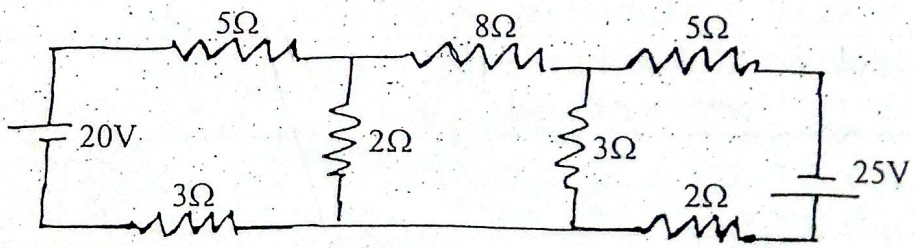
Subject: - Basic Electrical Engineering

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

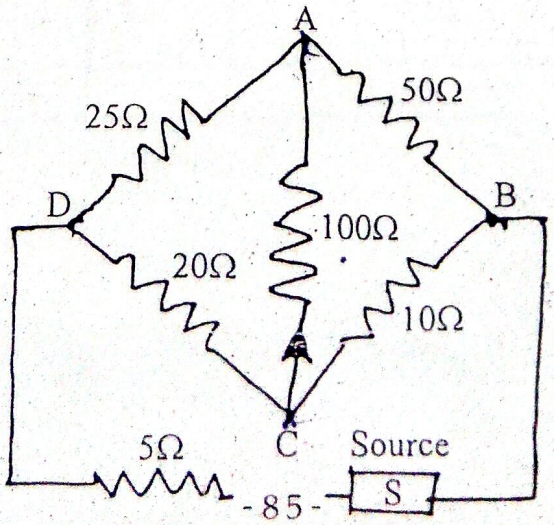
1. a) Describe the different types of energy sources for electricity generation. Which sources are more effective in the context of our country and why? [8]
   b) Explain electromotive force, potential difference and current with a circuit diagram. [3]
   c) State and explain Kirchoff's voltage law. [5]
2. a) State Superposition theorem and list the steps involved in applying it for the analysis of a resistor network with example. [8]
   b) Using Thevenin's theorem, find the current through 8Ω resistor in the circuit shown below. [8]



3. a) Using nodal analysis find the current through 8Ω resistor. [8]



   b) Use Kirchoff's law to determine the magnitude of current and polarity of the source if the current flowing through branch AC is 0.2A from C to A in the circuit shown below. [8]



4. a) Define capacitance and derive the equation for the charge stored in a capacitor. [4]

b) The impressed voltage and the current flowing through a circuit are, [4]
$v = 500 \sin(400t + \pi/3)$ and $i = 5 \sin(400t - \pi/6)$

Determine:

i) rms value of v & i
ii) Phase difference
iii) Power consumed in the circuit

c) A 220V, 50Hz ac supply is applied to a coil of 0.07H and effective resistance 3.0Ω connected in series with a 7.0 μF capacitor. Calculate [8]

i) Voltage across R, L and C
ii) Current
iii) Phase angle of the circuit
iv) Draw the vector diagram

5. a) Define power and power factor. [4]

b) Explain the importance of power factor in electricity generation with example. [4]

c) Two impedances $Z_1 = (10 + J15)\Omega$ and $Z_2 = (6 - J8)\Omega$ are connected in parallel. Total current supplied is 15A. Find: (i) Current in each branch (ii) Supply voltage and its phase angle w.r.t. the total current and (iii) Draw the phasor diagram. [8]

6. a) Derive the relation between line voltage and phase voltage in a 3 - phase star connected generator with phasor diagram. [8]

b) A 220V, 3ϕ voltage is applied to a balanced delta connected 3ϕ load of phase impedance $(15 + J20)\Omega$. Find: [8]

i) Current in each line
ii) Power consumed per phase
iii) Power factor

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