

SCHOOL OF ELECTRICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech
Course Code and Course Name : BAEEE101: Basic Engineering
Faculty Names : Jabeena A, Arun N, Razia Sultana W, Kittur Harish Mallikarjun, Arun S L, Chittaranjan Nayak, Jitendra Kumar Goyal
Class Numbers : VL2025260106824, 6309, 6307, 6826, 6282, 7150, 6276
Date of Examination : 18/08/2025
Exam Duration : 90 minutes **Maximum Marks: 50**

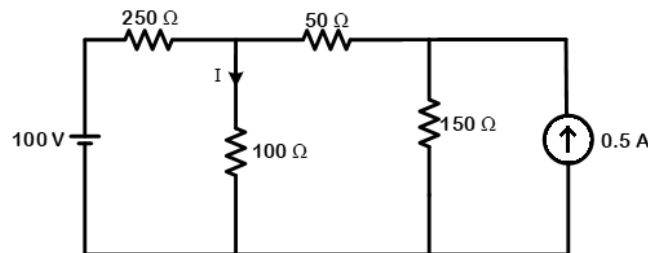
General instructions:

- Answer All Questions
- Rough work should not be done on question paper. It will be treated as malpractice.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)

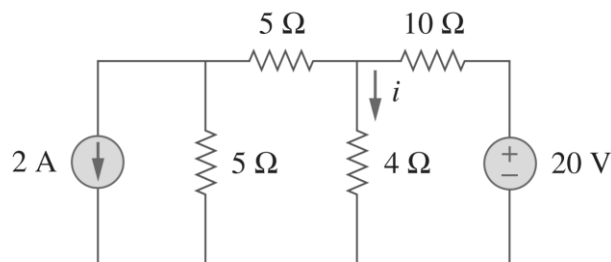
Course Outcomes Statements:

CO. 1: Analyse the electrical circuits, electrical motors and the role of power electronics in industrial applications

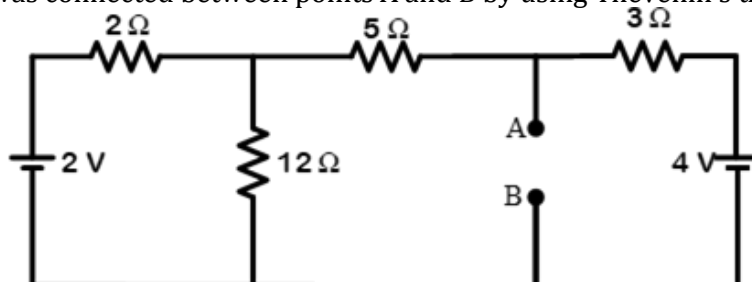
Q. No	Question	M	CO	BL
1.	Using nodal voltage analysis, determine the current I indicated in below figure.	10	1	3



2.	Using superposition theorem, determine the current i indicated in below figure.	10	1	3
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3.	In the network shown in below figure find the current that would flow if a 6 ohm resistor was connected between points A and B by using Thevenin's theorem.	10	1	3
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4. An instantaneous voltage $v(t) = 300 \sin 314t$ V is applied across series connected resistance of 150Ω , inductance of $0.2 H$ and capacitance of $150 mF$. 10 1 3
- (a) Compute the R.M.S. value of the current in the circuit and its phase angle with respect to the voltage.
- (b) Write the expression for the instantaneous current in the circuit.
- (c) Compute the r.m.s. value and the phase of the voltages appearing across the resistance and the inductance.
- (d) Calculate the power factor of the circuit.
- (e) Find the real and reactive power of the circuit.
5. a) Describe the function of the commutator, brushes, and armature in a DC machine. 6 1 2
- b) Explain the working principle of transformer. 2
- c) List any two applications of DC series motor and induction motor. 2



BAEEE101: Basic Engineering
School of Electrical Engineering (SELECT)
CAT-I

1. Solution:

$$\frac{V_1 - 100}{250} + \frac{V_1}{100} + \frac{V_1 - V_2}{50} = 0$$

$$17V_1 - 10V_2 = 200$$

$$\frac{V_2 - V_1}{50} + \frac{V_2}{150} = 0.5$$

$$-3V_1 + 4V_2 = 75$$

$$V_1 = 40.789V \quad V_2 = 49.342V$$

$$I = \frac{V_1}{100} = 0.408A$$

2. Solution:

Only 2A current source $\Rightarrow$ 20 V voltage source shorted

$$(4\Omega || 10\Omega) + 5\Omega = 2.857\Omega + 5\Omega = 7.857\Omega$$

$$\text{Apply CDR} \Rightarrow I_{7.857\Omega} = 2 \times \frac{5}{5 + 7.857} = 0.7778A$$

$$\text{Apply CDR} \Rightarrow I_{4\Omega} = 0.7778 \times \frac{10}{10 + 4} = 0.555A$$

$$I_1 = -0.555A$$

Only 20 V voltage source $\Rightarrow$ 2A current source opened

$$\frac{V_1 - 20}{10} + \frac{V_1}{4} + \frac{V_1}{10} = 0$$

$$V_1 = 4.444V$$

$$I_2 = \frac{V_1}{4} = 1.111A$$

$$I = I_1 + I_2 = 0.556A$$

3. Solution:

Calculation of V_{th}

$$\frac{V_1 - 2}{2} + \frac{V_1}{12} + \frac{V_1 - V_2}{5} = 0$$

$$47V_1 - 12V_2 = 60$$

$$\frac{V_2 - V_1}{5} + \frac{V_2 - 4}{3} = 0$$

$$-3V_1 + 8V_2 = 20$$

$$V_1 = 2.118V \quad V_2 = 3.294V \Rightarrow V_{AB} = 3.294V$$

Calculation of R_{th}

$$R_{AB} = ((2\Omega || 12\Omega) + 5\Omega) || 3\Omega = 2.0735\Omega$$

$$I = \frac{3.296}{2.0735 + 6} = 0.408A$$

4. Solution:

$$v(t) = 300 \sin 314tV \quad R = 150\Omega \quad L = 0.2H \quad C = 150mF$$

$$V = \frac{300}{\sqrt{2}} = 212.13V$$

$$X_L = \omega L = 62.8\Omega \quad X_C = \frac{1}{\omega C} = 0.021\Omega$$

$$Z = R + j(X_L - X_C) = (150 + j62.779)\Omega$$

$$I = V/Z = 1.3A \quad \phi = 22.71^\circ$$

$$i(t) = 1.838 \sin(314t - 22.71^\circ)A$$

$$V_R = IR = 195V \quad V_L = IX_L = 81.64V$$

$$p.f = R/Z = \cos \phi = 0.9224lag$$

$$P = VI \cos \phi = 254.369W$$

$$Q = VI \sin \phi = 106.465VAr$$