JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-II Semester (CSE/IT, ECE, CE)

COURSE CODE(CREDITS): 24B11EC211(4)/18B11EC211(4) MAX. MARKS: 35

COURSE NAME: Basic Electrical Engineering/Electrical Sciences

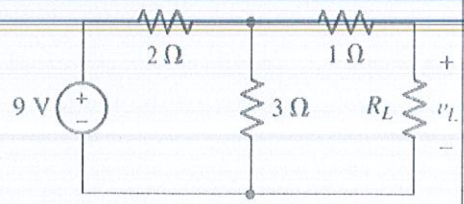
COURSE INSTRUCTORS: RKU, HSL, SWT, NTJ, PRG, SRU MAX. TIME: 2 Hours

Note: (a)All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

<table>
<tr><th>Q.No</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q.1</td><td>

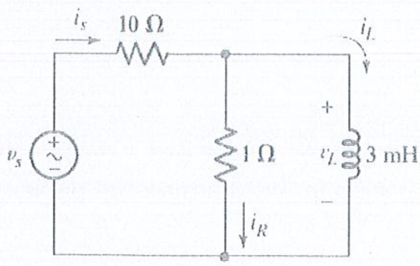
(a) Explain Source Transformation Theorem with an example.

(b) Give the statement of Norton's Theorem. Mention the procedure to convert a circuit into a Norton's Equivalent circuit. Obtain the Norton equivalent of the network connected to R_L. Determine v_L for $R_L = 1, 3.5, 6.257,\ and\ 9.8\ \Omega$.

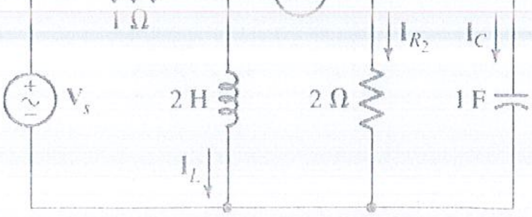


</td><td>CO-2</td><td>2+5</td></tr>
<tr><td>Q.2</td><td>

(a) If the source v_s in circuit is equal to $4.53\cos(0.333 \times 10^3 t + 30°)$ V, (i) obtain i_s, i_L, and i_R at $t = 0$ assuming no transients are present; (ii) obtain an expression for $v_L(t)$ in terms of a single sinusoid, valid for $t > 0$, again assuming no transients are present.



(b) In the circuit shown below, both sources operate at $\omega = 1$ rad/s. If $I_C = 2\angle 28°$ A and $I_L = 3\angle 53°$ A, calculate (i) I_s ; (ii) V_s ; (iii) $i_{R_1}(t)$.



</td><td>CO-3</td><td>4+3</td></tr>
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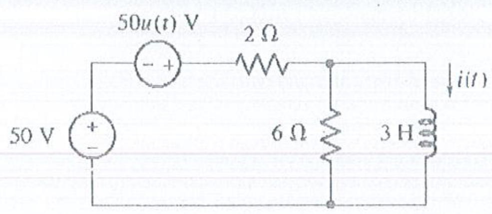
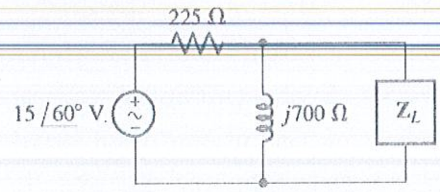
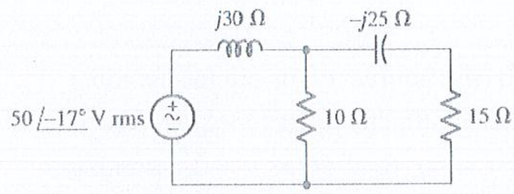
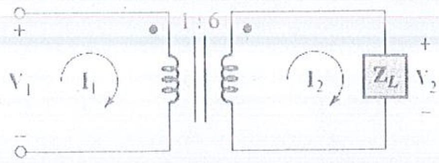
Q.No	Question	CO	Marks
Q.3	(a) Determine $i(t)$ for all values of time in the circuit.  (b) A parallel RLC circuit contains a 100 Ω resistor and has the parameter values $\alpha = 1000\ s^{-1}$ and $\omega_0 = 800$ rad/s. Find (i) C; (ii) L; (iii) s_1 and s_2 (roots of the CE/AE).	CO-4	4+3
Q.4	(a) What load impedance Z_L will draw the maximum average power from the source shown below? Calculate the maximum average power supplied to the load.  (b) Calculate the complex power delivered to 15 Ω of the circuit, and determine the power factor of the source. 	CO-4	3+4
Q.5	(a) What is the significance of the dot convention in a transformer, and how does it help in determining the polarity of voltages? (b) What is self-inductance in a transformer winding? How is it different from mutual inductance? (c) Calculate I_2 and V_2 for the ideal transformer circuit shown below if $V_1 = 4\angle 32^\circ$ and $Z_L = 1 - j\,\Omega$. 	CO-5	1+2+4