JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-2nd Semester (CSE/IT/ECE/CE)

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

COURSE NAME: Electrical Sciences

COURSE INSTRUCTORS: Prof Rajiv Kumar, Prof Shruti Jain, Dr Harsh Sohal, Dr. Salman Raju and Lt. Pragya Gupta,

MAX. TIME: 2 Hour

Note: (a)*All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

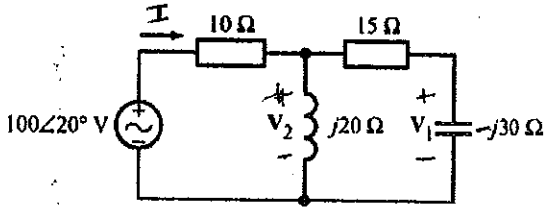
(d) Do all parts of the question in the same place in sequence.

(e) Try to do all the questions in sequence.

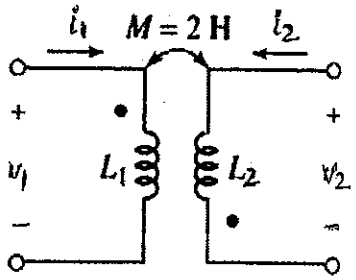
Q1. a) A 200-mH inductance is connected across 230-V, 50-Hz ac supply. Find the inductive reactance and the current in the circuit. **[2] (CO-4)**

b) A series *RC* circuit, having $R = 4\ \Omega$ and $C = 120\ \mu F$, is connected across 230-V, 50-Hz supply. Calculate (*i*) the reactance, (*ii*) the impedance, (*iii*) the current drawn by the circuit. **[2]**

c) In the circuit shown in Figure, find the current **I**. **[3]**



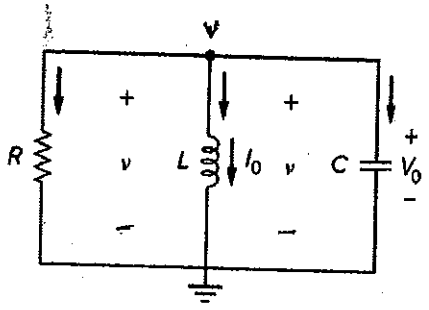
Q2.a) For the circuit shown in Figure, determine v_1 if i_2 is 5 sin45t amp and $i_1 = 0$. **[2] (CO-5)**



b) What is the transformation ratio? Express transformation ratio in terms of voltage, no of turns, current and induced EMF. Also, state the condition of transformation ratio for step up and step down transformers. **[3]**

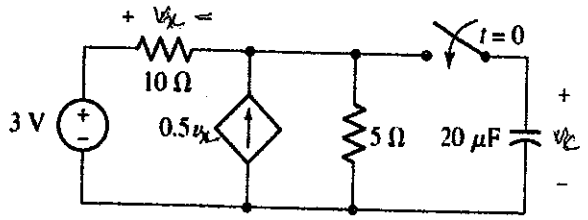
c) What are the key components of the equivalent circuit of a transformer, and how do they represent the actual transformer characteristics? **[2]**

Q3. a) In the given parallel circuit shown in Figure, find $v(t)$ for $t > 0$, assuming $v(0) = 5$ V, $i(0) = 0$, L = 1 H, C = 10 mF and R as 1.923 Ω. **[4] (CO-3)**



b) Explain the summary of the relevant equations for source free series and parallel RLC circuits. **[3]**

Q4. Obtain the Thevenin's equivalent of the circuit by considering capacitor as load. Use this to find the expression for the voltage drop across the capacitor for all values of t. **[4+3] (CO-3)**



Q5. a) Find the average power absorbed by an impedance Z=30-j20 Ω , when a voltage $V = 120 \angle 0$ is applied across it. **[4](CO-4)**

b) A series connected load draws a current $i(t) = 4\cos(100\pi t + 10)$ A, when the applied voltage is $v(t) = 120\cos(100\pi t - 20) volts$. Find the apparent power and power factor of the load. **[3]**