



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Class average = 34.5



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Vellore - 632014, Tamil Nadu, India
SCHOOL OF ELECTRICAL ENGINEERING
FALL SEMESTER 2023-2024
CAT-I

SLOT: D1+TD1

Programme Name & Branch : B.Tech & EE/EL/EL Course Code: BEEE102L
Course Name : Basic Electrical and Electronics Engineering
Faculty Members : Dr.B.Saravanan, Dr.V.Indragandhi and Dr. Anusuya Bhattacharyya
Class Numbers: VL2023240107422, VL2023240107428, VL2023240107435
Date of the Examination : 13.09.23 FN Duration: 90 minutes

Answer All Questions (5 x 10 = 50 Marks)

S.No	Questions	Marks
1.	<p>Using mesh current analysis, find the branch currents for the circuit shown in Figure 1. The following are the parameters of the circuit. $R_1=10\Omega$, $R_2=15\Omega$, $R_3=12\Omega$, $R_4=11\Omega$, $R_5=13\Omega$, $B_1=25\text{ V}$ and $B_2=18\text{V}$.</p> <p style="text-align: right;"> $I_1 = 1.169\text{ A}$ $I_2 = 0.2817\text{ A}$ $I_3 = -0.6208\text{ A}$ $I_4 = 0.8873\text{ A}$ $I_5 = 0.9026\text{ A}$ </p> <p style="text-align: center;">Figure 1</p>	10
2.	<p>Using Nodal Analysis, find the Node voltages for the circuit given in Figure 2, find the current through 50Ω resistance.</p> <p style="text-align: right;"> $V_A = 11.212\text{ V}$ $V_B = 12.12\text{ V}$ $I = 0.1818\text{ A}$ </p> <p style="text-align: center;">Figure 2</p>	10

3. According to the super position principle, what percentage of the total current flowing through the 5Ω resistance in the circuit shown in Figure 3 results from the $5V$ source? What percentage of the power supplied to the 5Ω resistance supplied by the $5V$ source? Assume that both sources are active when answering both the questions.

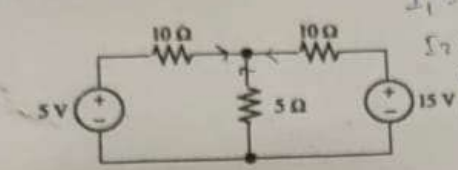


Figure 3

Handwritten notes:
 $I_1 = 0.25 A$
 $I_2 = 0.75 A$
 $P_0 = 0 \text{ watt}$
 $V_A = 5V$
 $R = 13.33 \Omega$

10

4. A coil has a resistance of 10Ω and an inductance of $12mH$. Calculate (a) the reactance (b) the impedance (c) the current taken from a $240V$, $50Hz$ supply, (d) the phase angle between the supply voltage and current (e) Power taken from the supply and (f) draw the phasor diagram relating voltage and current.

10

5 a Find the thevenin's equivalent resistance for the circuit shown in Figure 4

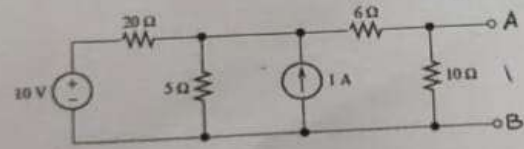


Figure 4

Handwritten note: $R_{th} = 5\Omega$

3

b. A Series R-C Circuit takes a power of 7000 watts when connected to $200V$, 50 Hz supply. The voltage across the resistor is $130V$. Calculate the (i) resistance (ii) Current (iii) power factor (iv) Capacitance and (v) Impedance

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$X_C = 2.522$

Handwritten calculations for Question 4:
 $X_L = 3.77 \Omega$
 $Z = 30.687$
 $I = 22.477$
 $P = 20.656$
 $S = 5314 \text{ VA}$
 $P = 5047 \text{ W}$
 $R = 2.414 \Omega$
 $I = 53.85 \text{ A}$
 $PF = 0.55$
 $\phi = 49.458^\circ$
 $C = 1.128 \text{ mF}$
 $Z = 3.706 \Omega$