Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATION, MAY 2017

SECOND SEMESTER

EE16201 – CIRCUIT THEORY

(Common to EEE and ECE)

(Regulation 2016)

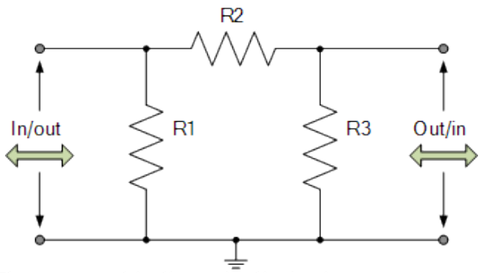
Q. Code:813215

Time: Three hours **Maximum : 100 marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 marks)

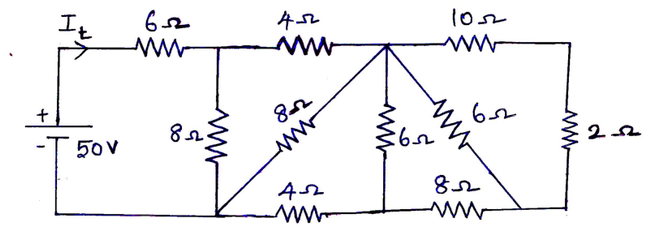
1. Calculate the power dissipated by the element of an electric heater of resistance 30Ω when a current of 10A flows in it. If the heater is on for 30 hours in a week, determine the energy used.
2. An oven takes 15A at 240V. It is required to reduce the current to 12A. Find the value of resistor which must be connected in series.
3. Considering R1= 5Ω, R2=10Ω and R3=3Ω, Convert π connected resistors to equivalent T connection using star delta conversion.



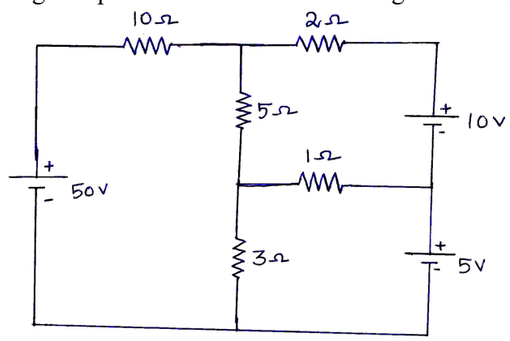
4. State Superposition Theorem and indicate its limitations.
5. A coil having an inductance and resistance of 50mH and 100 ohms is connected in series with a capacitor and a 100V, 1kHz source. Obtain the value of capacitance that will cause resonance in the circuit.
6. Find the value of self inductances and mutual inductances of the two coupled coils 1 and 2 if k=0.6; N_1=500 turns; N_2=750 turns; I_1=2 A; Φ_1=10 mwb and Φ_{12}=6 mwb.
7. Draw the DC current response of the R-L transient circuit indicating the steady state and the transient state.
8. Sketch the equivalent circuit of the two port network governed by the open circuit impedance parameters.
9. List the advantages of three-phase system.
10. The two wattmeter method is used to measure power in a three-phase load. The wattmeter readings are 400 W and -35 W. Calculate the power factor.

PART B - (5 X16 = 80 marks)

11. (a) (i) Determine the total current flowing through the circuit. (8)

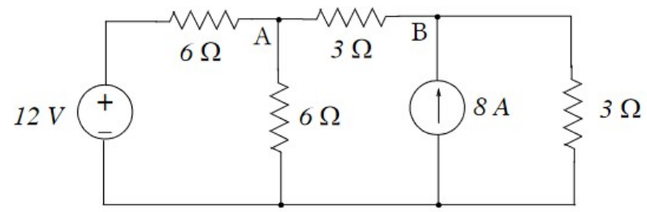


(ii) Find the voltage drop across 1Ω resistor in the figure shown below. (8)



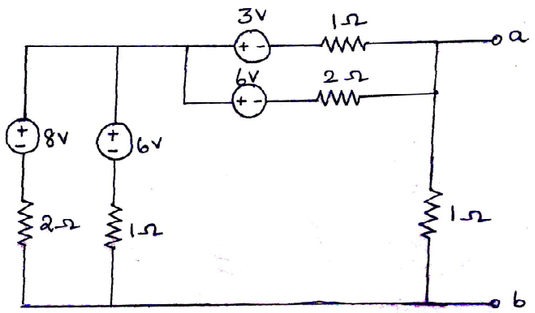
(OR)

(b) (i) Evaluate the voltages at node A and B using nodal analysis. Also calculate the current flowing through 3 ohm resistor. (12)

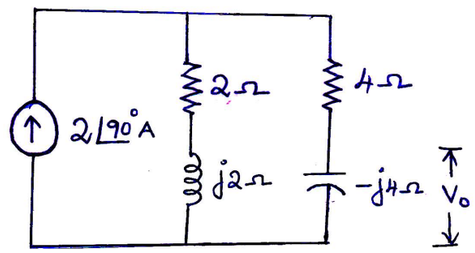


(ii) Define Real power and Power factor. (4)

12. (a) (i) Using successive source transformation, find the voltage across the resistor connected between 'a' and 'b'. (8)

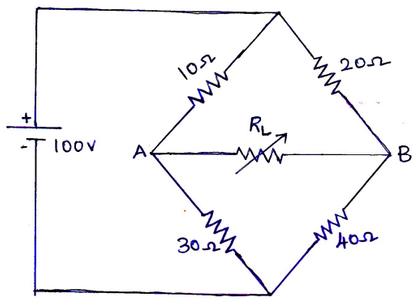


(ii) Verify the reciprocity theorem for the given circuit. (8)



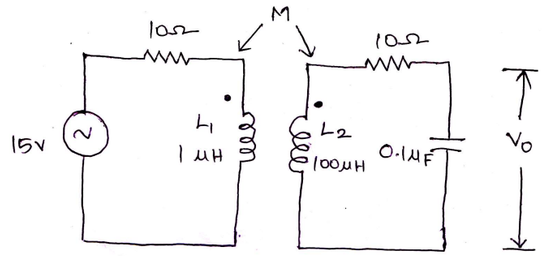
(OR)

(b) Estimate the load resistance value to receive maximum power from the source. Also calculate the maximum power delivered to the load. (16)



13. (a) (i) A series RLC circuit is connected to 230V AC supply. The current drawn by the circuit at resonance is 25A. The voltage drop across the 5μF capacitor is 4000V at the series resonance. Calculate the resistance, Inductance and the resonant frequency. (10)

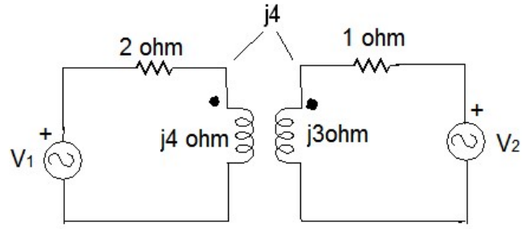
(ii) For the single tuned circuit given below, determine the resonant frequency and the output voltage at resonance. Assume $R_s >> \omega_r L_1$ and K=0.9. (6)



(OR)

(b) (i) Derive the expression for coefficient of coupling in terms of Self and Mutual inductances. (6)

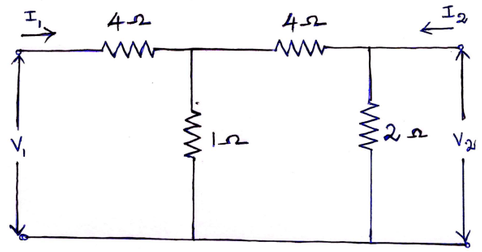
(ii) Find V2 in coupled circuit shown below such that current in the loop 1 is zero. Assume V1= 5∠0° V. (10)



14. (a) A series RLC circuit with R=5 Ω, L=0.1 H, C=500 μF has a DC voltage of 100 V applied at t=0 through a switch. Find the resulting current transient equation. (16)

(OR)

(b) Determine the Z parameters for the given two port network. (16)



15. (a) Three Identical coils, each having resistance of 15Ω and inductance of 0.03H are connected in delta across a three phase 400V, 50Hz supply. Calculate the phase currents, Line currents, Power factor, Reactive Power and the total power consumed by the load. Also draw its neat phasor diagram indicating the phase angle. (16)

(OR)

(b) An unbalanced four-wire star connected load has a balanced voltage of 400V. The load in each phase are Z_R=(4+j8)Ω, Z_Y=(3+j4)Ω and Z_B=(15+j20)Ω. Calculate the line currents, the total power and the current flowing through the neutral wire. (16)