Reg. No. : 9 2 0 2 1 6 1 0 6 0 1 2

Question Paper Code : 50472

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Second Semester

Electrical and Electronics Engineering

EE 6201 – CIRCUIT THEORY

(Common to Biomedical Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Medical Electronics Engineering)

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

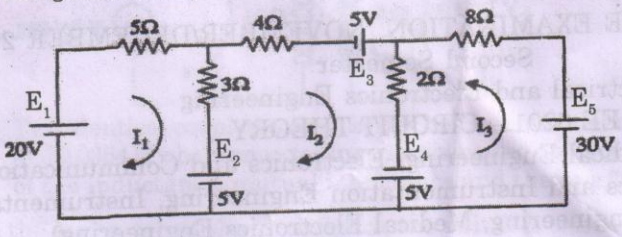
Answer ALL questions

PART – A **(10×2=20 Marks)**

1. The resistances of 1.5 Ω and 3.5 Ω are connected in parallel and this parallel combination is connected in series with a resistance of 1.95 Ω. Calculate the equivalent resistance value.
2. State Kirchhoff's laws.
3. Two resistors 4Ω and 6Ω are connected in parallel. If the total current is 12 A. Find the current through each resistor.
4. State Maximum power transfer theorem.
5. Write down the application of tuned circuits.
6. Two coupled coils with $L_1 = 0.02$ H, $L_2 = 0.01$ H and $K = 0.5$ are connected in series aiding arrangement. Obtain the equivalent inductance.
7. What is the time constant for series RL and RC circuits ?
8. What are the parameters commonly used in the analysis of two port network ?
9. The power input to a 2000 V, 50Hz, 3 phase motor is measured by two watt meters which indicate 300 Kw and 100 Kw respectively. Calculate power factor.
10. Write the expression for determining reactive and apparent power in a three phase circuit.

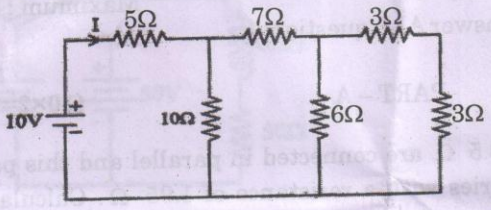
PART – B (5×16=80 Marks)

11. a) Determine the current supplied by each battery in the circuit shown in figure using mesh analysis. (16)

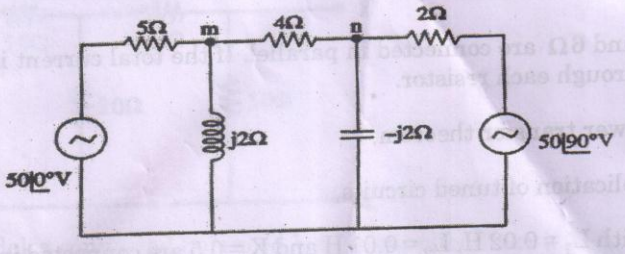


(OR)

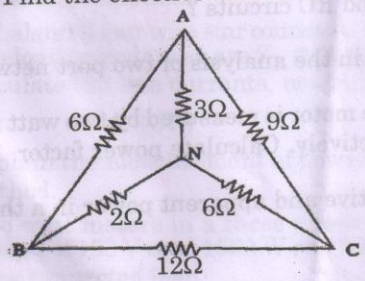
b) i) Determine the current I delivered by the source. (6)



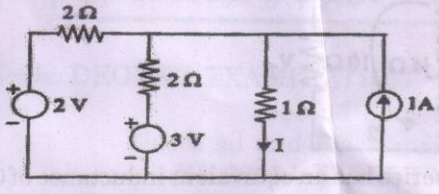
ii) Use nodal voltage analysis to find the voltages of nodes 'm' and 'n' for the circuit shown in figure. (10)



12. a) i) In the circuit of figure six resistors are connected to form delta and a star. Find the effective resistance between A and B. (8)

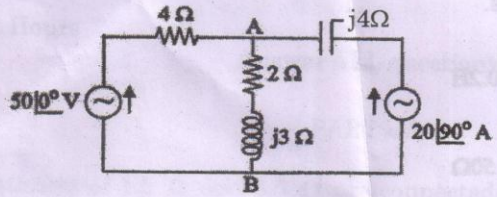


ii) Evaluate the current I flowing through the 1 ohm resistance, by applying Norton's theorem. **(8)**

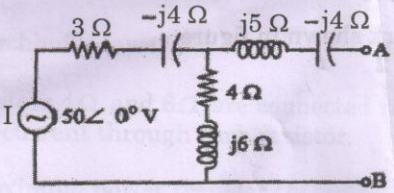


(OR)

b) i) For the circuit shown in figure determine the current in (2 + j3) Ω by using superposition theorem. **(8**

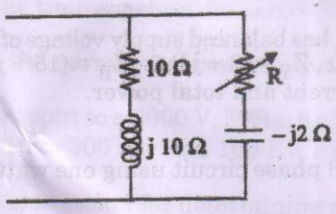


ii) Determine the Thevenin's equivalent across AB for the given circuit. **(8)**



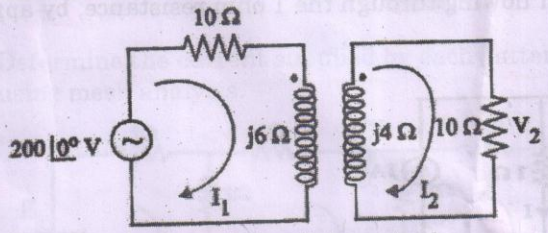
13. a) i) Compute Q of the series RLC circuit with R = 10 Ω, L = 0.04 H and C = 1 μ F. Find bandwidth, resonant frequency and half power frequencies. **(10)**

ii) For the parallel network shown in figure, determine the value of R for resonance. **(6)**



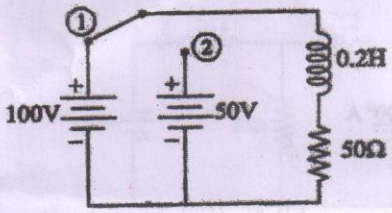
(OR)

b) i) In the circuit shown in figure, find the phasor voltage V_2. **(10)**



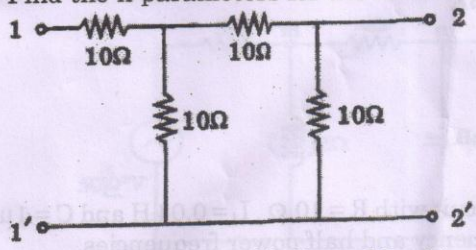
ii) Two identical coupled coils in series has an equivalent inductance of 0.08 H and 0.0354 H when connected in series aiding and series opposing. Find the values of the inductance, mutual inductance and the co-efficient of coupling. **(6)**

14. a) In the series circuit shown in figure, the switch is closed on position 1 at t = 0. At t = 1 milli second, the switch is moved to position 2. Obtain the equations for the current in both intervals. **(16)**



(OR)

b) Find the h-parameters for the network shown in figure. **(16)**



15. a) i) A delta connected balanced load is supplied from a 3 phase 400 V supply. The line current is 20 A, total power taken by load is 10,000 W. Calculate the impedance in each branch, the line current, power factor and total power consumption. **(6)**

ii) Unbalanced four wire star connected load has balanced supply voltage of 400 V. The load impedances are $Z_R = (4 + j8)\,\Omega$, $Z_Y = (3 + j4)\,\Omega$, $Z_B = (15 + j10)\,\Omega$, calculate the line currents, neutral current and total power. **(10)**

(OR)

b) i) Explain the measurement of power in 3 phase circuit using one wattmeter method. **(8)**

ii) Two watt meters in a three phase three wire system with a effective line voltage of 120 V read 1500 W and 500 W. Find the impedance of the balanced delta connected load. **(8)**