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B.E / B.Tech(Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

ELECTRICAL AND ELECTRONICS ENGINEERING

Second Semester

EE8201-Electric Circuit Analysis

(Regulation 2012)

Time: 3 Hours Answer ALL Questions Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. If i_x=3A and the 18V voltage source supplies 8A current, find the value of R_A in Fig .1.
2. Obtain the Thevenin's equivalent of Fig.2.

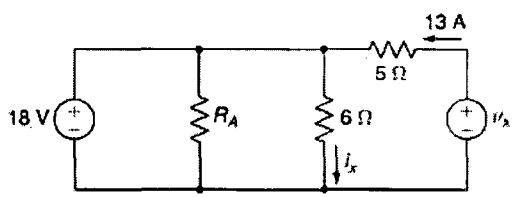

Fig.1

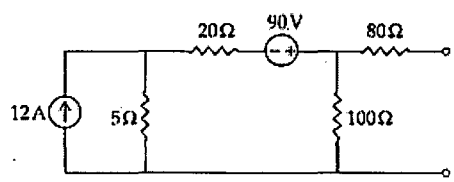

Fig.2

3. Determine the resonant frequency of the RLC circuit with R=10Ω, L=0.5 mH and C = 10μF.
4. Two inductively coupled coils have self-inductances L_1 = 50mH and L_2= 200mH. If the coefficient of coupling is 0.5.Find the value of mutual inductances between the coils.
5. The power input to a 3φ induction motor is measured using two wattmeters. The readings are 1 kW and 0.35 kW respectively. Calculate the power factor of the motor.
6. A balanced star connected load of (4+j3) Ω/phase is connected to a balanced 3φ, 400V supply. The phase current is 12A. Find the total active power.
7. A 50μF capacitor is discharged through a 100kΩ resistor. If the capacitor was initially charged to 400V.Determine i(t).
8. Draw the pole zero plot for the transfer function $\mathbf{H(s)=\frac{K\,s\,(s-4)}{(s+6)(s^2+6s+25)}}$
9. Determine Z parameters if the Y parameters are $Y=\begin{bmatrix} \frac{2}{15} & \frac{-1}{5} \\ \frac{-1}{10} & \frac{2}{5} \end{bmatrix}$
10. Calculate the value of Z parameters if A=2, B= -1, C=3 and D= -2.

Part – B (5 x 16 = 80 marks)

11. (i). Find the current through 12 Ω resistor using Norton's equivalent circuit in Fig. 3a. **(8)**

(ii). Using Superposition Theorem, find the current i_3 in Fig 3b. **(8)**

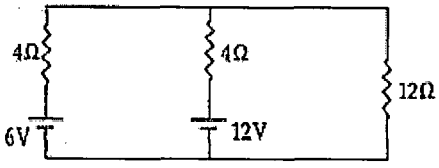

Fig.3a

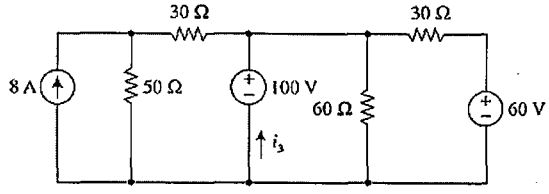

Fig.3b

12. a) i) In Fig. 4a, L_1=0.4H, L_2=2.5H, k=0.6 and $i_1 = 4i_2 = 20\cos(500t-20°)$ mA. Evaluate the following quantities at t=0 **1)** i_2 **2)** V_1 **3)** total energy stored in the system. **(10)**

ii) In a coupled circuit, $L_2=16L_1$ and coupling coefficient k=0.6, When both inductance are connected in series opposing, the equivalent inductances is 73.2mH. Find L_1, L_2 and M. **(6)**

(OR)

b) Find the value of L at which the circuit resonates at a frequency of 1000 rad/sec in the circuit shown in Fig. 4b

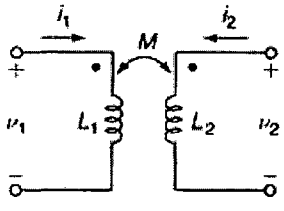

Fig. 4a.

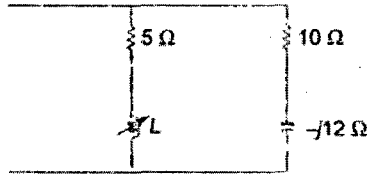

Fig. 4b

13. a) (i) A three phase balanced delta connected load of (4+j8) Ω is connected across a 400V,3φ balanced supply. Determine the phase currents and line currents. Assume the phase sequence as RYB and also calculate the power drawn by the load. **(8)**

(ii) A balanced star load of parallel connected RLC in each phase is connected to a three phase 400 V, 50 Hz balanced supply. The values of R, L and C in each phase are 10 Ω, 1H and 100μF respectively. Calculate the line current, the power and the power factor. **(8)**

(OR)

b) (i) A three phase balanced star connected load of (15+j20) Ω per phase is connected across a 440V, 3φ, 50 Hz supply. Determine the line currents and power drawn by the load. Assume the phase sequence as RYB. **(8)**

(ii) Three equal inductors connected in star take 5kW at 0.7 PF when connected to a 400V, 50 Hz three phase, three wire supply Calculate the line currents (i) if one of the inductor is disconnected and (ii) if one of the inductor is short circuited.

(8)

14. a) Determine the complete solution for the current when the switch is closed at t=0 to the applied voltage v(t)= 400 Cos(500t+π/4) with resistance =15Ω, inductance L=0.2H and capacitance C= 3μF.

(OR)

b) A coil having resistance of 10Ω and inductance of 14H is connected across a DC voltage of 140V. Calculate (i) the value of current at 0.4 seconds after switching on the supply, (ii) with the current having reached the final value, the time it would take for the current to reach a value of 8 A after switching off the supply.

15. a) Find I_1, I_2 in the circuit given in Fig. 5a

(OR)

b) Determine the Z and ABCD parameters for the given network shown in Fig.5b

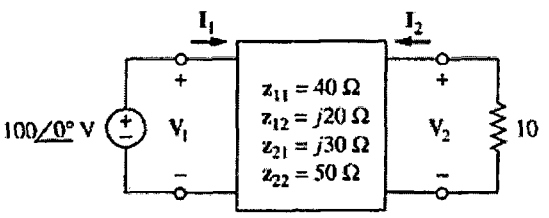

Fig.5a

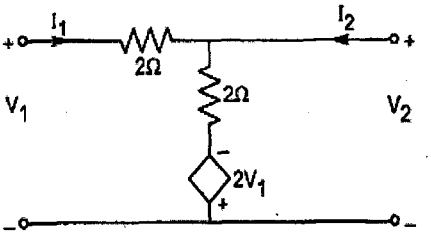

Fig.5b