Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

III SEMESTER B.S. DEGREE EXAMINATION – APRIL / MAY 2017

SUBJECT: SPECIAL NETWORK APPLICATIONS (EE233)

(BRANCH: EC & EE)

Tuesday, 9 May 2017

Time: 3 Hours **Max. Marks: 100**

✓ **Answer ANY FIVE full Questions.**

1A. A symmetrical RYB, 400V, 50Hz, three phase supply is connected to unbalanced delta connected load. The load impedances are 150 Ω between R & Y, 50μF between Y & B, (30+j70) Ω between B & R

a) Find Line currents
b) Draw the circuit diagram for two wattmeter method for measurement of power
c) Draw the phasor diagram and find out the two wattmeters readings.

1B. A 3 phase, 400 V, 50 Hz, RYB, 3 wire supply feeds an unbalanced Y-connected load. The branch impedances of the loads are: $Z_R = (4 + j3)\ \Omega$, $Z_Y = (6 + j8)\ \Omega$, $Z_B = (5 + j12)\ \Omega$. Find the line currents, the neutral displacement voltage, the readings of the 2 watt-meters connected to measure the 3 phase power with the current coils of the same inserted in the R and Y lines respectively.

(10+10)

2A. Three loads $Z_A = 80\Omega$, $Z_B = -j50\Omega$, $Z_C = j100\Omega$ are connected in star across a balanced, three phase 440V ABC supply. Calculate

a) Line currents
b) Phase voltages
c) Neutral shift voltage.

2B. Three loads $Z_R = 5\angle 30^0\ \Omega$, $Z_Y = 10\angle 45^0\ \Omega$, $Z_B = 10\angle 60^0\ \Omega$ are connected in star to R, Y & B phase respectively. The current coils of the two wattmeters are connected in R & B lines. If the supply voltage is 415V, 50Hz. Determine the readings of two wattmeters. Assume phase sequence as RYB. **(10+10)**

3A. A resistor and a capacitor are connected in series across a 150V ac supply. When the frequency is 40Hz, the circuit draws 5A. When the frequency is increased to 50Hz, it draws 6A. Find the values of resistance and capacitance. Also find the power drawn in the second case.

3B. Impedances Z_2 & Z_3 in parallel are in series with impedance Z_1 across a 100V, 50Hz AC supply. $Z_1 = (6.25+1.25j)\ \Omega$, $Z_2 = (5+0j)\Omega$, $Z_3 = (5-jX_c)\Omega$. Determine the value of capacitance of X_c such that the current in the circuit will be in phase with the total voltage. What is then the circuit current and power. **(10+10)**

4A. Derive the expressions for the resonant frequency and half power frequencies of the series RLC circuit. Plot the variation of current with frequency.

4B. Derive the expression for the resonant frequency of the circuit shown in Fig.4 B.

(10+10)

5A. The total inductance of two coils A and B, when connected in series is 0.5 H or 0.2 H, depending on the relative directions of the currents in the coils. Coil A, when isolated from coil B, has a self inductance of 0.2 H. Calculate (a) the mutual inductance between two coils, (b) the self inductance of the coil B , (c) the coupling coefficient between the two coils , and (d) the two possible values of the emf induced in coil A when the current in the series combination decreases at 1000 A/s

5B. Obtain the dotted equivalent circuit for the coupled circuit shown in Fig.5 B. and use it to find out the voltage V across the 10 ohm capacitive reactance.

5C. Obtain a conductively coupled equivalent circuit for the magnetically coupled circuit shown in Fig. 5 C. **(4+10+6)**

6A. Obtain Thevenin and Norton equivalent circuits at terminals ab for the coupled circuit shown in Fig.6 A.

6B. A ring shaped electromagnet has an area of 6mm and a cross sectional area of 12 $cm^{2.}$ The mean length of the core is 60cm. Calculate the mmf required to produce a flux density of 0.4 wb/m^2 in the air gap. Assume relative permeability of the material is 600.

6C. Compute Voltage V for the coupled circuit shown in Fig. 6 C.

(10+4+6)

7A. Define h-parameters. Express h-parameters in terms of z-parameters

7B). Evaluate V2/Vs for the circuit given in Fig. 7 B.

(7+13)

8A. Find Y-parameters for network shown in Fig. 8 A.

8B. Find the A,B,C,D parameters for the network shown in Fig.8B. and check whether the network is symmetric and reciprocal. **(10+10)**

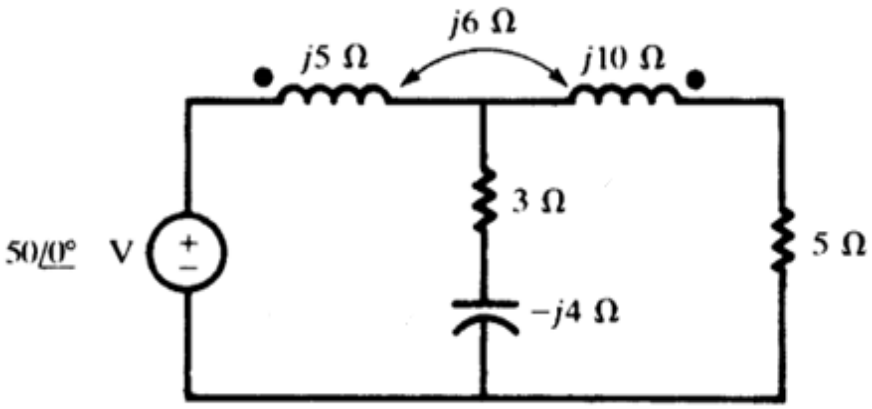

Fig.5C.

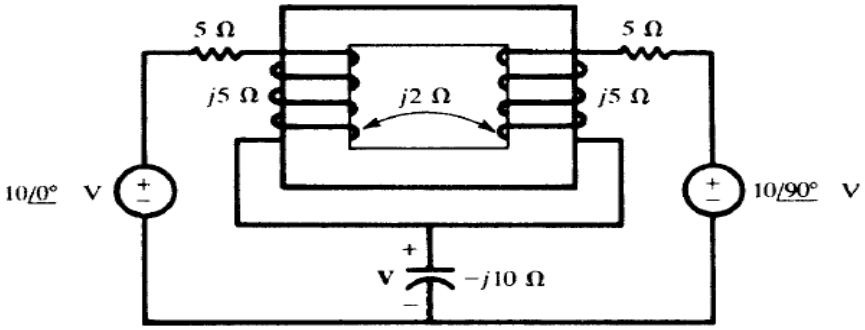

Fig. 5 B.

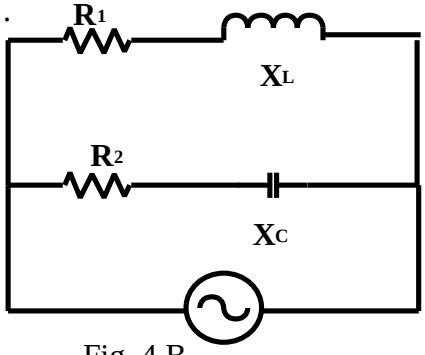

Fig. 4 B.

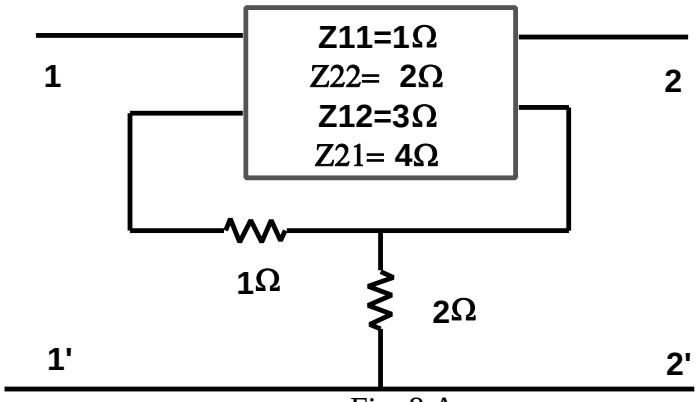

Fig. 8 A.

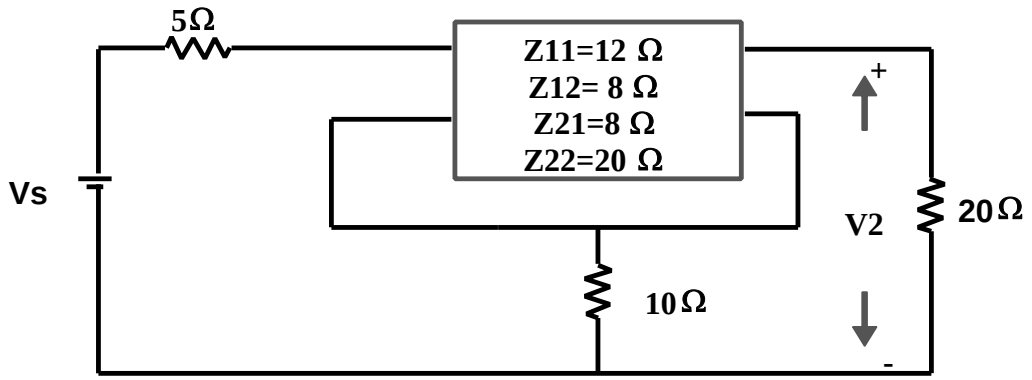

Fig. 7B

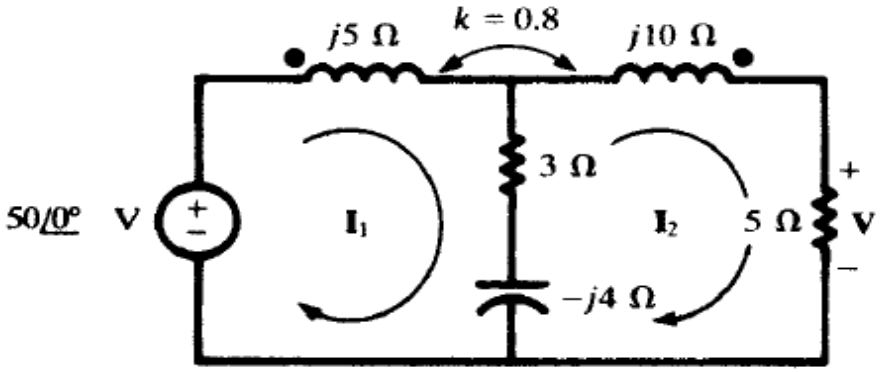

Fig.6C.

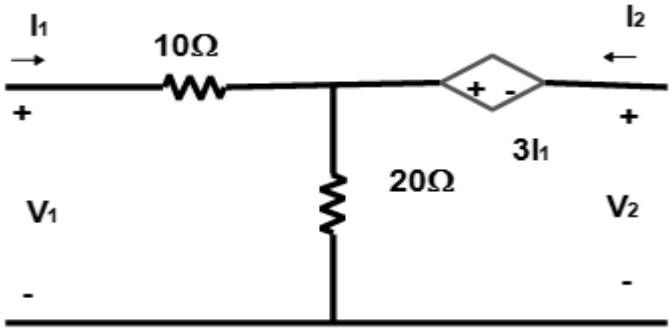

Fig. 8 B.

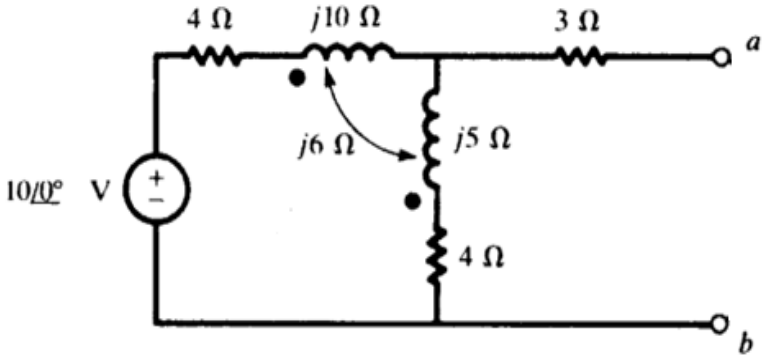

Fig.6 A.