HDU-003-115301

Seat No. _____

M. Sc. (Electronics) (Sem. III) Examination

November / December – 2017

Paper - IX : Circuits & Networks

Faculty Code : 003
Subject Code : 115301

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer any seven from the following : **14**

(1) Define following :

(1) Voltage

(2) Current

(3) Power

(4) Circuit

(2) Briefly write on VCVS and VCCS.

(3) Derive voltage divider formula.

(4) Write the general mesh equations for three resistive network and general nodal equations for three nodes resistive circuit.

(5) Explain following for sine wave.

(1) Peak value

(2) RMS value

(3) Phase difference

(4) Form factor

(6) Draw the waveforms of the following sinusoidal functions.

(1) $v_1 = 10 \sin \omega t$

(2) $v_2 = 5 \sin(\omega t + 90)$

(3) $v_3 = 7 \sin(\omega t - 45)$

(4) $I_1 = 3 \sin \omega t$

(7) Perform addition of $E_1 = 100 \angle 30°$ and $E_2 = 50 \angle 20°$.

(8) Briefly explain half power frequencies.

(9) What is coupled circuit? Write its types.

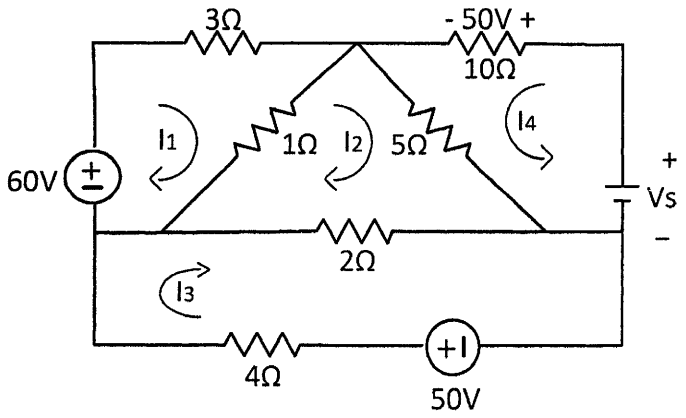
(10) Explain magneto motive force and reluctance.

2 Answer any **two** from the following :

(a) Write the procedure to convert Delta into star and star into Delta networks made of resistors only. **7**

(b) Explain dual networks with one example. **7**

(c) Using mesh analysis, determine the voltage V_s which gives a voltage of 50V across the $10\ \Omega$ resistor for the following circuit. **7**



3 Answer the following :

(a) Write the statements for the following theorems. **7**

(1) Super position theorem

(2) Thevenin's theorem

(3) Reciprocity theorem

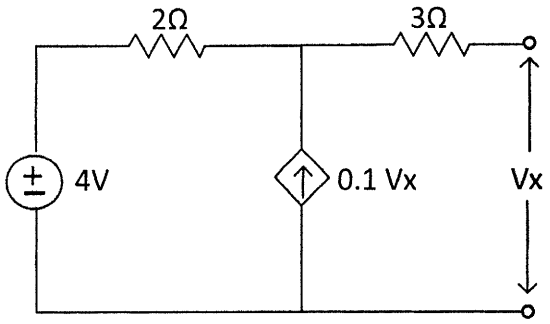
(4) Compensation theorem

(5) Maximum power transfer theorem

(6) Tellegen's theorem

(7) Millman's theorem

(b) For the following circuit obtain Thevenin's equivalent circuit. 7



OR

3 Answer the following :

(a) Discuss the impedance for an RL AC circuit driven by $v(t) = V_m e^{j\omega t}$. Derive the formula for Z and θ. Draw the impedance triangle. 7

(b) Write about the apparent power and power factor. Explain reactive power. Draw the power triangle. 7

4 Answer the following :

(a) Write about the voltage and current response of the series RLC circuit and derive the condition for the maximum voltage across the inductor and capacitor. 7

(b) Draw an RLC circuit such that R_L and X_L are in series while R_C and X_C are also in series but both these branches are in parallel to each other and driven by an AC source voltage. Discuss locus diagram for following cases. 7

(1) Variable X_L

(2) Variable X_C

(3) Variable R_L

(4) Variable R_C

5 Answer any **two** from the following :

(a) What is coefficient of coupling? Derive the formula for the same. **7**

(b) Prove the following : **7**

(1) $L \propto N^2$

(2) $\frac{V_2}{V_1} = \frac{N_2}{N_1}$

(c) Draw a single tuned coupled circuit. Derive the expressions for voltage. **7**

(d) Draw series AC circuit of R and C. Derive the expression for the total current. **7**