3E1642

Roll No. _____ [Total No. of Pages : 3

3E1642

B.Tech. III Sem.(Main/Back) Examination, Dec. - 2016
Electrical Engineering
3EE2A Circuit Analysis - I

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

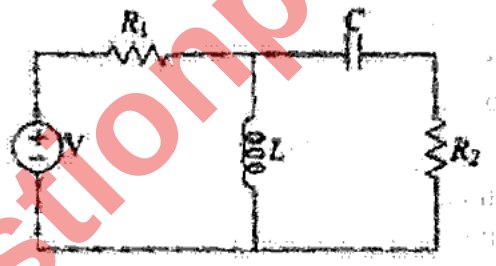
Instructions to Candidates:

*Attempt any **five questions,** selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

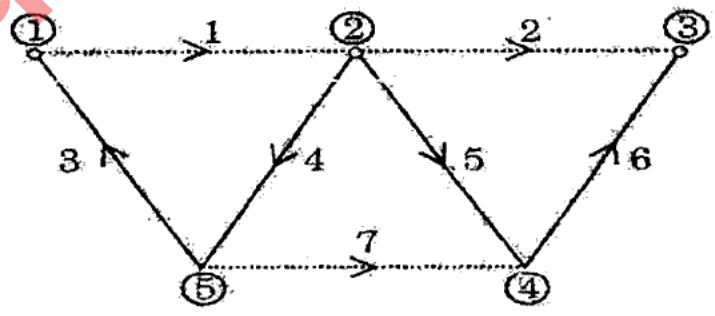
1. a) Define Q factor in an AC circuit. Deduce the relation between band width, resonant frequency and Q factor. **(8)**

b) Draw the dual of the network shown in figure. **(8)**



OR

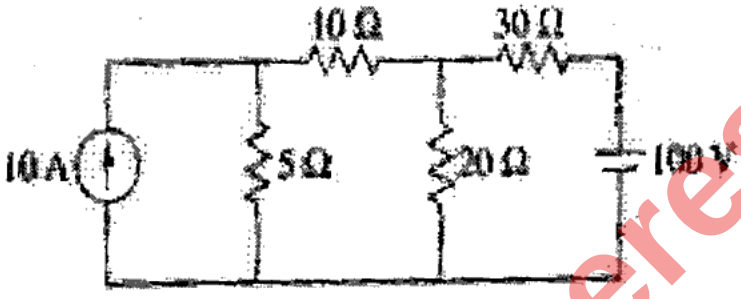
1. a) A graph is shown in figure below. Find the tie - set and cut set matrices and obtain the KCL and KVL equations. **(8)**



b) A 240-V, 100-Hz ac source is connected to a series RLC circuit consisting of a coil and variable capacitor. The coil has a resistance of $55m\Omega$ and an inductance of 7mH. The capacitor is varied so as to achieve resonance. Determine (i) the value of the capacitance, (ii) the circuit quality factor, and (iii) the half - power frequencies. **(8)**

Unit - II

2. a) Using Thevenin Theorem, find the current through the $10-\Omega$ resistor. **(8)**



b) State and explain for Tellegen's theorem that the sum of power delivered to a closed network is zero. **(8)**

OR

2. a) State and explain for maximum power transfer theorem that power transfer from a d.c. source network to a resistive network is maximum when the internal resistance of the d.c. source network is equal to the load resistance. **(8)**

b) Explain the compensation theorem with its limitations. **(8)**

Unit - III

3. a) A balanced, three - phase load connected in delta draws a power of 10.4 kW at 200 V at a power factor of 0.5 lead. Find the values of the circuit elements and the reactive voltamperes drawn. **(8)**

b) What do you mean by power triangle? Explain active, reactive and apparent power with example. **(8)**

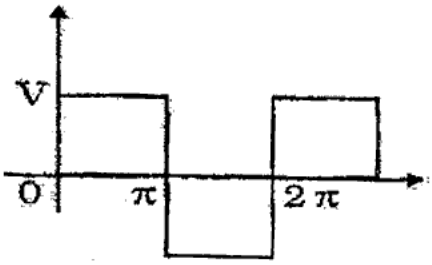
OR

3. a) Explain the neat circuit and phasor diagram, how the power and power factor of $3-\phi$ system can be measured by means of two wattmeter method. **(8)**

b) Write down the relationship between line voltage and line current with phase voltage and phase current in star connected and delta connected circuits. **(8)**

Unit - IV

4. a) A square waveform is shown below. Obtain the Fourier series. **(8)**



b) Derive the expression of power with Non - sinusoidal voltage and current. **(8)**

OR

4. a) Find the first few terms of Fourier series of the function given by

$f(a) = 1 \text{ for } 0 < \alpha < \pi$

$f(a) = -1 \text{ for } \pi < \alpha < 2\pi$ **(8)**

b) Explain the different kinds of symmetry in non - sinusoidal waves. **(8)**

Unit - V

5. a) A 50 Hz, 400 V (peak value) sinusoidal voltage is applied at t = 0 to a series R-L circuit having resistance 5Ω and inductance 0.2 H. Obtain an expression of current at any instant t. Calculate the value of the transient current 0.1 sec. after switching on. **(8)**

b) State and deduce initial - value and final value theorems. **(8)**

OR

5. a) Explain the impulse response of series RC network. **(8)**

b) An impulse function is given by $s(t-t_1)$. Obtain its Laplace transform. **(8)**