

**Code No: 133BJ****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, November/December - 2018****NETWORK ANALYSIS****(Common to ECE, ETM)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) What is an Ideal transformer? [2]
- b) Discuss the dot convention between magnetically coupled coils. [3]
- c) What is resonance? Explain. [2]
- d) What is the significance of power factor? [3]
- e) Explain the significance of average value. [2]
- f) What are the Laplace transform of step and exponential functions? [3]
- g) Define poles and zeros in a transfer function. [2]
- h) What is a driving point in transfer function? Explain. [3]
- i) Write the Properties of LC Networks. [2]
- j) State Foster's Reactance theorem. [3]

**PART-B****(50 Marks)**

- 2.a) Clearly explain the following:
  - i) Self inductance (L)
  - ii) Mutual inductance (M)
- b) An Iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the relative permeability of the Iron is 400, when a current of 1 Amp flows in the winding, determine the flux density Neglect leakage and fringing. [5+5]

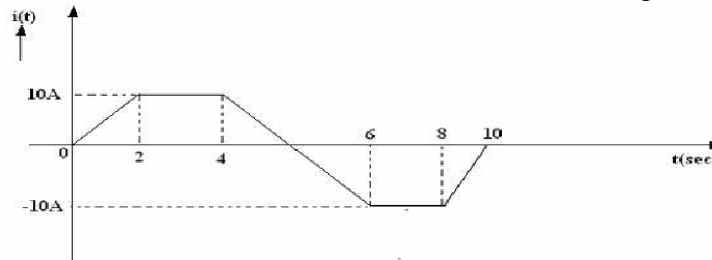
**OR**

3. Define and explain the following with an example: [10]
  - a) Oriented Graph
  - b) Tree of a Graph
  - c) Tie set and a basic Tie set
  - d) Cut set and a basic Cut set.
- 4.a) R-C series circuit is suddenly excited from a step voltage V. Derive an expression for the current as a function of time and draw the graph current Vs Time.
- b) An inductive coil of Resistance R and inductance L is connected in parallel with a capacitor C. Derive the expressions for resonant frequency and Q factor. [5+5]

**OR**

5. A series RLC circuit is connected across a variable frequency supply and has  $R = 12 \text{ ohms}$ ,  $L = 1 \text{ mH}$  and  $C = 1000 \text{ pF}$ . Calculate  
 a) Resonant frequency,  
 b) Q factor and  
 c) Half power frequencies. Derive the formulae used. [2+2+6]

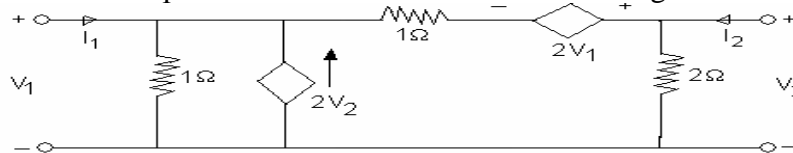
- 6.a) Derive expression for R.M.S and average value of a sinusoidal alternating quantity. [5+5]  
 b) A pure inductance of  $5 \text{ mH}$  carries a current of the wave form shown in figure 1. Sketch the waveform of  $V(t)$  and  $P(t)$ . Determine the average value of power.



**Figure: 1**  
**OR**

- 7.a) A capacitor of  $100 \text{ }\mu\text{F}$  is connected across  $200 \text{ V}$ ,  $50 \text{ Hz}$ , Single phase supply. Calculate: i) The reactance of the capacitor ii) RMS value of the current iii) The maximum value of the current.  
 b) When an impulse voltage is impressed across R-C circuit, derive an expression for its current response. [5+5]

- 8.a) Determine the 'h' parameters of the network shown in figure 2.



**Figure: 2**

- b) Define Z and Y parameters of a two port network and determine the relationship between the above parameters. [5+5]

**OR**

9. Explain clearly the following terms:  
 a) Propagation constant and characteristic impedance  
 b) Attenuation constant. [5+5]

- 10.a) What is a high pass filter? In what respects it is different from a low pass filter?  
 b) Derive the equations to find the inductances and capacitances of a constant K high pass filter. [5+5]

**OR**

- 11.a) Explain the variation of Attenuation, phase shift and characteristic impedance of Band pass filter.  
 b) Draw the circuit diagram for T and  $\pi$  sections of composite filter. [5+5]