

**R16**

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
- Resonant frequency,
  - Q factor and
  - 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.

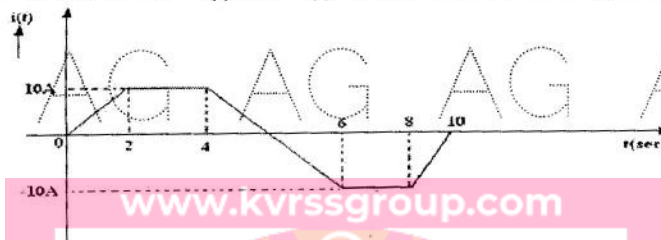


Figure: 1  
OR

- 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.

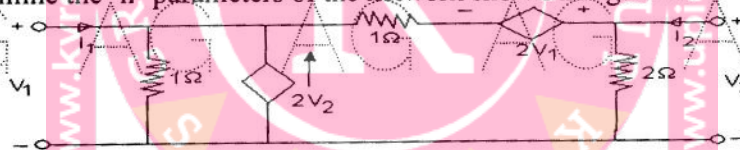


Figure: 2

- b) Define Z and Y parameters of a two port network and determine the relationship between the above parameters. [5+5]
9. Explain clearly the following terms:
- Propagation constant and characteristic impedance
  - 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]