

Code No: 133BK

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, April/May - 2018

NETWORK THEORY

(Electrical and Electronics Engineering)

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.

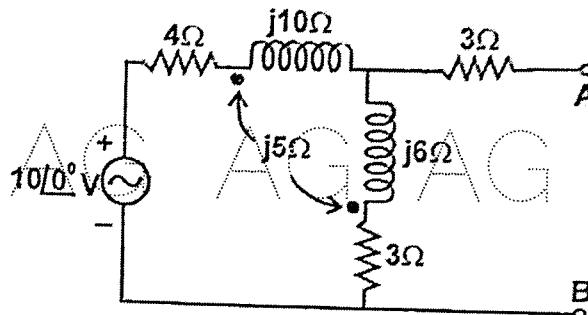
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A**(25 Marks)**

- Define the terms (i) planar graph (ii) non planar graph. [2]
- Two coupled coils with $N_1=200$ and $N_2=600$ turns have a $K=0.8$. With coil 1 opened and current of 10 A in coil 2, the flux in coil 2 is 0.38 mWb. Find L_1 , L_2 and M . [3]
- Obtain the relationship between phase voltages and line voltages in three phase balanced star system. [2]
- Three identical impedances $(3+j4)$ ohms are connected in a delta connection is connected to a three phase, three wire 230 V ABC system. Find the line currents. [3]
- Find Laplace transform of the rectangular signal with an amplitude of 1.0 units and a time period of T sec. [2]
- Voltage across a capacitor cannot change instantaneously, Justify. [3]
- A two port network has the following Z-parameters. Find h parameters. [2]
- Write the necessary conditions for driving point and transfer function. [3]
- Write the significance of cutoff frequency of a filter. [2]
- A series low pass filter with a cutoff frequency 6 kHz is needed. Using $R=12$ k Ω , calculate (i) C (ii) $|H(j\omega)|$. At 25 kHz and (iii) angle of $H(j\omega)$ at 25 kHz. [3]

PART-B**(50 Marks)**

- Obtain the Thevenin's equivalent circuit at terminals AB of the coupled circuit shown in Figure 1.

**Figure: 1**

- Write the procedure to draw the dual network of RLC series circuit and construct its dual network. [5+5]

- OR
- 3.a) For the circuit shown in Figure 2 find the maximum power delivered to the load.

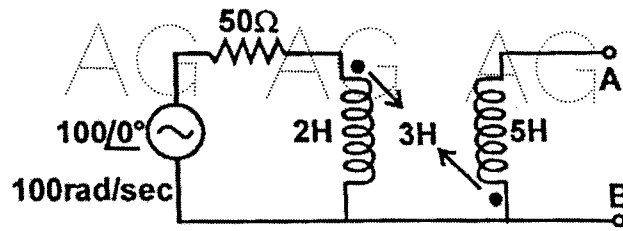


Figure: 2

- b) For the graph shown in Figure 3 write the (i) incidence matrix and (ii) express branch voltages in terms of node voltages. [5+5]

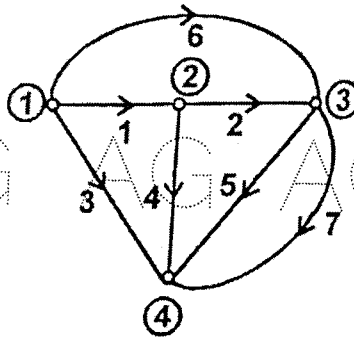


Figure: 3

- 4.a) A balanced star load with impedances of $(9+j7)$ ohms to a three-phase four wire 480 V ACB system. Find the line currents and total power.
 b) With a neat circuit diagram, explain measurement of power with two wattmeter method. [5+5]

OR

- 5.a) Two wattmeters in line A and B of a 230 V, RYB system read 1500 W and 500 W respectively. Find the impedance of the balanced delta connected load.
 b) A three phase three wire 220 V, ABC system supplies a delta connected load where $Z_{AB}=(10-j10)$ ohm, $Z_{BC}=(12+j8)$ ohm and $Z_{CA}=23$ ohm. Find the current and the readings of wattmeters in lines A and C. [5+5]

- 6.a) A series RLC series circuit with $R=5$ ohm, $L=0.1$ H and $C=500$ micro F has a constant voltage $V=25$ V applied at $t=0$. Find the resulting current.
 b) Obtain the response of an RL series circuit when it is excited with ramp input. [5+5]

OR

- 7.a) The switch is closed at $t=0$ connecting a voltage source $V=V \sin \omega t$ to a series RL series circuit. Derive an expression for $i(t)$.
 b) From the fundamentals obtain the step response of a series RC circuit. [5+5]

- 8.a) Find Z-parameters of T-network with series branches of 4 ohm and a shunt branch of 8 ohm. Derive the necessary equations.
- b) Obtain Y parameters in terms of ABCD parameter of a two port network. [5+5]

OR

- 9.a) Obtain input impedance, voltage and current transfer functions in terms of ABCD parameters of a typical two port network.

- b) The following direct current measurement were made on the two port network:

Port 1 open	Port 1 short circuited
$V_1 = 2 \text{ mV}$	$I_1 = -1 \text{ } \mu\text{A}$
$V_2 = 10 \text{ V}$	$I_2 = 40 \text{ } \mu\text{A}$
$I_2 = 100 \text{ } \mu\text{A}$	$V_2 = 5 \text{ V}$

Calculate h parameters of network.

[5+5]

- 10.a) Draw the circuit diagram of series RL circuit that acts as a high pass filter.
- i) Write an expression for the circuit transfer function
- ii) Find the value of R and L that will yield a high pass filter with a cutoff frequency of 10 kHz.

- b) Explain in detail about constant K and m derived filters.

[5+5]

OR

- 11.a) With a neat sketch draw the magnitude response of (i) low pass and (ii) high pass filters. Justify your answer

- b) Write short notes on band pass and RC filters.

[5+5]