Code No: 124DH **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2017

PRINCIPLES OF ELECTRICAL ENGINEERING

(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) Draw transformed network (s-domain equivalent) for the series circuit having R = 5 Ω L=0.5 Hand C=0.5 F. [2]

b) What do you understand by "Time Constant" of a circuit? What is its significance on the response of the circuit? [3]

c) State the condition for symmetry and Reciprocity in a two port network in terms of 'h' parameters. [2]

d) Obtain 'Z' parameters in terms of 'Y' parameters for a two port network. [3]

e) Distinguish between a low pass filter and high pass filter. [2]

f) Explain clearly about the Attenuation. [3]

g) What are the uses of equalizer bar in DC generators? [2]

h) What are the methods of speed control in DC motor? [3]

i) Why is transformer rated in KVA? Justify. [2]

j) How are the transformer losses affected if power factor of a given load is varied? [3]

PART-B

(50 Marks)

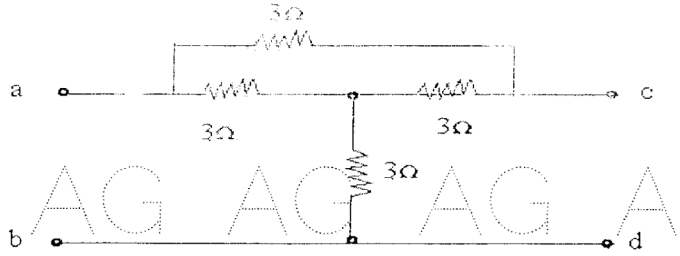
2. A series RLC circuit with R = 3 Ω, L = 1H and C = 0.5F, is excited by a unit step voltage. Obtain the expression for I(t) using Laplace Transform method. Assume that the circuit is initially relaxed. Sketch the variation of I(t) and state whether the circuit is over damped, or under damped or critically damped. [10]

OR

3.a) Calculate the time taken by a capacitor of 1μF and in series with a 1MΩ resistance to be charged up to 80% of the final value.

b) In a series RL circuit, the application of a dc voltage results in a current of 0.741 times the final steady state value of current after 1 sec. However, after the current has reached its final value, the source is short circuited. What would be the value of current after one second? [5+5]

4. Define ABCD parameters of a two part network and obtain the relation with Z-parameters. Determine Y-parameters for the bridge- T network shown in figure. [10]



OR

5.a) What is a transformed network? Explain clearly with an example.

b) The Voltages at the two ports of a two-port network are represented as $V_1 = 5I_1+5I_2$, $V_2 = I_1+2I_2$. If a load impedance of $3\angle 0^0$ ohm is connected at the output port, determine the input impedance. [5+5]

6. Design a constant K, T-section and π-section high pass filter having cut off frequency f_c = 10 kHz and characteristic impedance Z_0=500 ohms. Calculate: a) the characteristic impedance and phase constant of the filter at 25 kHz and b) attenuation of the filter at 5 kHz. [10]

OR

7.a) Bring out the draw backs of constant K filters.

b) Obtain the necessary equations for a m-derived T-section low pass filter from a proto type constant K-filter. [4+6]

8.a) Derive the induced e.m.f equation of a D.C. Generator.

b) The armature of a 4-pole, lap-wound DC shunt generator has 120 slots with 4 conductors per slot. The flux per pole is 0.05wb. The armature resistance is 0.05 ohm and the shunt field resistance is 50 ohms. Then find the speed of the machine when supplying 45A at terminal voltage of 250V. [5+5]

OR

9.a) Explain the magnetizing characteristics of DC shunt generator.

b) A 4 pole lap wound D. C. shunt generator has a useful flux per pole of 0.07 wb. The armature winding consists of 220-turns each of 0.004 ohms resistance. Calculate the terminal voltage when running at 900 rpm if the armature current is 50A. [5+5]

10.a) Obtain the equivalent circuit of a single phase transformer referred to LV side and HV side.

b) A single phase 50Hz transformer has 100 turns on the primary and 400 turns on the secondary winding. The net cross sectional area of core is 250 cm^2. If the primary winding is connected to a 230V 50Hz supply, determine
i) The EMF induced in the secondary winding
ii) The maximum value of flux density in the core. [5+5]

OR

11.a) Explain the principle of operation of a transformer. Derive its emf equation.

b) A single phase transformer has 180 and 40 turns respectively in its secondary and primary windings. The respective resistances are 0.233 and 0.067 Ω. Calculate the equivalent resistance of i) the primary in terms of the secondary winding ii) the secondary in terms of the primary winding. [5+5]

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