

Code No: R09220401

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech-II Year II Semester Examinations, May-2013

Principles of Electrical Engineering

(Common to ECE, ETM)

Time: 3 hours

Max. Marks: 75

Answer any five questions  
All questions carry equal marks

- 1.a) For the circuit shown below in Figure 1 the switch 'S' that has been closed for a long time and then opens at  $t=0$ .

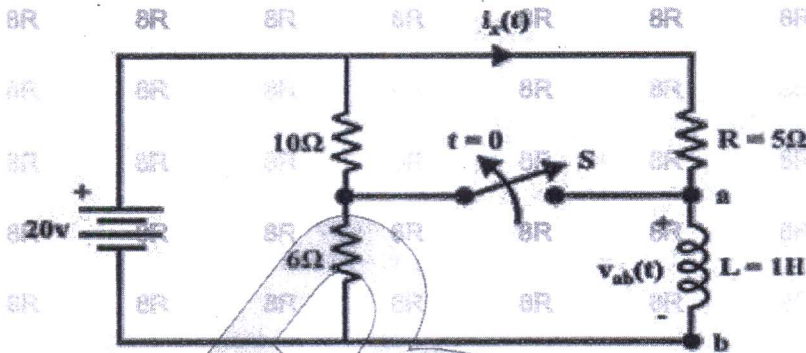


Figure 1

Find,

- (i)  $v_{ab}(0^-)$  (ii)  $i_x(0^-), i_x(0^+)$  (iii)  $i_x(0^+)$  (iv)  $v_{ab}(0^+)$  (v)  $i_x(t=\infty)$  (vi)  $v_{ab}(t=\infty)$   
(vii)  $i_x(t)$  for  $t > 0$

- b) Derive the expression for voltages and currents, time constant when a series R-L circuit is excited with DC source. [10+5]

- 2.a) The following Figure 2 shows the simplified model of a field effect transistor. Find its y parameters.

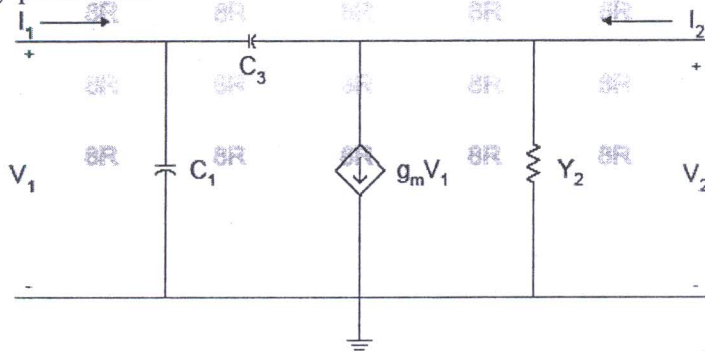


Figure 2

- b) A simplified equivalent circuit of a bipolar junction transistor is shown in Figure 3 below find its h-parameters. [8+7]

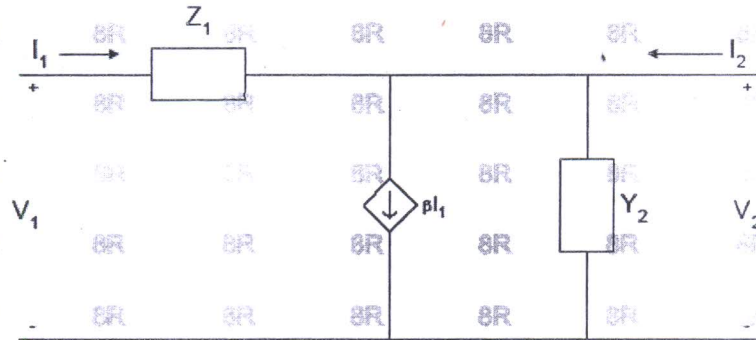


Figure 3

- 3.a) Design constant-k low pass T and  $\pi$ -section filters to be terminated in 600 ohm and having cut off frequency 3 kHz. Determine (i) the frequency at which the filters offer attenuation of 17.372 dB (ii) attenuation at 6 kHz (iii) the characteristic impedance and phase constant at 2 kHz.
- b) Design a constant-k type band-pass filter section to be terminated in 600 ohm resistance and having cut off frequencies of 2 kHz and 5 kHz. [9+6]
- 4.a) Design a T-attenuator to give an attenuation of 10dB. The characteristic resistance is 600 $\Omega$ .
- b) Design a symmetrical lattice attenuator to have a characteristic impedance of 100 $\Omega$  and attenuation of 12 dB. [8+7]
- 5.a) With neat sketch, explain the external and internal characteristics of DC Shunt Generator.
- b) A Short Shunt Compound Generator delivers a load current of 30A at 220V and has armature, series field and shunt field resistances of 0.05, 0.03 and 200 Ohms respectively calculate the induced emf and the armature current. Allow 1.0V per brush contact drop.
- c) Derive the expression for induced e.m.f of a DC generator. [7+4+4]
- 6.a) Explain the necessity of 3 point starter, with a neat sketch, explain the construction and working of a 3 point starter for a DC Shunt Motor.
- b) A 25 KW, 250V DC shunt generator has armature and field resistance of 0.06 Ohms and 100 Ohms respectively. Determine the total armature power developed when working (i) as generator delivering 25kW output and (ii) as a motor taking 25 kW input. [8+7]
- 7.a) What is a transformer? Derive the EMF equation of single phase transformer and derive expression for voltage transformation ratio.
- b) Explain the operation of transformer on no-load, Draw and explain phasor diagram of a transformer loaded with resistive, inductive and capacitive loads. [7+8]
8. Explain the working principle of capacitor start, capacitor start – capacitor run 1-phase types of induction motors, with neat circuit diagrams, and give their applications.

[15]