

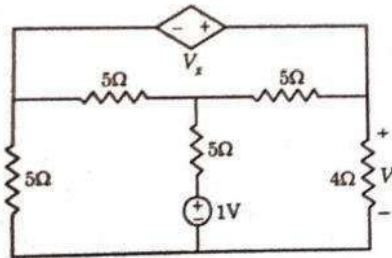
TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
**(Sample Question)**

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCT/BEI	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

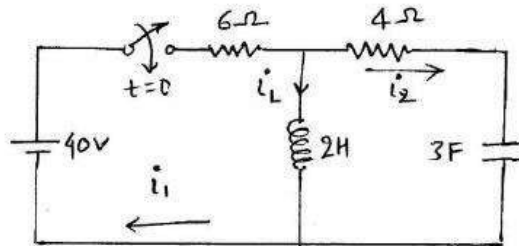
**Subject:** - Electrical Circuit and Machines (EE 154)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.
- ✓ Semi-log graph paper is to be provided (if necessary).

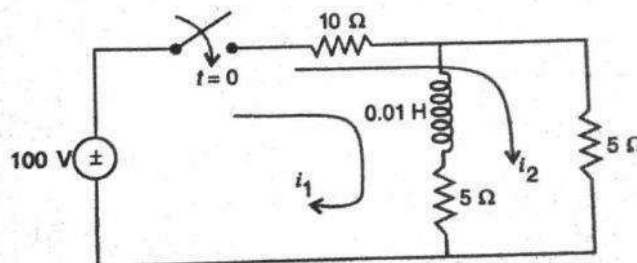
1. Using mesh analysis and matrix method solve the given network and find value  $V_x$ . [6]



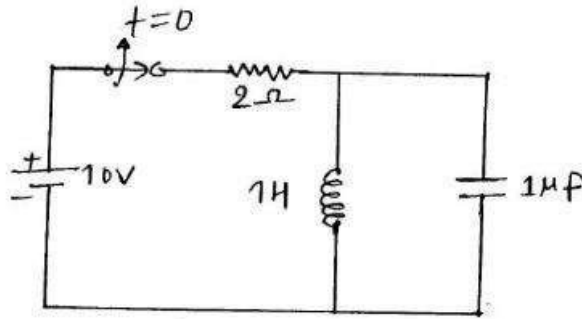
2. The switch is closed at  $t=0$ . Find at  $t=0^+$ , current and voltage of each element also calculate  $\frac{di(t)}{dt}$  of coil and  $\frac{dv(t)}{dt}$  of capacitor. [5]



3. Find the solution of current  $i_1$  and  $i_2$  for any time  $t>0$ , using classical approach. [6]



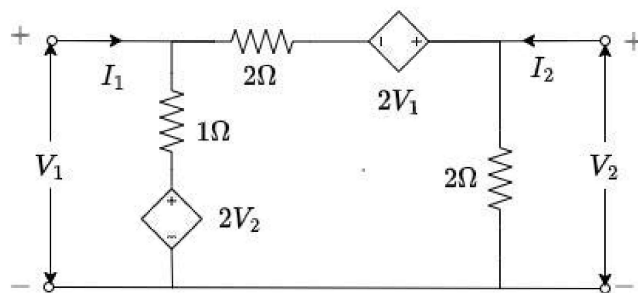
4. In the given with s/w closed steady state condition is reached and at  $t=0$ , switch is opened. Using Laplace transform method, find the expression for the current  $i_L(t)$  through the inductor and its value at  $t=5\text{ms}$ . [6]



5. Sketch the asymptotic plot of given transfer function. [8]

$$G(s) = \frac{20(s + 5)}{(s + 10)(s^2 + 21s + 20)}$$

6. The network shown below is a two port network containing dependent voltage source. Obtain Z-parameters and T-parameters of the network. [6]



7. Explain the working principle of transformer on No Load. What are the different losses in transformer. [6]
8. A 4 pole, 250 V dc long shunt compound generator supplies a load of 10 kW at rated voltage. The armature, series field and shunt field resistances are  $0.1 \Omega$ ,  $0.15 \Omega$  and  $250 \Omega$  respectively. The armature is lap wound with 50 slots, each slot containing 6 conductors. If the flux per pole is 50 mWb, calculate the speed of generator. [6]
9. Explain the construction of three phase induction motor? How rotating magnetic field is produced in three phase induction motor. [6]
10. Write short notes on following [any two] [2.5\*2]
- Magnetic circuits
  - Universal motor
  - Dc motor starter

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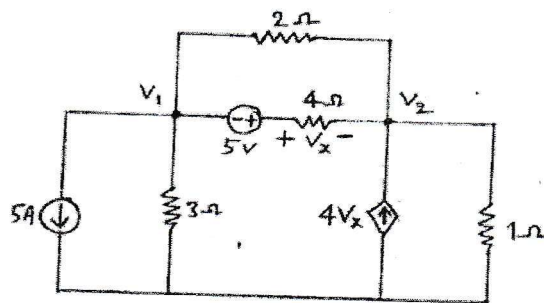
TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2081 Ashwin

Exam.	Regular (New Course -2080 Batch)		
Level	BE	Full Marks	60
Programme	BEL, BCT	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

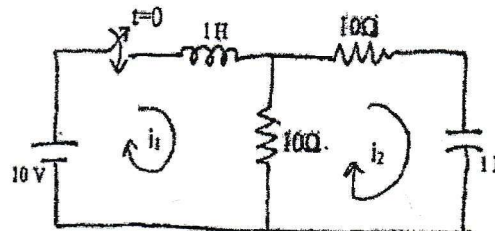
**Subject:** - Electrical Circuits and Machines (EE 154)

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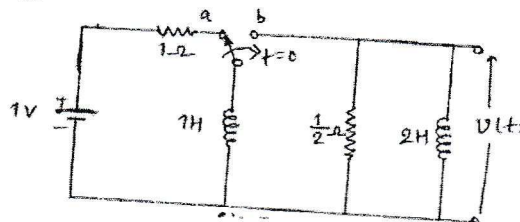
1. Using Nodal analysis and matrix solution method, find  $V_x$  and the current in 2 ohm resistance. [6]



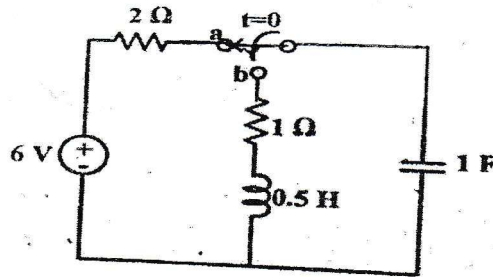
2. Obtain the value of  $i_1$ ,  $i_2$ ,  $di_1/dt$ ,  $di_2/dt$  at  $t = 0^+$ , if the switch is closed at  $t = 0$  in the circuit shown below. [5]



3. The circuit shown below is in steady state with switch is at position 'a'. The switch is moved to position 'b' at  $t = 0$ . Find the expression for  $V(t)$  and current through 2H inductor  $i_L(t)$  for  $t > 0$  using classical method. [6]



4. The switch in the figure below has been in position 'a' for a long time. Then, it is moved to 'b' at  $t = 0$ . Obtain the expression for voltage across capacitor for  $t > 0$  using Laplace transform method. [6]



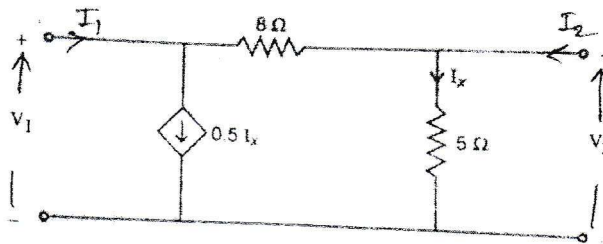
5. Plot asymptotic Bode graph of given transfer function.

$$G(s) = \frac{500(s+2)}{s(s^2+15s+121)}$$

[7]

6. Find the expression of Z parameters in terms of ABCD parameters. For given two port networks, find ABCD parameters.

[2+4]



7. Explain operation of transformer at loaded condition and prove that main flux in the core of transformer at any loading condition is constant. [6]
8. A 240 V dc shunt motor has armature winding resistance of  $0.4 \Omega$  and field winding resistance of  $120 \Omega$ . It draws a current of 30A at half load and the corresponding speed is 1400 rpm. If a resistance of  $1.2 \Omega$  is connected in series with the armature winding and load torque is decreased by 20%. Calculate the new speed. [6]
9. Explain the Torque-speed characteristics of three phase induction motor with the help of proper mathematics and graph. [6]
10. Write short notes on (Any Two) [2×3]
- Role of commutator and carbon brush in dc machine
  - Hysteresis and eddy current power losses
  - Stepper motor

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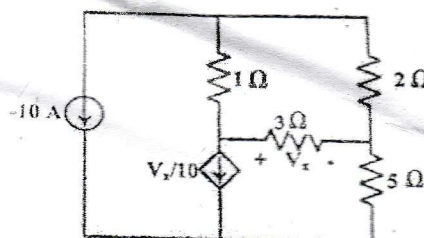
TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2082 Baishakh

Exam.	Back (New Course)		
Level	BE	Full Marks	60
Programme	BEI, BCT	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

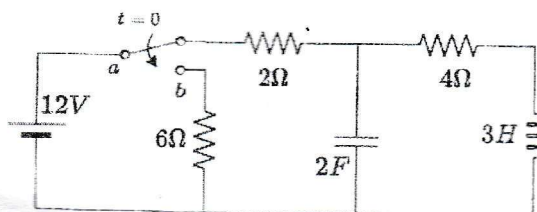
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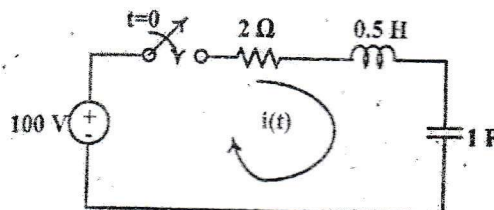
1. In the given circuit, determine  $V_x$  and power consumed by it using mesh analysis and solve by matrix method. [6]



2. In the network shown below, the switch has been in position a for long time. At  $t = 0$ , it is suddenly thrown off to position b. Find current through each element,  $\frac{di_L}{dt}$  of coil and  $\frac{dv_C}{dt}$  of capacitor at  $t = 0^+$ . [5]



3. A DC source of 100 V is suddenly applied at time  $t = 0$  to a series RLC circuit comprising  $R = 2\Omega$ ,  $L = 0.5\text{ H}$  and  $C = 1\text{ F}$ . Obtain the expression for current in the circuit by using classical method. [6]



4. An exponential voltage  $V(t) = 20e^{-4t}$  is suddenly applied at time  $t = 0$  to series RLC circuit comprising  $R = 2\Omega$ ,  $L = 0.5\text{ H}$  and  $C = 1\text{ F}$ . Obtain the expression for the current  $i(t)$  in the circuit using Laplace method. [6]



5. Sketch the asymptotic bode plot for the transfer function given by

[8]

$$\frac{100s(s+5)}{(s+1)(s^2+10s+100)}$$

6. Find the expression of hybrid parameters in terms of Z parameters. Derive the equivalent T parameters of two cascade connected two port networks. [3+3]
7. The following test results were obtained on 20 kVA, 2200/220 V, 50 Hz, single phase transformer. [5]  
O.C test: 220 V, 1.1 A, 125W (On LV side)  
S.C test: 52.7 V, 8.4 A, 287W (On HV side)  
Calculate the equivalent circuit parameters referred to secondary side.
8. Explain the production torque in DC motor with necessary mathematical explanation and derivation. What are the role of back emf in DC motor? [4+2]
9. How does three phase induction motor start? Why speed of this motor never reaches synchronous speed? [6]
10. Write notes on: (Any Two) [2×3]  
a) Magnetization of magnetic material  
b) Auto transformer and its application  
c) Stepper motor

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