



SE-6223

B. E. II (Sem. - III) (Inst. & Control) Examination
April/May - 2011
Electrical Circuit Theory

Time : 3 Hours]

[Total Marks :100

Instructions :

(1)

नीचे दर्शायेले निशानीवाणी विषयों उत्तरवही पर अवश्य लपकी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. 2 (Sem. - 3) (Inst. & Control)

Name of the Subject :
Electrical Circuit Theory

Subject Code No. : 6 2 2 3 Section No. (1, 2,.....): 1&2

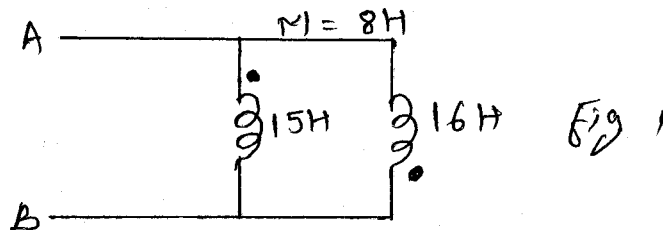
Seat No. :

Student's Signature

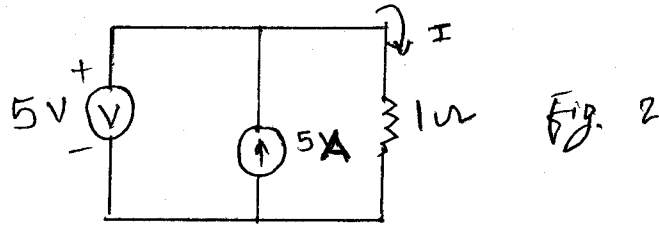
- (2) Attempt all questions.
- (3) Answer to the two sections must be written in separate answer books.
- (4) Figures to the right indicate full marks.
- (5) Assume necessary data wherever required.
- (6) Write algorithm or draw the flowchart showing program logic.
- (7) Scientific calculator up to Casio-100D, 100MS series is permitted.

SECTION - I

- 1 (a) Attempt all. 10
 - (i) The equivalent inductance seen at terminals AB 2
in (fig.1) is _____



- (ii) The value of the current I flowing in the $1\ \Omega$ resistor in circuit, shown in fig.2 will be _____ 2



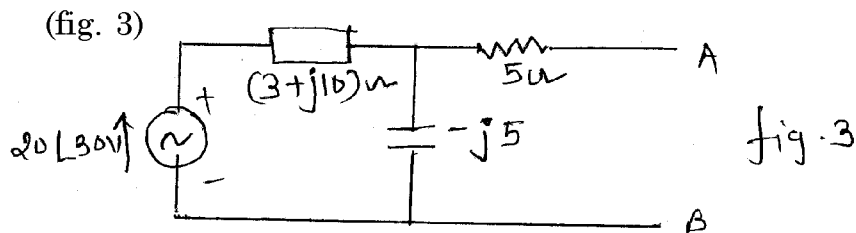
- (iii) The total resistance of four resistors in parallel is always less than the smallest resistance. (True/False) 1

- (iv) If one branch of a parallel circuit shorts, the total resistance decreases. (True/False). 1

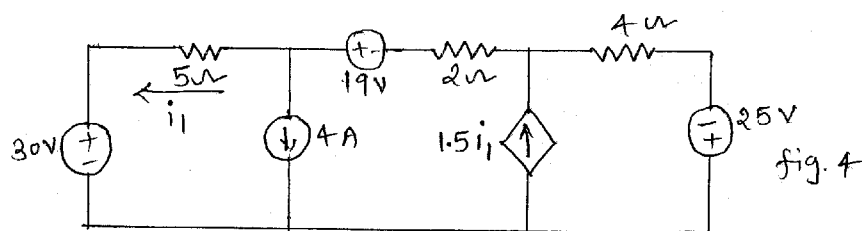
- (v) Distinguish between dependent and independent sources. 2

- (vi) What is two port N/W ? State name of two port parameters. 2

- (b) Explain maximum power transfer theorem. Find out the impedance at AB to obtain maximum power transferred to load and what is the maximum power ? 6



- (c) Evaluate the value of i_1 in the circuit. (fig. 4) 4



- 2 (a) For the network shown in fig. 5 draw the oriented graph. Write Tie-set schedule, hence obtain values of all the branch voltages and branch currents. 10

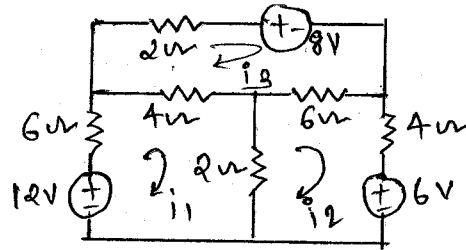


fig. 5

- (b) Define and explain the following terms with suitable example : 5
- (i) Circuit
 - (ii) Graph
 - (iii) Loop
 - (iv) Co-tree
 - (v) Planner and non-planner graph.

OR

- 2 (a) Explain KCL and KVL in brief. 5
- (b) Draw the graph of the network shown in fig 6. Write tie-set schedule, obtain the values of all the branch currents. 10

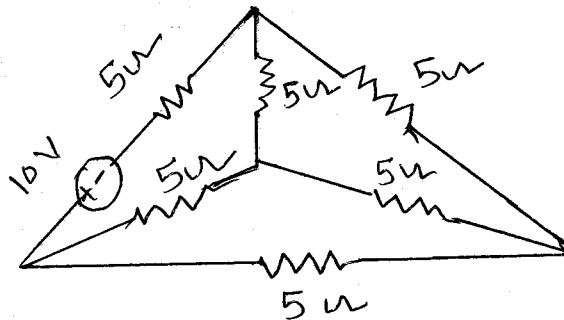
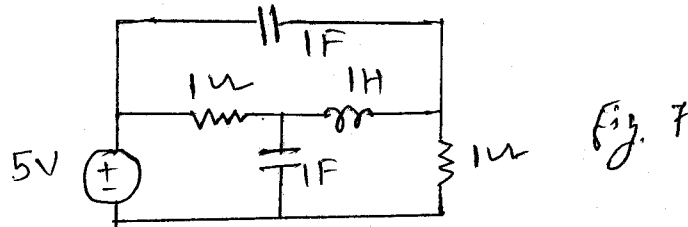


fig 6

3 Attempt any **three** :

15

- (i) Explain duality. Draw the dual of a given network. (fig 7).



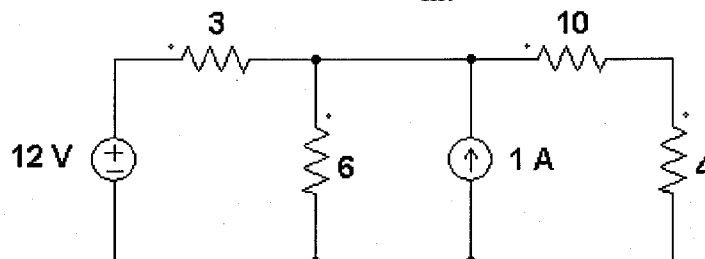
- (ii) Explain the types of sources of energy.
- (iii) For the mutually coupled coils, prove mutual inductance $M = K\sqrt{(L_1L_2)}$, where K is coupling coefficient and L_1 and L_2 are the self inductances of the coils.
- (iv) State and explain reciprocity theorem.
- (v) Explain quality factor in brief.

SECTION - II

4 (a) Attempt all : (Each question carries equal marks.)

10

- (i) Define laplace transform.
- (ii) State and explain Thevenin's theorem with suitable example.
- (iii) (a) Laplace transformation of e^{-t} is _____
 (b) Laplace transformation of $\sin(\omega t)$ is _____
- (iv) For given network, find R_{int} .



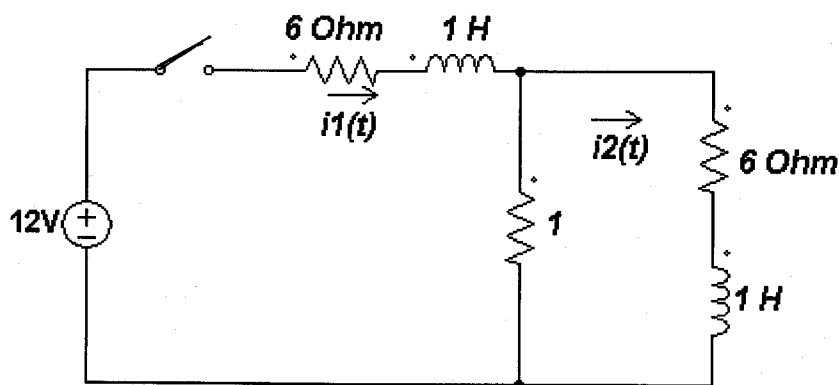
- (v) Find the final value of $f(t)$ using final value theorem.

$$F(s) = \frac{3(s+1)}{s(s+2)(s+3)}$$

- (b) State and explain convolution integral. 5
 (c) Find inverse Laplace transformation of using partial fraction expansion method. 5

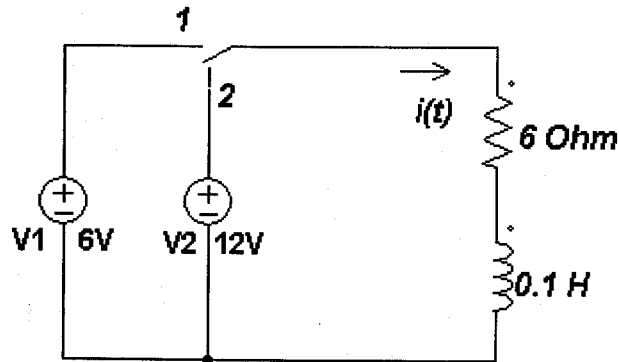
$$F(s) = \frac{s+5}{s(s^2+2s+5)}$$

- 5 (a) Write admittance function for a series RLC circuit. 7
 Sketch magnitude and phase plots for the above admittance function as a function of frequency and also explain it.
 (b) Using Laplace transform, find $i_2(t)$ at $t = 0+$ following closing at $t = 0$ of switch k . Assume initial conditions to be zero. 8



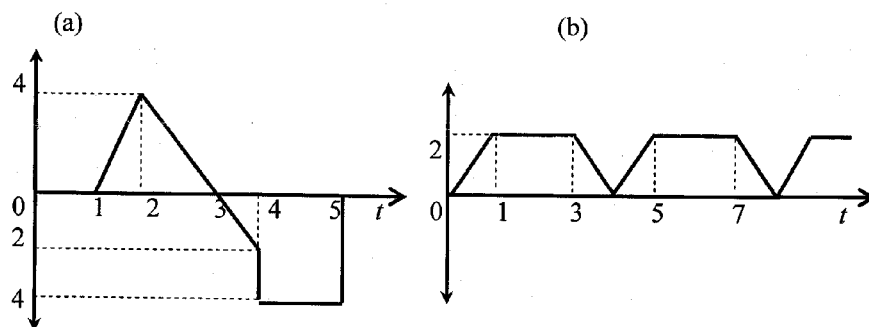
OR

- (b) Using Laplace transform, obtain the expression for the current $i(t)$ when the switch is moved from position 1 to position 2 at $t = 0$. 8

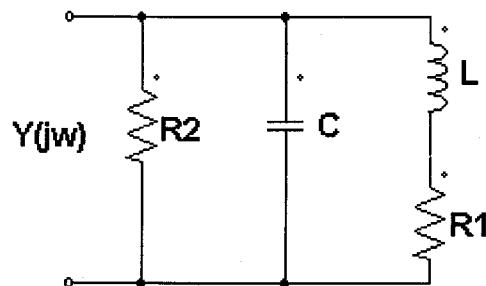


6 Attempt any **three** : 15

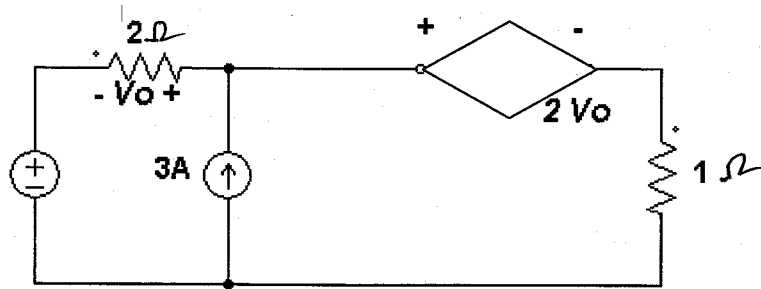
- (i) Find the Laplace transform of following waveform.



- (ii) Determine the convolution integral when $f_1 = e^{-2t}$ and $f_2 = 2t$.
- (iii) Draw the polar plot of the following circuit.



- (iv) Find the power loss in 1 ohm resistor using Thevenin's theorem.



- (v) Using Norton's theorem, find current through 2 ohm resistor.

