17/4 AN

F 3086 (Pages : 6) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Electronics and Communication / Applied Electronics and Instrumentation / Electronics and Instrumentation Engineering

NETWORK THEORY (L A S)

(Prior to 2010 Admissions—Old Scheme)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Two inductively coupled coils have self inductance $L_1 = 40$ mH and $L_2 = 180$ mH. If the Coefficient of coupling is 0.6, (a) find the value of mutual inductance between the coils, (ii) what is the maximum possible mutual inductance ?
2. Write a note on dependent and independent sources with help of neat sketches and practical examples for the sources.
3. State and explain Millman's theorem.
4. Explain the incidence matrix with an example graph.
5. Calculate the value of initial current in a series RL circuit with $R = 100\ \Omega$, $L = 8$ H with a battery supply of 10 V.
6. State and prove final value theorem of Laplace Transforms.
7. Briefly explain the open circuit impedance parameter and transmission parameter.
8. The z-parameters of a two port network is $\begin{bmatrix} 5 & 10 \\ 3 & 4 \end{bmatrix}$. Find its h-parameters.
9. List the properties of a positive real function. What is the significance of each ?
10. Compare the properties of Foster and caver forms of networks.

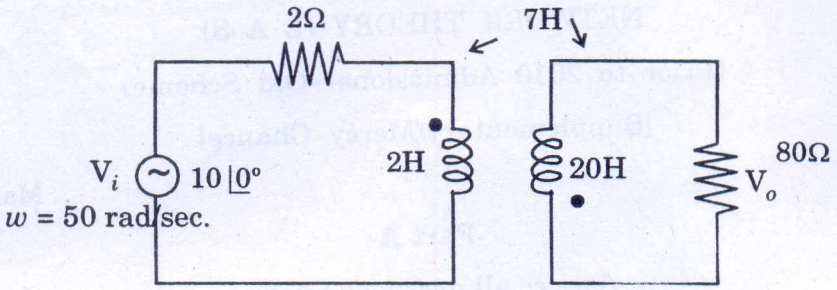
(10 × 4 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) For the circuit shown below, find the ratio of output voltage to the input voltage.

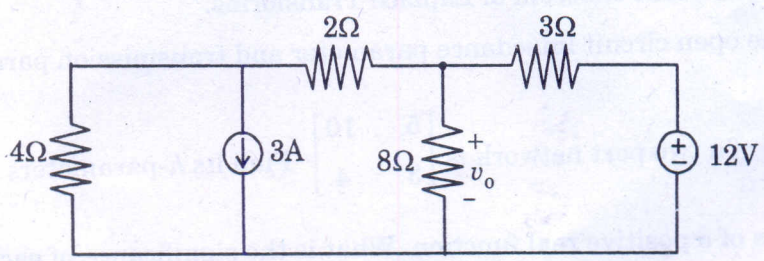


(b) The inductance matrix for the circuit of a three series connected coupled coils is given below. Calculate the inductances and indicate the dots for the coils.

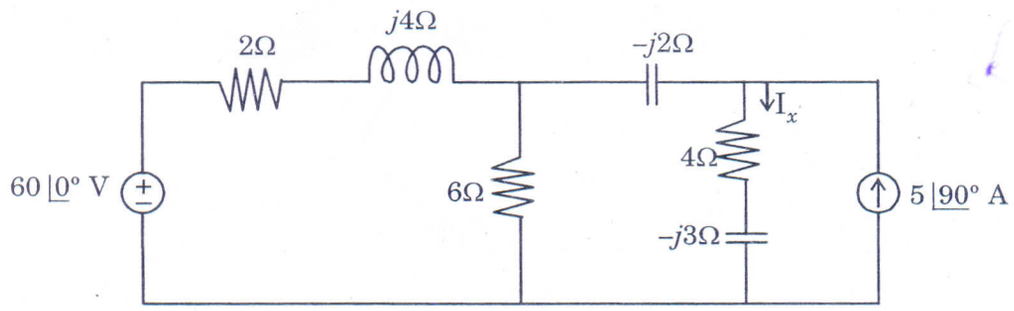
$$L = \begin{bmatrix} 6 & -2 & 1 \\ -1 & 3 & -5 \\ 1 & -6 & -6 \end{bmatrix}.$$

Or

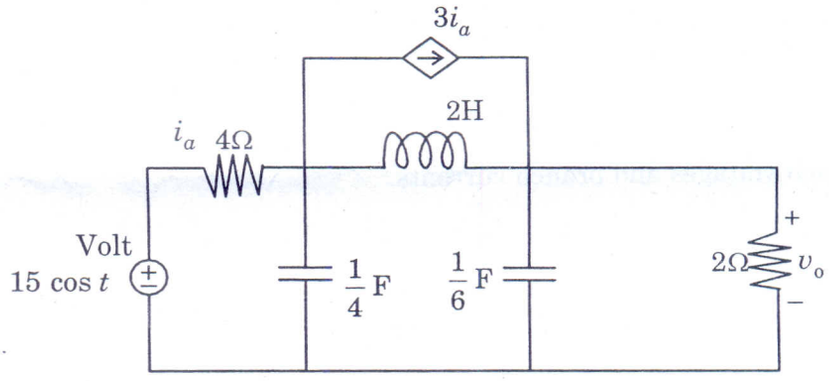
12. (a) For the following circuit, $v_0 = 3.2$ V. Find v_0 if both the independent sources are doubled ?



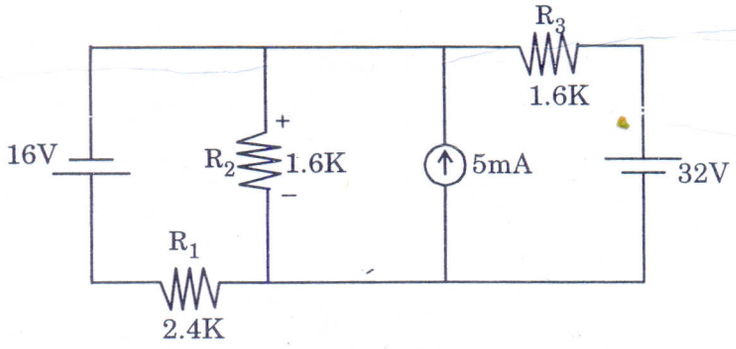
(b) Use the method of source transformations to find I_x in the following circuit :



13. (a) Using Thevenin's theorem, find v_o in the given circuit below :

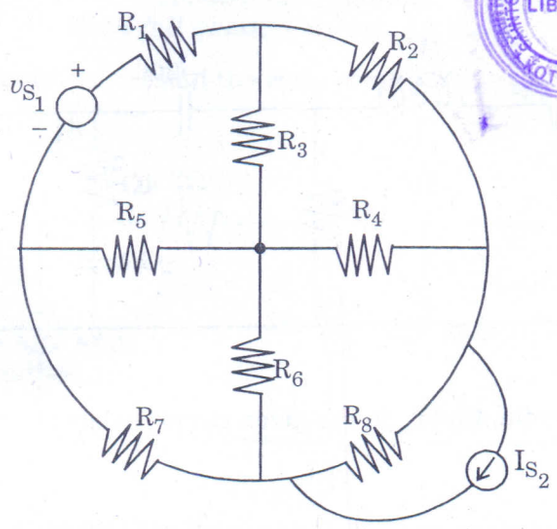


(b) Determine the voltage drop across R_2 of the circuit below using superposition theorem :



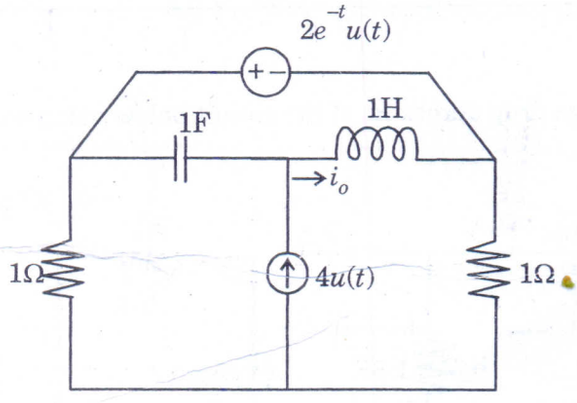
Or

14.



For the above network, draw the system graph. Select a tree and perform cut-set schedule. Also calculate all branch voltages and branch currents.

15. (a) Find $i_0(t)$ for $t > 0$ in the following network :



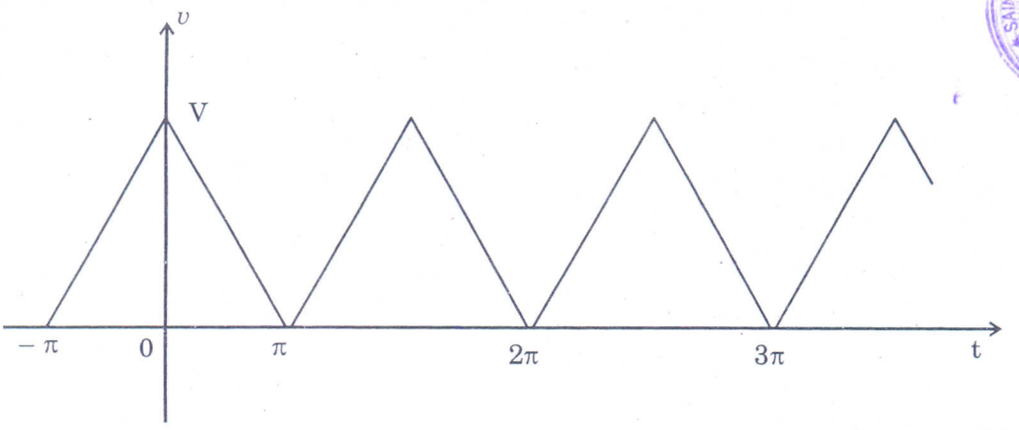
(b) Find the Laplace Transforms of the following signals :

(i) Sin (wt) u (t) ; and (ii) cos (wt) u (t).

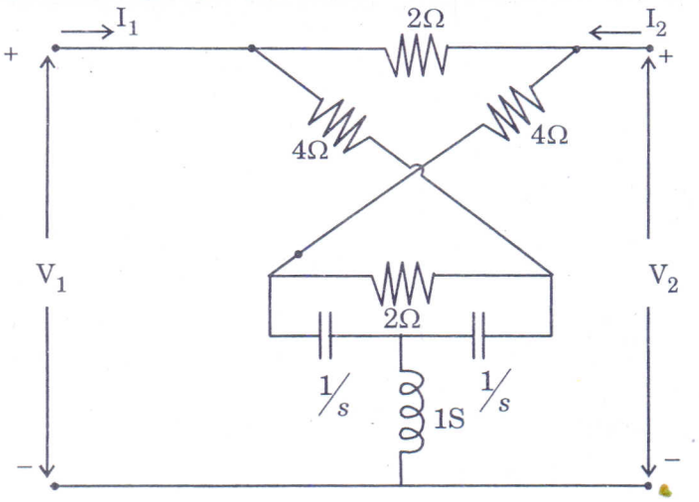
Or

16. (a) Derive the Fourier series for the exponential form. Write the equations for evaluating the coefficients.

(b) Find the Fourier series representation for the triangular wave shown below :



17. Find the z-parameters of the circuit shown below :—



Or

18. (a) Realise a constant k low-pass filter to cut-off at 1.1 kHz with a terminating resistance of 600 Ω. Draw the circuit.

(b) Show that the mid-frequency is the geometric mean between the lower and upper cut-off frequencies for a band-pass filter.

19. (a) Test for positive real function property of :

$$\frac{s^3 + 10s^2 + 30s + 16}{s^2 + 7s + 10}.$$

(b) Test whether the polynomial $s^7 + s^5 + s^3 + s$ is Hurwitz ?

Or

20. (a) Determine the condition for $N(s) = \frac{s^2 + \alpha s + \beta}{s^2 + \gamma s + \delta}$ to be positive real functions, when α, β, γ and δ are real constants.

(b) Realise the RC driving point impedance $N(s) = \frac{s^2 + 7s + 10}{s^2 + 4s + 3}$ in Foster II form.

(5 × 12 = 60 marks)