Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-III (ELECTRICAL)
CBCS (NEW) REGULAR EXAMINATION NOV-DEC 2015
2EE301: CIRCUIT ANALYSIS

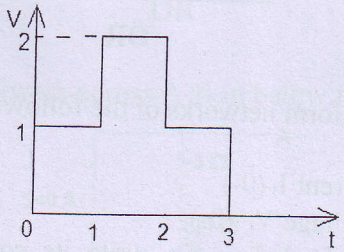
Time: 3 Hours **Total Marks:-60**

Instructions: - (1) This Question paper has two sections. Attempt each section in separate answer
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

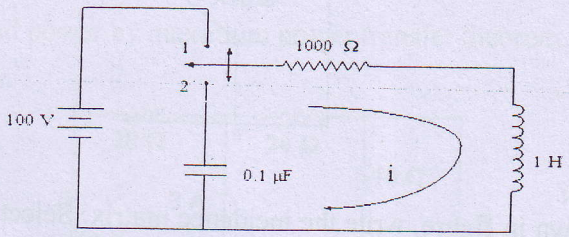
SECTION-I

Q:1

(A) For the waveform shown in below figure, write its equation and determine its Laplace transform. **[05]**



(B) In the network of below figure, the switch K is changed from position 1 to 2 at t = 0. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at t = 0+. **[05]**

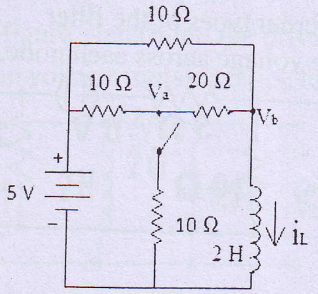


OR

Q:1

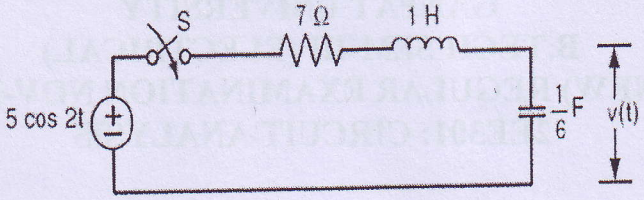
(A) Statement: initial value and final value theorem. **[04]**

(B) In the network shown in figure below, a steady state is reached with switch k open. At t=0, the switch is closed. Determine the values of $V_a(0-)$, $V_a(0+)$, $V_b(0-)$ and $V_b(0+)$. **[06]**

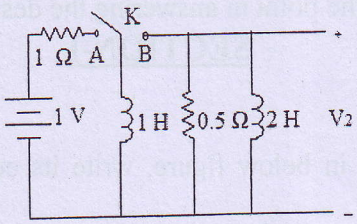


Q:2

(A) In the network shown, find the voltage v(t) for t>0 through Laplace transform. [05]



(B) In the network of below fig, the switch K is in position A for a long period of a time. At t = 0, the switch is moved from A to B. Obtain particular solution for V2 (t) using differential equation method. [05]

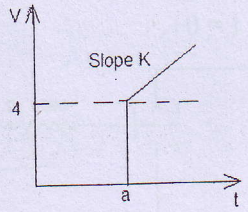


OR

Q:2

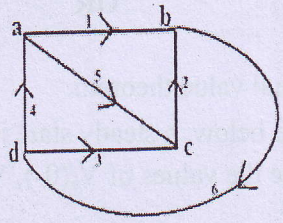
(A) Draw and Explain the transform networks of the following elements [05]
(a)Resistance
(b) inductor with initial current $I_L(0-)$
(c) capacitor with initial voltage V_C (0-)

(B) For the waveform shown in below fig, write its equation and determine its Laplace transform. [05]



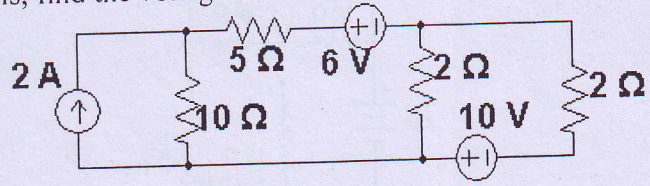
Q:3 **Attempt any two:** [10]

(A) For the graph shown in figure, write the incidence matrix. Select [1, 2, 3] as tree and write the tie-set and cut-set matrices.



(B) What is a filter? Explain different types of the filter.

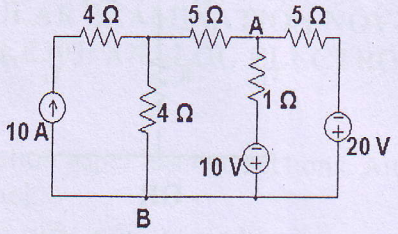
(C) Using node analysis, find the voltage across each node.



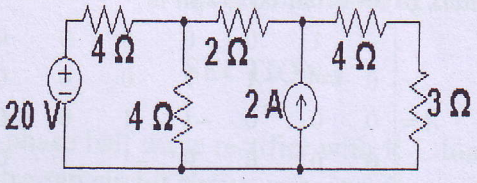
SECTION-II

Q:4

(A) Find the voltage between A and B of the circuit shown in Figure, by mesh analysis (KVL). **[05]**



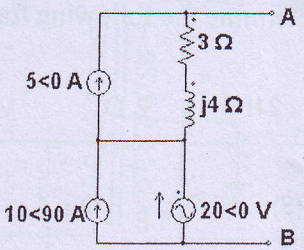
(B) Verify Tellegen's theorem for the given circuit. **[05]**



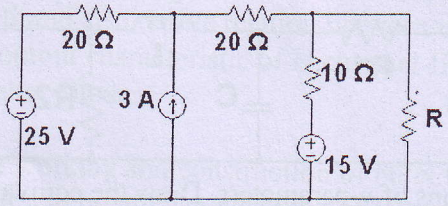
OR

Q:4

(A) Find the Norton's equivalent network across A-B in below figure. **[05]**



(B) Find Resistance 'R' and power by maximum power transfer theorem in the given circuit shown in below figure. **[05]**

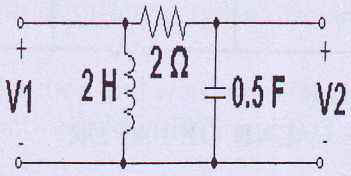


Q:5

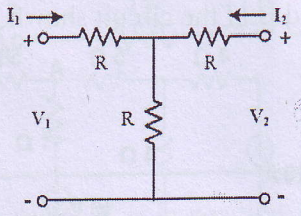
(A) Draw the pole zero diagram for the given network function, **[02]**

$$V(s) = \frac{3S}{(S+1)(S+3)}$$

(B) For the 2-port network shown in figure, determine the driving point impedance Z11(s), transfer impedance Z21(S) and the voltage transfer ratio (forward voltage gain) G21(S). **[05]**



(C) A 2-port network is shown in the figure. The parameter h21 for this network can be given by [03]



OR

Q:5

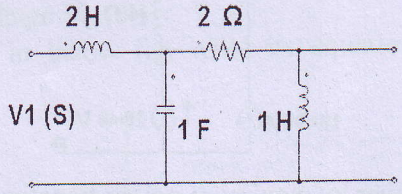
(A) A reduced incidence matrix of an oriented graph is [05]

$$A=\begin{bmatrix} -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 1 & 0 \\ 0 & 0 & -1 & 0 & 0 & -1 & 1 \end{bmatrix}$$

(i) Draw the graph (ii) Calculate the number of possible trees.

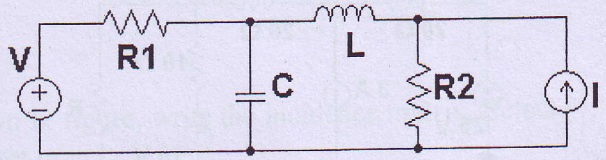
(iii) Write the tie-set matrix (iv) Write the cut-set matrix

(B) For the network shown in fig., determine the following transfer functions G21(S), Y21(S) and α21(S). [05]



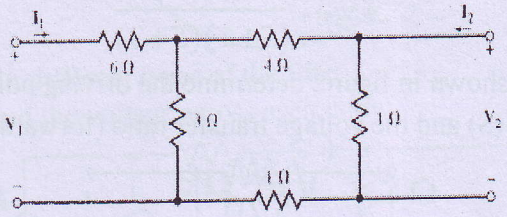
Q:6 **Attempt any two:** [10]

(A) What is duality? Draw the dual network for the given network.



(B) Write the defining equations of y-parameters. Draw the equivalent circuit and find the conditions for reciprocity & symmetry.

(C) Find ABCD (Transmission) parameters for a given network for the network given in figure.



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