EC-304 **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM III) ODD SEMESTER EXAMINATION2015-16
NETWORK ANALYSIS AND SYNTHESIS

[Time: 3 hrs.] **[Max. Marks: 100]**

Note- ***Attempt All Questions. All Questions carry equal marks*:-**

1. Attempt any four of the following: **(5 x 4= 20)**

a) Show that the derivative of a parabolicfunction is a ramp function and derivative oframp function is a step function.

b) With the help of mathematicalexpressions and characteristics curves, explain unit step, impulse and ramp signals used to analyses the network.

c) Define the concept of Complex Frequency.

d) Define the following terms:
   i. Network analysis.
   ii. Network synthesis.
   iii. Complex frequency.

e) Synthesize the waveform as sown in **figure 1**in terms of unit and ramp functions.

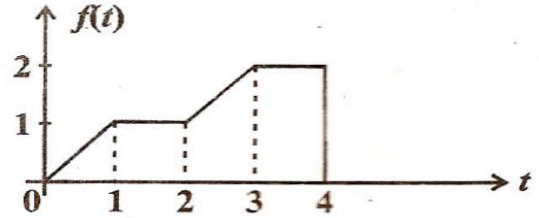

Fig. 1

f) For the network shown in **figure 2**the switch is closed at t=0. If the current in L and voltage across C are 0 for t<0 find i(0+), $\frac{di(0+)}{dt}$ and $\frac{d^2i(0+)}{dt^2}$.

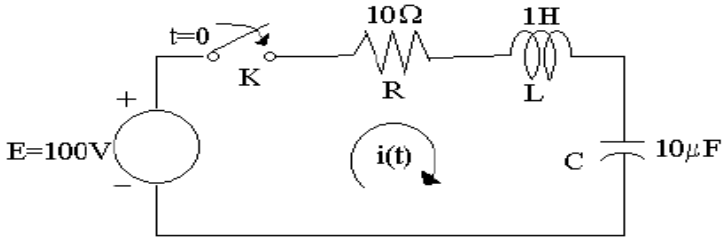

Fig. 2

2. Attempt any four of the following: **(5 x 4= 20)**

a) Determine the Laplace Transform of the following waveform shown in **figure 3**:

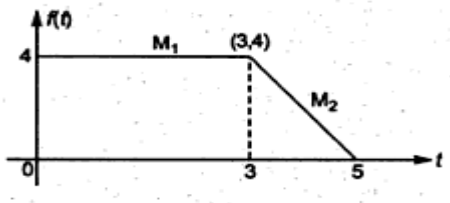

Fig. 3

b) Find current in 4Ω resistance of **figure 4**. Using Thevenin Theorem.

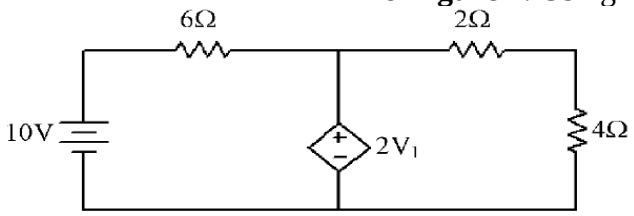

Fig. 4

c) Represent Y-Parameter in terms of h-parameter.

d) Find the Inverse Laplace transform of

$$X(s) = \frac{S}{(S+1)((S+2)^2+1)}$$

e) Determine the Y-parameters of the network shown in **figure 5**:

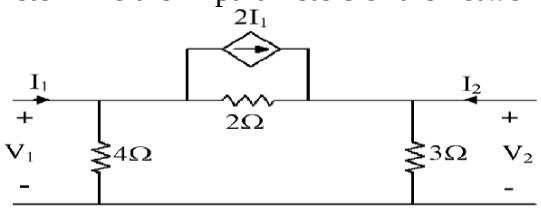

Fig. 5

f) Prove that in a parallel-parallel interconnected two networks with admittance matrix $[Y_A]$ and $[Y_B]$ respectively, the overall Y-matrix is given as $[Y]=[Y_A]+[Y_B]$.

3. Attempt any two of the following: (10 x 2= 20)

a) Check the Positive Realness of the function given and give the properties of Positive Real Function with an example : F(s) = $\frac{(s+1)(s+4)}{(s+2)(s+3)}$

b) Check whether the polynomial is Hurwitz or not and give its properties:
$P(s) = s^7+2s^6+2s^5+s^4+4s^3+8s^2+8s+4$

c) The driving point impedance of a one port LC network is given by Z(s) = $\frac{8(s^2+4)(s^2+25)}{s(s^2+16)}$

Obtain the First and Second Foster form of equivalent networks.

4. Attempt any two of the following: (10 x 2= 20)

a) Explain the term "Zero of transmission". Realize the network function with 1Ω termination

$$Y_{21}(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)}$$

b) Enlist the properties of Transfer Function of the network. Obtain the Zero of Transmission of the function $Z(s) = \frac{(s+1)(s+4)}{(s+2)(s+3)}$

c) Find the Transfer Function of the network shown in **figure 6**also sketch pole-zero configuration of the network:

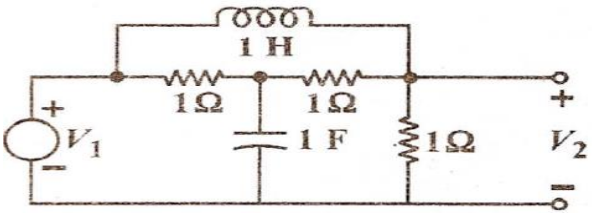

Fig. 6

5. Attempt any two of the following: **(10 x 2= 20)**

a) Draw the circuit of non-inverting Differentiator and Integrator using one ideal op-amp and determine its transfer function.

b) Determine the value of V_O for the circuit shown in **figure 7**:

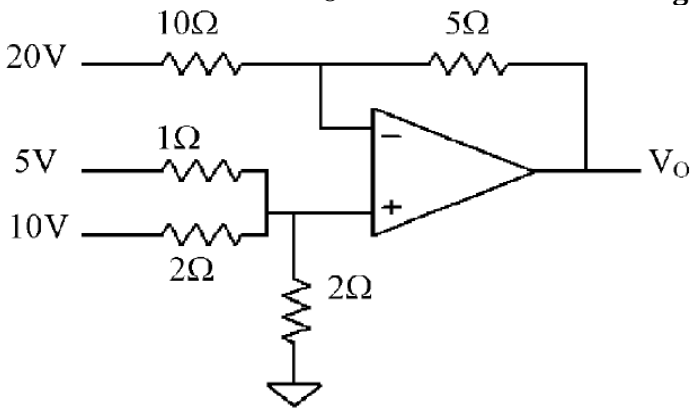

Fig. 7

c) Explain Voltage Controlled Current Source and Current Controlled Voltage Source in terms of Inverting and Non-inverting Amplifier.