T.E. II C.B.G.S.
Electronics SS
29/05/15

QP Code : 3313

(3 Hours) **[Total Marks : 80**

N.B. : (1) Questions **No.1** is **compulsory**.
(2) Attempt any **three** questions from the remaining questions.
(3) Solve **every** question in an **order**.

1. (a) Prove convolution property of Fourier Transform. **20**
(b) State and prove final value Theorem of Laplace Transform.
(c) Prove shifting property of Z transform.
(d) Determine energy and/or power of following signals.

(i) $x(n) = \left(\frac{3}{5}\right)^n u(n) - (4)^n u(-n-1)$

(ii) $x(t) = 4e^{-2t} u(t)$

2. (a) Obtain output $y(t) = x(t) * h(t)$ using graphical convolution. **10**

$x(t) = 1+t$ for $-1 \le t \le 0$

$= 1-t$ for $0 \le t \le 1$

$h(t) = 1$ for $0 \le t \le 2$

$= 0$ elsewhere

(b) Obtain h (n) for all possible ROC conditions. Also plot the ROC comment on causality and stability at the system. **10**

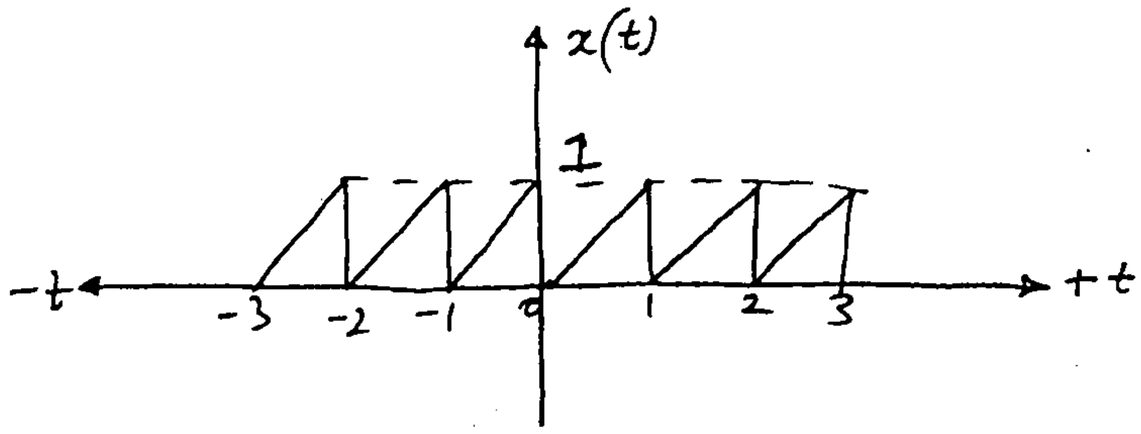
$$H(z) = \frac{4z(z^2-8z+9)}{(z-\frac{1}{3})(z-3)(z+4)}$$

3. (a) A C.T. LTI system has **8**

$$\frac{d^2y(t)}{dt^2} + \frac{5dy(t)}{dt} + 6y(t) = \frac{7dx(t)}{dt} - 3x(t)$$

(i) Determine Transfer function.
(ii) Obtain impulse response.
(iii) Obtain unit Ramp response.

(b) Plot the magnitude and phase spectrum of the periodic signal. Shown below. **8**



TURN OVER

(c) Obtain initial and final value 4

$$\text{if } X(z) = \frac{3z^2}{4z^2 - 5z + 1}$$

4. (a) If two subsystem are connected in cascade 8

$h_1(n) = (0.9)^n \; u(n) - 0.5(0.9)^{n-1} \; u(n-1)$

$h_2(n) = (0.5)^n \; u(n) - (0.5)^{n-1} \; u(n-1)$

Determine overall impulse response of the interconnected system.

(b) Obtain z transform of the following signal using properties of z transform. 6

$$x(n) = \left(\frac{3}{4}\right)^{n-1} \sin\left(\frac{\pi}{6} n\right) u(n)$$

(c) Prove Parsevals theorem of Fourier series. 6

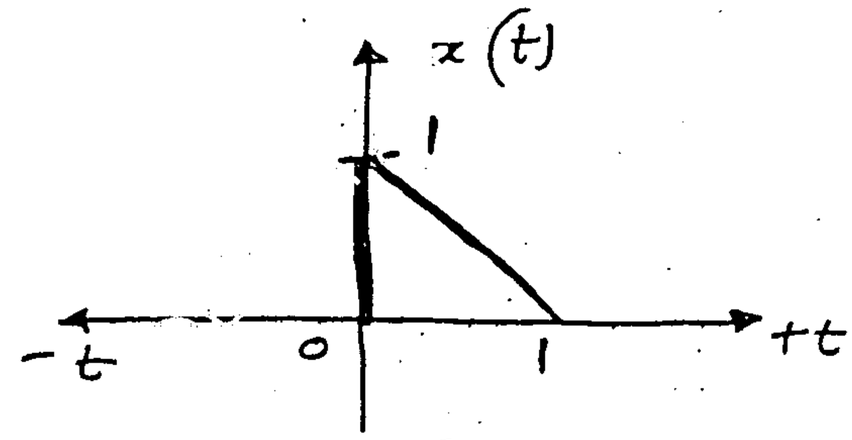
5. (a) Obtain circular convolution of 5

$x_1(n) = [3\ 2\ 1\ 4]$

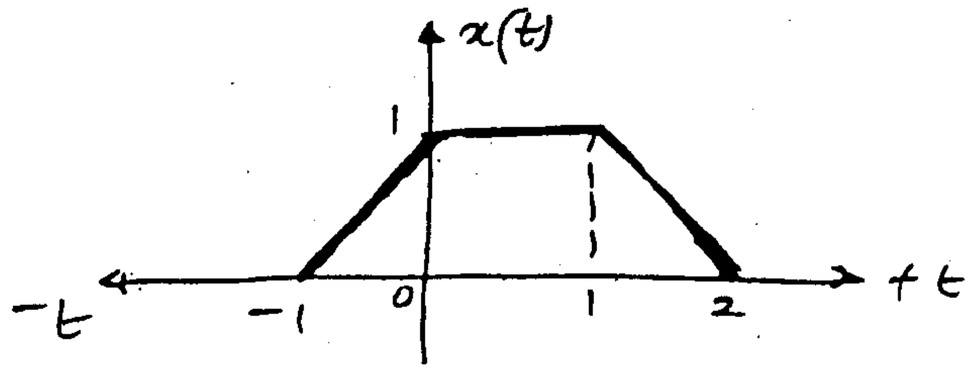
$x_2(n) = [5\ 7\ -8\ 2]$

(b) Obtain Laplace Transform of following waveforms using its properties. 5

(i)



(ii)



(c) Obtain zero input response, zero state response and total response of a D. T. L. T. I. system. 10

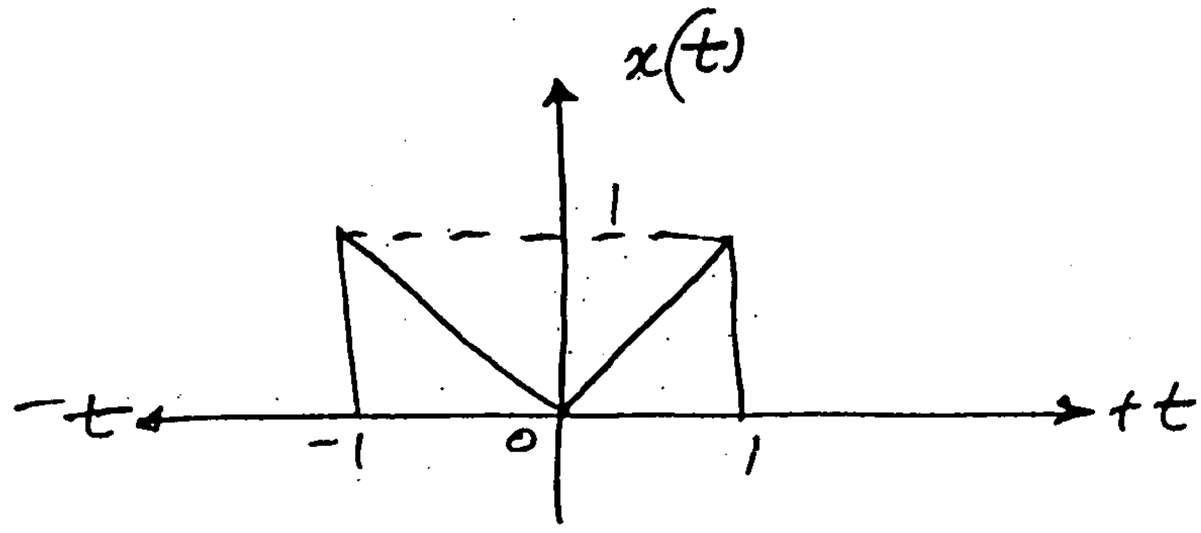
$$y(n) + 7y(n-1) + 12\,y(n-2) = 4\,x(n) - 11\,x(n-1)$$

If $y(-1) = 1 \quad y(-2) = 2 \quad x(-1) = 0.$

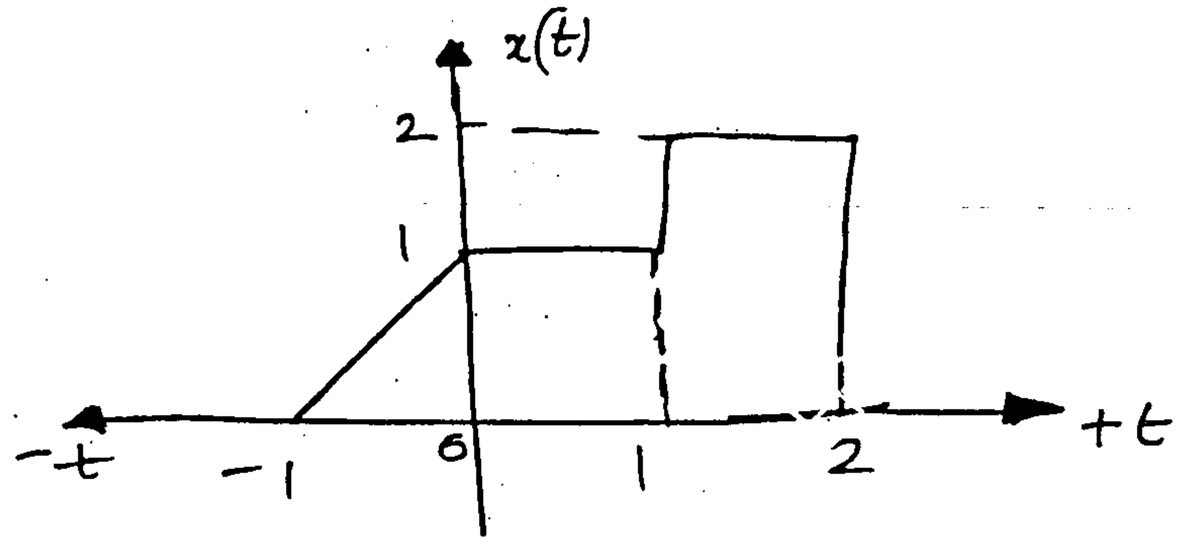
If input $x(n) = u(n)$ = unit step signal

TURN OVER

6. (a) Obtain Fourier transform of the following signal. 6



(b) Plot even and odd parts of following signals. 6



(c) Obtain h (t) for causal and stable system If 8

$$H(s) = \frac{s^2 - 3s + 11}{(s-1)(s+2)(s+3)}$$

Plot the ROC and pole's and zero's of the system.

T.E. Sem V (CBGS) · ETRX

OLIC

19/5/15

QP Code : 3306

(3 Hours) **[Total Marks : 80**

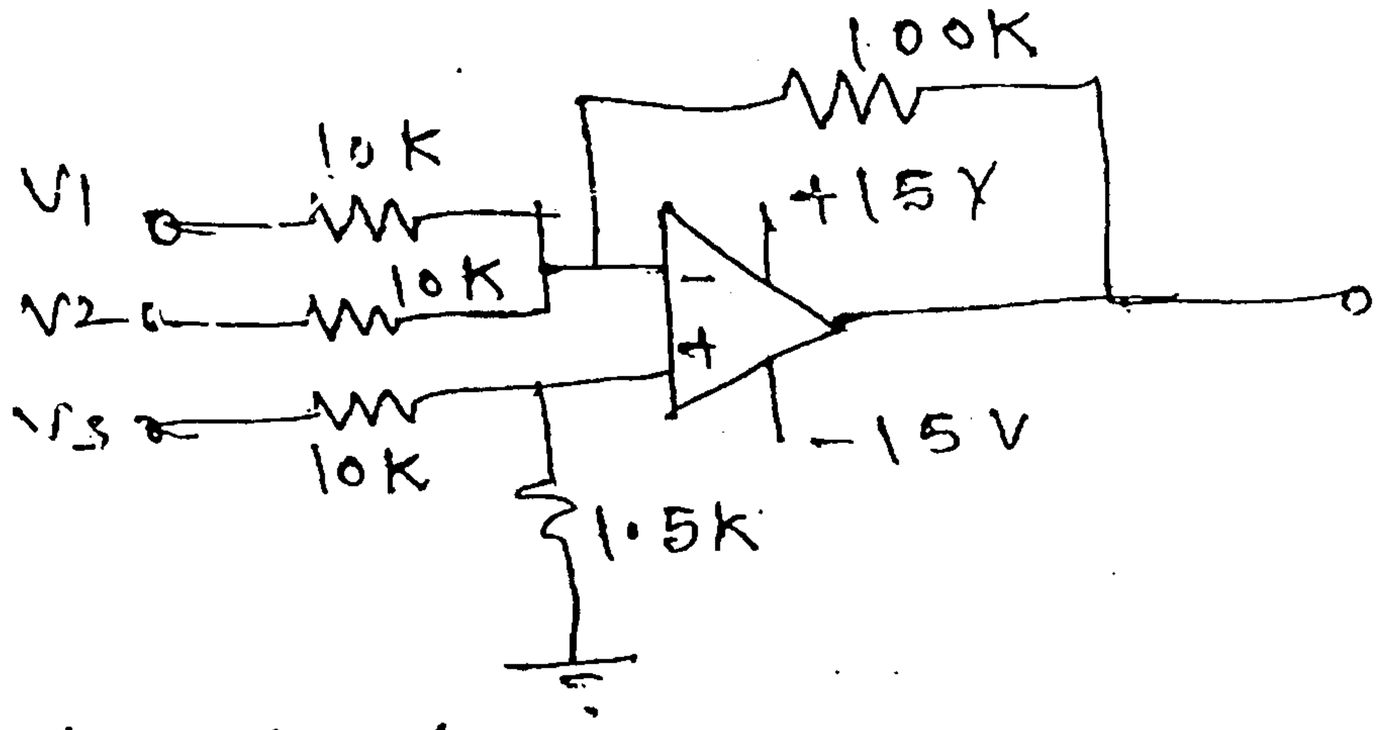
N.B. (1) Question No. **1** is **compulsory**.
(2) Solve any **three** questions from **remaining** questions.
(3) Assume **suitable** data if **necessary**.

1. Solve any **four** :–
   (a) What is the need of Input offset voltage compensation and how it can be achieved. **5**
   (b) Design RC phase shift oscillator to produce sinusoidal output of 5KHz. **5**
   (c) Design schmitt strigger circuit to achiev upper and lower threshold voltage as 1·5 volts. **5**
   (d) Explain Resolution, Accuracy and settling time with respect to DAC. **5**
   (e) Design a Flasher circuit using IC 555, in which lamp should remain on for 4 sec and off for 2 sec. **5**

2. (a) Derive closed loop parameters for Inverting opamp. **10**
   (b) Design a second order KRC low pass filter with a cut off frequency fo = 2KHz and Q = 5. **10**

3. (a) Design a triangular wave generator to get the ouput frequency of 1·5 KHz and $V_{o\,(p-p)} = 7·5V$ using IC 741. **10**
   (b) Explain counter type ADC with neat diagram. **10**

4. (a) Calculate output voltage for the given amplifier. **10**



$V_1 = 1.5V$
$V_2 = 3V$
$V_3 = 4V$

(b) (i) Prove that opamp can be used as current to voltage converter. 4
(ii) Compare normal rectifier with precision rectifier. 3
(iii) Define different parameters of PLL. 3

5. (a) Explain different comparators, state different applications and suggest modifications for practical comparator. 10
(b) What are different possible IC 723 based voltage regulators. Design voltage regulator to achieve $V_o = 12V$ and $I_o = 1$ Amp. 10

6. (a) Explain function of each block of PLL. 10
(b) Design voltage Regulator using IC LM317 for the given specifications. $V_o = 12 \pm 3$ volts and 1L = 100mA. 10
