| Seat No. | |
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Total No. of Pages : 3

# T.E. (E & TC) (Semester-V) (Revised) Examination, April-2018
## SIGNALS AND SYSTEMS
## Sub. Code : 66316

**Day and Date : Thursday, 26 - 04 - 2018** **Total Marks : 100**
**Time : 10.00 a.m. to 01.00 p.m.**

**Instructions :** 1) All questions are compulsory.
2) Figure to the right indicates full marks.

*Q1)* Solve any two **[16]**

a) Explain unit impulse, unit step, unit ramp and exponential signals.

b) Sketch the discrete signal $x(n) = \begin{cases} 1 & for \quad -1 \le n \le 2 \\ \frac{1}{2} & for \quad 3 \le n \le 5 \\ 0 & \quad elsewhere \end{cases}$

And evaluate Odd and Even Signals.

c) Sketch following signals

i) $x(t) = tu(t)$

ii) $x(t) = (t-1)u(t)$

iii) $x(t) = t.\ u(t-1)$

iv) $x(t) = (t-1)u(t-1)$

*Q2)* Solve any two **[18]**

a) Prove that any CT signal can be represented as a sum of shifted scaled unit impulse sequences. Also explain convolution integral.

b) Convolve the sequences x(n)={2,3,1,4} and h(n)={–1,2,3} using graphical method.

c) Check following systems for time variant or invariant

i) $y(n) = x(-n)$

ii) $y(t) = x^2(t)$

iii) $y(t) = x(t^2)$

iv) $y(n) = x(n).x(n-2)$

*Q3)* Solve <u>any Two</u> **[16]**

a) Explain sampling theorem in time domain.

b) Explain Interpolation techniques and Aliasing.

c) Explain reconstruction of signals from its samples.

*Q4)* Solve <u>any Two</u> **[16]**

a) Find Z-transform of following signals

i) $x[n] = a^n u[n]$

ii) $x[n] = \sin\,[n\omega T]u[n]$

b) Determine the DT sequence associated with Z.T. given below using P.F.E. method $x(z) = \dfrac{10z}{(z-1)(z-2)}$.

c) Explain properties of Z-transform in detail.

*Q5)* Solve <u>any Two</u> **[18]**

a) Find trigonometric Fourier series and Plot Fourier spectrum of time domain signal x(t) shown in figure. 1

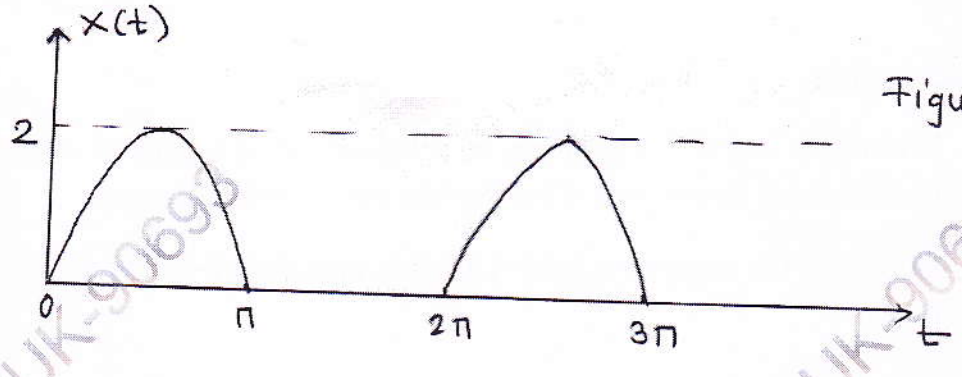


Figure.1

b) Explain properties of Fourier series in detail.

c) Compute the exponential Fourier series and plot the magnitude and phase spectrum time domain signal shown in figure.2.

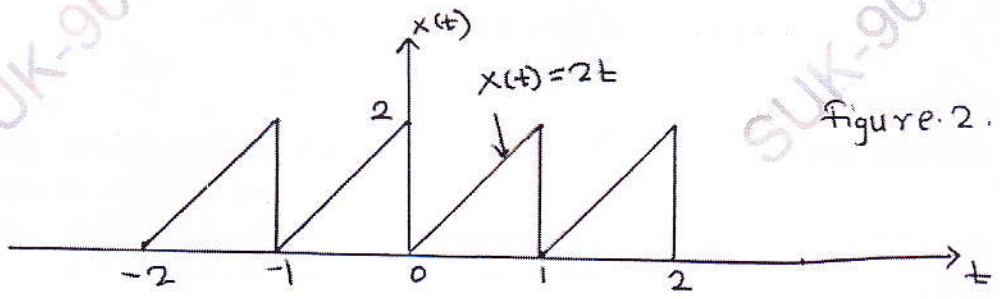


figure.2.

*Q6)* Solve any Two **[16]**

a) Find the continuous spectrum of a non periodic signal m(t) shown in figure.3.

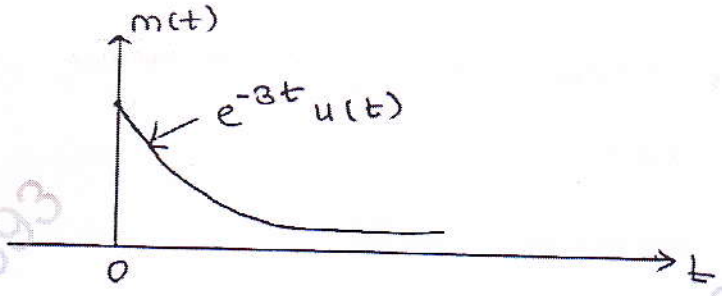


Figure.3.

b) Explain properties of Fourier transform in detail.

c) Find the F.T. of signal x(t) given in equation using frequency shifting property, $x(t) = \sin \omega_0 t$.

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