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THIRD SEMESTER

Roll No.  
B.Tech.[CE]  
FEB-2019

**SUPPLEMENTARY SEM EXAMINATION**

**EC 205 SIGNALS AND SYSTEMS**

Time: 3 Hours

Max. Marks: 40

Question ONE is compulsory ALL Questions  
Assume suitable missing data, if any

1. (a) Determine whether the signal  $x(n) = \sin(\frac{6\pi}{7}n + 1)$  is periodic  
State the reasons
- (b) Convolve the signals  $u(t - 1)$  and  $\delta(t - 1)$
- (c) Find the DTFT of sequence  $x[n] = e^{-n\omega T}u(n)$
- (d) Find the Z-transform and its associated ROC for the signal

$$x[n] = \{2, -1, 3, 0, 2\} \quad (2 \times 4 = 8)$$

2. (a) A system is characterized by the differential equation  
 $\frac{d^2}{dt^2}y(t) + 6\frac{d}{dt}y(t) + 8y(t) = \frac{d}{dt}x(t) + x(t)$  find the transfer  
function and the output signal  $y(t)$  for  $x(t) = \delta(t)$ . (6)
- (b) Classify different types of signals with examples (2)
3. (a) Determine the complex Fourier series of the waveform  $x(t)$   
shown in Fig.1. (4)

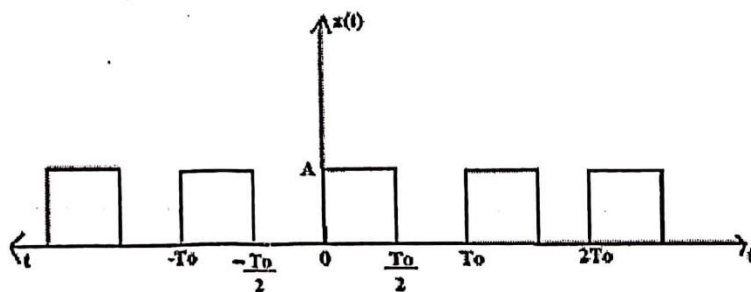


Fig.1.

- (b) Draw the magnitude and phase plot of the Fourier Transform of  
the signal  $x(t) = e^{-at}u(t)$  for  $a > 0$  (4)

P.T.O.

4. (a) The output of system  $y(t)$  is defined as  $y(t) = \frac{1}{2} \int_{-\infty}^t x(z) dz$

determine whether the system is Time invariance, Linearity, Causality and memoryless, where  $x(t)$  is input to the system. (4)

- (b) State and prove convolution property of Laplace Transform (4)

5. (a) The transfer function of a system is  $H(j\omega) = \frac{j\omega}{(j\omega)^2 + 3(j\omega) + 2}$

Find the system equation and the impulse response. (04)

- (b) Determine the Nyquist rate for the following signals (04)

(i)  $x(t) = 1 + \cos(200\pi t) + 4\sin(400\pi t)$

(ii)  $x(t) = 2 \cos(600\pi t) \cos(800\pi t)$

6. Write short notes on ANY TWO

(a) Relation between DTFT and Z-Transform

(b) Parseval's energy theorem

(c) Sampling theorem and aliasing (2x4=8)