Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5352]-131

S.E. (E&TC/Electronics) (First Semester) EXAMINATION, 2018

SIGNALS AND SYSTEMS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Use of non-programmable calculator is allowed.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

Q.1) A) Determine if the following systems described by y (t) = sin[x (t+2)] are
1. Static/Dynamic 2. Linear/Nonlinear 3. Time invariant/ Time variant
4. Causal/Non-causal [6]

B) Find the following linear convolution sum
If x (n) = {2, 3, 1, 4} h (n) = {– 1, 2, 3}
↑ ↑
And y (n) = x (n) * h (n) [3]

C) Determine whether the following LTI system described by impulse
Response h (t) = e^{-t}u (t+1) is stable and causal. [3]

OR

Q.2) A) Find the convolution Integral of following signal x (t) = u (t)
And h (t) = 1 for $-1 \leq t \leq 1$. [6]

P.T.O.

B) Find whether the following signal is energy or power. Find Appropriate value

$x(t) = 4\cos\left(\frac{\pi}{4}t\right)$ for $-\frac{1}{2} \le t \le \frac{1}{2}$ [6]

Q.3) A) State and prove the following properties of Laplace Transform.

i) Integration in time domain ii) Time shifting in time domain [6]

B) Find the Quadrature Fourier series for the given signal x (t) = $\sin\omega_0 t$. [6]

OR

Q.4) A) State conditions for the existence of Fourier Transform. Find fourier transform of the given signal y(t) = $e^{-at}u(t)$. [6]

B) Find the Laplace transform of the following signal with ROC:

1) x (t) =$e^{3t}u(t) + e^{-t}u(-t)$. 2) x (t) = $5e^{-3t}\sin(2t)$. [6]

Q.5) A) State and Describe the properties of Energy Spectral Density.(ESD) [6]

B) Calculate the ESD, total energy of a signal x(t)=Asinc(2Wt) [7]

OR

Q.6.A) State and Describe properties of cross-correlation of the CT energy signals. [6]

B) Find the auto correlation using basic autocorrelation equation of the following signals.
$x_1[n]=[4,3,2,1]$ $x_2[n]=u[n]$ [7]

Q.7.A) Explain probability distribution model of Binomial distribution. [3]

B) If A and B are two events such that p(A)=0.3, p(B)=0.4, $p(A \cap B)=0.2$
Find i) $p(A \cup B)$ ii) $p(\overline{A}/B)$ [4]

C) The probability that a student gets A grade, B grade, C grade, D grade and E grade in a course are 0.2, 0.3, 0.15, 0.25 and 1.0 respectively. What are the probabilities that he/she gets i)A,B or C grade ii) B,C or D grade.[6]

OR

Q.8) A) A certain random variable has the CDF given by: [6]

$F_X(x) = 0, \quad$ for $x \leq 0$

$= kx^2, \quad$ for $0 < x \leq 10$

$= 100k, \quad$ for $x > 10$.

1) Calculate the value of k.

2) Find the values of P ($x \leq 5$) and P ($5 < x \leq 7$).

3) Plot the corresponding PDF.

B) State the properties of probability density function. [3]

C) Find the mean and variance of uniform distribution function. [4]