BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)

B.Tech.Sem - V Robotics & Automation Engineering : WINTER- 2022

SUBJECT : ITC-III: SIGNALS & SYSTEMS

Day : Friday | Time : 02:30 PM-05:30 PM

Date : 16-12-2022 | W-24794-2022 | Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**
2) Figures to the right indicate **FULL** marks.
3) Use of non – programmable **CALCULATOR** is allowed.

Q.1 Distinguish between the following: **(10)**

i) Even & odd signals
ii) Periodic & Non periodic signals
iii) Continuous & discrete time signals
iv) Energy & power signals
v) Deterministic & Random signals

OR

Q.1 Perform the following operations on following sequence $x(n) = \{ 2, 3, 1, 2 \}$ & plot the resultant sequence. **(10)**

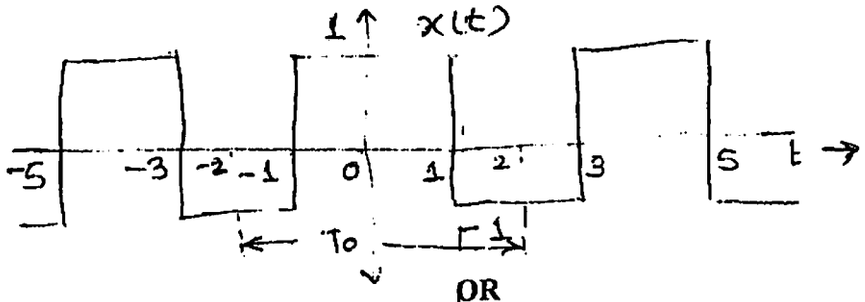
i) $x(n - 2)$
ii) $x(- n)$
iii) $x(n + 3)$
iv) $2\,x(n)$
v) $x(n) + x(n - 2)$

Q.2 Classify the systems according to their properties. Explain each type of system with suitable example. **(10)**

OR

Q.2 Determine the output response y(n) using graphical method for the input sequence $x(n) = \{ 1, 2, 3, 2 \}$ and impulse response $h(n) = \{ 1, 2, 2 \}$. **(10)**

Q.3 Find the exponential Fourier series for the following signal. **(10)**



OR

Q.3 a) Explain the conditions for the existence of Fourier series. **(05)**

b) What is the difference between Fourier transform & Laplace Transform? **(05)**

Q.4 a) What are the limitations of Fourier Transform? How are these overcome by Laplace Transform? **(05)**

b) Explain important applications of Laplace Transform. **(05)**

P.T.O.

OR

Q.4 Determine the inverse Laplace transform of the following function **(10)**

$$X(s) = \frac{1}{s^2 + 3s + 2}$$

ROC = -2 < Re(s) < -1

Q.5 Determine the z -Transform & ROC of **(10)**

i) $x(n) = \left(\frac{1}{2}\right)^n u(-n)$

ii) $x(n) = u(-n)$

OR

Q.5 Explain any five properties of z – Transform. **(10)**

Q.6 a) Define power spectral density (PSD). Explain the properties of power spectral density. **(06)**

b) Explain any two properties of autocorrelation. **(04)**

OR

Q.6 Compute autocorrelation of the following signal and plot the autocorrelation function. **(10)**

x (n) = { 2, 3, 1, 4 }
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