PARUL UNIVERSITY
Faculty of Engineering & Technology
B Tech Examination

Subject Name: Signals & System   Subject Code: 203105257

Branch/Semester: CSE/IT 4th Semester

[Date: 11/03/2021]   [Time: 10:00 to 11:30]   [Total Marks: 40]

Marks

Q.1   **(A) Multiple Choice Questions**   **05**

1. Average power of the energy signal is_____
   a) Zero   b) Infinite   c) positive   d) negative
2. The period of $x[n] = 2\ sin\ sin[2n]$
   a) 2   b) π c) 2π d) non-periodic
3. If the output of the system at any time depends only on presents and past inputs, that system is_____.
   a) Causal   b) static   c) Dynamic   d) Anti-causal
4. The following equation is known as which form of Fourier series?

$$x(t) = a_0 + 2\sum_{k=1}^{\infty} A'_k \cos \cos(k\omega_0 t + \theta_k)$$

   a) Normal form   b) Rectangular form
   c) Trigonometric form   d) polar form
5. Magnitude spectrum of real valued periodic signal is which function?
   a) Even function   b) Odd function
   c) Neither even nor odd   d) None of the above

(B) Each carries one mark.   **05**

1. Define invertible system.
2. Define Impulse response of continuous-time LTI system.
3. Define Deterministic and random signal.
4. Evaluate $\int_{-\infty}^{\infty} e^{-t}\delta(t-2)dt$.
5. Which operation in frequency domain is equal to multiplication in time domain?

Q.2   **Attempt any four(Short Questions)**   **12**
(1) Differentiate between energy and power signal.
(2) Check Linearity, Causality and invertibilty of the system $y(t) = x^2(t)$.
(3) Sketch and label carefully.
      a. $x[n]u[3-n]$
      b. $x[n-2]\delta[n-2]$

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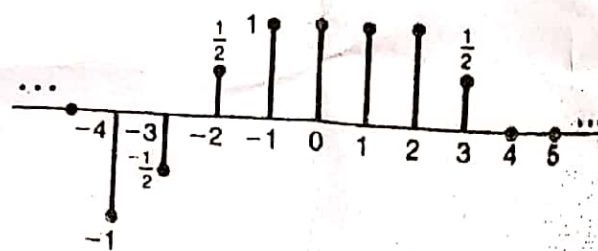Subject Name: Signals & System   Subject Code: 203105257
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(4) Consider a causal LTI system whose input $x[n]$ and output $y[n]$ are related by the difference equation $y[n] = \frac{1}{4}y[n-1] + x[n]$. Determine $y[n]$ if $x[n] = \delta[n-1]$.

(5) Write dirichlet conditions for existence of fourier transform.

Q.3   **Attempt any two**   08
(1) Explain Causality, invertibilty, stability and with or without memory properties for an LTI systems.
(2) Find the fourier transform of time signal. $x(t) = \{t; |t| < 10; |t| > 1$
(3) Find the inverse fourier transform $\delta(\omega)$.

Q.4   (A) Explain any five properties of continuous-time fourier series.(without   05
proof)

(B) Find the convolution $f(t)$ of two functions $f_1(t)$ and $f_2(t)$ which are   05
given as $f_1(t) = \{1; |t| \le 10; |t| > 1$ and $f_2(t) = \{1; |t| \le \frac{1}{2}0; |t| > \frac{1}{2}$

OR

(B) Find the trigonometric fourier series for the waveform shown in Figure.   05