

B. Tech Odd Semester Examination, February, 2023**Electronics & Communication Engineering**
(3rd Semester)Course No.: ECE-305
(Signals and Systems)*Full Marks: 50**Pass Marks: 25**Time: 2 hours*

- Note:**
1. Attempt any five questions.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the right margin indicate full marks for the question.
 6. All the mathematical symbols and abbreviations have their usual meanings.

1. Determine whether each of the following sequences are periodic or not. If periodic determine the fundamental period

a. $x(n) = \sin \frac{6\pi n}{7}$

b. $x(n) = \sin \frac{n}{8}$ 5+5

2. A system is characterized by

$$y(n) = x(n-1)$$

Determine whether the given system is

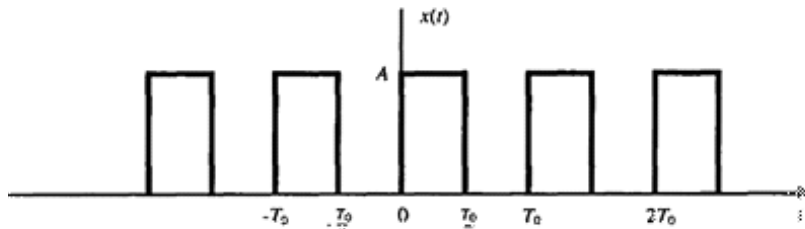
- a) Linear
- b) Stable

- c) Causal
- d) Memoryless
- e) Time invariant

Justify your answer also. 5*2

3. Consider the periodic square wave $x(t)$ shown in figure below

- a) Determine the complex exponential Fourier series of $x(t)$.
- b) Determine the Trigonometric Fourier series of $x(t)$. 5*2



4. Find the fourier transform of

a) $x(t) = A[u(t+a) - u(t-a)]$ for $a > 0$

b) $x(t) = \frac{1}{a + jt}$ 5*2

5. Find the convolution of the two discrete time signals which are given below $x(n) = \{1, 1, 2, 2\}$ and $h(n) = \{1, 2, 3, 4\}$.

- a) Do it graphically
- b) Verify the same using tabular method. 7+3

6. The output $y(t)$ of a continuous time LTI system is found to be $2e^{-3t}u(t)$ when input is $u(t)$.

- a. Find the impulse response $h(t)$ of the system.
- b. Find the output $y(t)$ when the input is

5+5

7. Determine the Nyquist rate corresponding to each of the following signals:

a. $x(t) = \sin^2(200\pi t)$

b. $x(n) = a^n u(-n-1)$ 5*2

8. Find the Z transform of the following

a. $x(n) = u(-n)$

b. $x(t) = 3\cos(50\pi t) + 10\sin(300\pi t) - \cos(100\pi t)$ 5+5

$e^{-t}u(t)$
