



BTECH
(SEM III) THEORY EXAMINATION 2023-24
BASIC SIGNALS & SYSTEMS

TIME: 3HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A**1. Attempt all questions in brief.**

Q no.	Question	Marks
a.	Define causal and non-causal system.	2
b.	What do you mean by complex exponential Fourier series coefficient (C_n).	2
c.	Differentiate Laplace transform and Z transform.	2
d.	Write the Laplace transform of system: $F(t) = u(t) + u(t+7)$	2
e.	What are the advantages of state model over transfer function.	2
f.	Determine the Z transform of signal $u[n]$.	2
g.	Write the properties of ROC for Z-transform?	2

SECTION B**2. Attempt any three of the following:**

a.	Explain different types of systems with examples in detail.	7
b.	Explain the condition for existence of Fourier transform and describe the properties of Fourier transform.	7
c.	Compute the transfer function of a system whose poles are at $-0.3 \pm j 0.5$ and a zero at -0.3 .	7
d.	Explain the state transition matrix with proof and also describe its properties.	7
e.	Determine the Z transform and ROC of signal $x[n] = a^n u[n]$	7

SECTION C**3. Attempt any one part of the following:**

a.	Observe the function graphically $x(t) = u(t) + 2u(t) + 3u(t-4) - u(t-5)$ (ii) $x(t) = r(t+1) - r(t) + r(t-2)$	7
b.	Explain the properties of convolution in details.	7

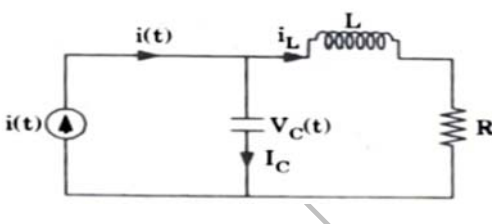
4. Attempt any one part of the following:

a.	Compute the Fourier transform of the signal $x(t) = e^{-at} u(t)$	7
b.	Explain different types of symmetry for Fourier series.	7

5. Attempt any one part of the following:

a.	Calculate the inverse Laplace transform of the following transfer function: $X(S) = \frac{s+3}{s(s+1)(s+2)}$	7
b.	For an LTI system with unit impulse response $h(t) = e^{-2t} u(t)$. Calculate the output to the input $x(t) = e^{-t} u(t)$.	7

6. Attempt any one part of the following:

a.	Examine the state model of the electrical circuit shown in Figure <div style="text-align: center;">  </div>	7
b.	Explain the transfer function and derive the expression for transfer function of a state model.	7

7. Attempt any one part of the following:

a.	A causal LTI system is described by the difference equation $Y[n] = y[n-1] + 2y[n-2] + x[n-1]$ Find the impulse response $h[n]$ for the given difference equation.	7
b.	Explain Initial value theorem with proof for Z transform.	7