International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Semester End Exam, Spring 2023

Course Code: **EEE 3501** Course Title: **Continuous Signals and Linear System**

Time: 2 hours 30 minutes Full Marks: 50

(i) The figures in the right-hand margin indicate full marks
(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs), Program Outcomes (POs) and Bloom's Levels (BL) of the Questions			
CO	**CO Statements**	**PO**	**BL**
CO1	Strengthen knowledge of about signal, system, properties of signal and system, and representation of system by means of differential equation.	**POa**	**C2**
CO2	Learn, analyze, and apply the important mathematical tools such as convolution, Fourier analysis, Laplace transformation for the analysis of the signals and systems of circuit applications.	**POb**	**C3**

Bloom's Levels (BL) of the Questions						
Letter Symbols	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

1. a) **Define** the convolution integral with example of two signals. And describe from the convolution result why is it an invaluable tool for the engineer? **CO2** **C5** **05**

1. b) **Evaluate** the convolution integral between h(t) and x(t) to get the system output y(t) = h(t)*x(t). **CO2** **C5** **05**

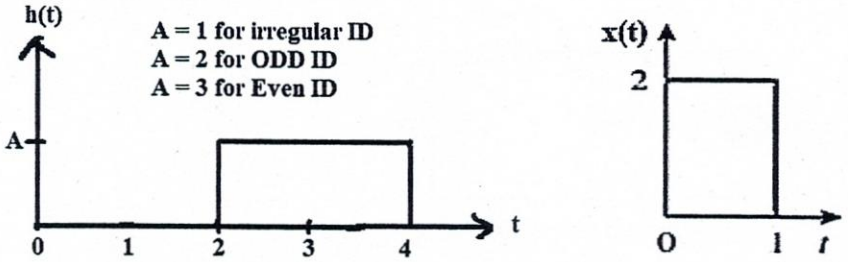

Fig.01: h(t) and x(t) for question 1(b).

Or

1. a) **Determine** the convolution of two signals in Fig.1. **CO2** **C5** **05**

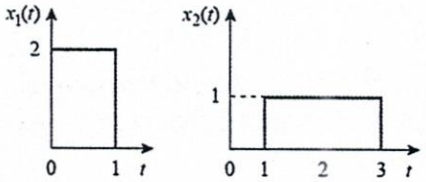

Fig.01: Two signals

1. b) **Determine** a state variable description for the discrete system shown in Fig.2. **CO2** **C5** **05**

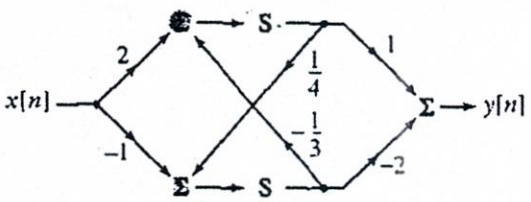

Fig.02: A discrete system

2. a) **Formulate** the Fourier Series of the given signal. **CO2 C6 05**

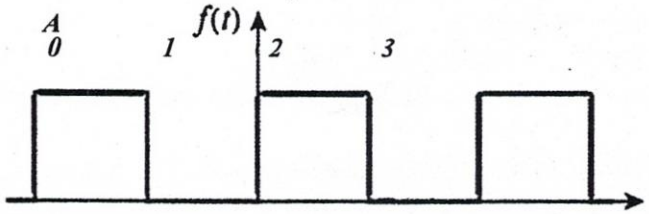

Fig.03: A signal for question 2(a). Consider A=2.

2. b) **Determine** the Frequency Spectrum of the given signal. **CO2 C5 05**

Part B

[Answer the questions from the followings]

3. a) **Determine** the output of the system using Fourier Transform for **CO2 C5 05**

$$v_i(t) = 2e^{-5t}\,u(t)$$

(ID last digit + 1) Ω

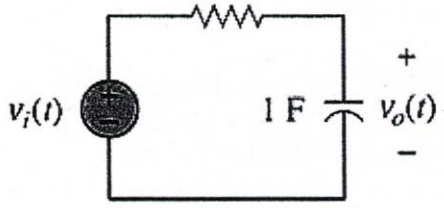

Fig. 04: System for question 3(a)

3. b) Among the phasor, Fourier Series, and Fourier Transform, which one will you select for doing circuit analysis and why? **Explain** briefly. **CO2 C5 05**

4. a) **What** are the significances of Laplace Transformation? CO2 C3 05

4. b) **Determine** the output and transfer function of the system using Laplace transformation. CO2 C5 05

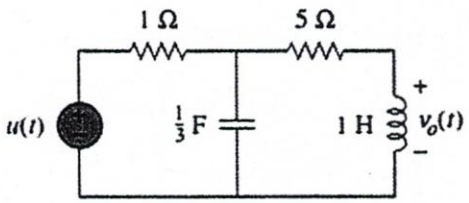

Fig.05: System for question 4(a)

Or

4. a) **Compute** the Laplace transform of sin(wt). **CO2 C3** 05

4. b) **Use** the Laplace transform to **solve** the system differential equation with zero initial conditions. **CO2 C5** 05

$$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 8y(t) = 2$$

5. a) If a 10MHz carrier is modulated by a 5KHz intelligent signal, determine the frequencies of three components of AM signal that results. Also draw the frequency spectrum of the AM signal. **CO2 C5** 05

5. b) **Differentiate** between TDM and FDM with signal example. Also, from the example explain network stability. **CO2 C6** 05