

International Islamic University Chittagong (IIUC)
Dept. of Electronic and Telecommunications Engineering
Final Examination

Program: B.Sc (Engg.)
Course Code: ETE 2325/2305
Full Marks: 50

Semester: Autumn, 2018
Course Title: Signals and Linear Systems
Time: 2.5 Hours

[Answer any two questions from Part-A and any three questions from Part-B. The figures in the right margin indicate full marks]

Part A

- 1.(a) Explain the following terms :
- i) Parallel connection of the LTI systems
 - ii) Cascade connection of the LTI system
- 1.(b) What do you mean by difference equation? Show the equivalence representations of LTI system differential and difference equation.
- 2.(a) Point out the following terms:
- i) Zero input response
 - ii) Zero state response
- 2.(b) Determine the natural response of the system described by the equation,

$$\frac{d^2 y(t)}{dt^2} + 6 \frac{dy(t)}{dt} + 5y(t) = \frac{dx(t)}{dt} + 4x(t) ;$$

$$y(0) = 1; \quad \left. \frac{dy(t)}{dt} \right|_{t=0} = -2$$

3. Determine the Fourier series representation of the following discrete time signals.

i) $x(n) = 2 \cos \sqrt{3} \pi n$

ii) $x(n) = 3 e^{\frac{j5\pi n}{2}}$

PART B

- 4.(a) Point out the Fourier transforms.
- (b) Construct the relationship between Fourier transform and Laplace transform.
- (c) Determine the Fourier transform of following continuous time domain signals

$$x(t) = e^{-at} \cos \Omega_0 t u(t)$$

5.(a) Determine the Fourier transform of the triangular pulse shown in the Fig.1

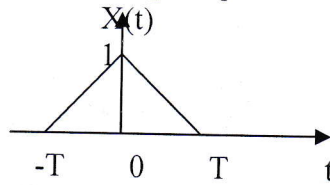


Fig.1

(b) Determine the Fourier transform of the rectangular pulse shown in the following Fig.2

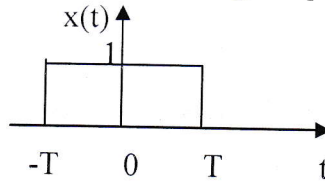


Fig.2

6.(a) Point out the Laplace transforms.

(b) Construct the Region of Convergence (ROC) for Laplace transformed signal considering the following cases:

- i) Right sided (causal) signal
- ii) Left sided (anti causal) signal
- iii) Two sided signal

(c) Construct the Laplace transform of the following continuous time signals and their ROC

- i) $x(t)=A u(t)$
- ii) $x(t)=e^{-4|t|}$

7.(a) Determine the Laplace transformation and ROC of the following signals

- i) $h(t)=\sin(2t)u(t)$
- ii) $h(t)=t\sin(2t)$

(b) Find the inverse Laplace transformation of the following transfer function $F(s)=(2s^2-16)/(s^3-16s)$