YMCAUST -MAY 2018	
B.Tech., IV SEMESTER	
Signals & Systems (EI-204-C)	
Time: 3 Hours	**Max. Marks: 75**
Instructions:	*1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.* *2. Answer any four questions from Part -B in detail.* *3. Different sub-parts of a question are to be attempted adjacent to each other.*

PART –A

Q1 (a) Define energy and power signals. (1.5)

(b) What is a stable system? (1.5)

(c) What is the necessary and sufficient condition on the impulse response for the stability of the discrete time system? (1.5)

(d) State the distributive property of convolution. (1.5)

(e) What are Dirichlet conditions? (1.5)

(f) State the differentiation property of Fourier transform. (1.5)

(g) Find the discrete time Fourier transform of $x(n) = \delta(n - n_0)$. (1.5)

(h) State the circular time shifting property of DFT. (1.5)

(i) What is the relation between Fourier transform and Laplace transform? (1.5)

(j) What is the region of convergence (ROC)? (1.5)

PART –B

Q2 (a) Give the detail classification of the discrete time systems. (8)

(b) Sketch the following signals.(1) $r(t)u(2-t)$ (2) $r(t) - 2r(t-1) + r(t-2)$, where $u(t)$ is step signal and $r(t)$ is ramp signal. (7)

Q3 (a) Find the natural response of the system described by the difference equation $y(n) - 1.5y(n-1) + 0.5y(n-2) = x(n)$; y(-1)=1 and y(-2)=0. (8)

(b) Determine the response of the system with impulse response $h(t) = u(t)$ for the input $x(t) = e^{-2t}u(t)$. (7)

Q4 Find the Fourier series for the following periodic signal $x(t) = t$ for $0 \le t \le 1$ and repeats every 1 second. (15)

Q5 (a) Find the Fourier transform of $x(t) = e^{-3t}[u(t+2) - u(t-3)]$. (8)

(b) State and prove the time shifting property of Fourier transform. (7)

Q6 (a) Find the Laplace transform of the signal $x(t) = e^{-3t}Sin(\omega_0 t)u(t)$. (8)

(b) Find the inverse Laplace transform of $X(s) = s/(s^2 + 5s + 6)$. (7)

Q7 (a) By means of DFT and IDFT, determine the sequence $x_3(n)$ corresponding to the circular convolution of the sequences $x_1(n)=\{2, 1, 2, 1\}$ and $x_2(n)=\{1, 2, 3, 4\}$. (15)

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