

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018**

**Course Code: EC202**

**Course Name: SIGNALS & SYSTEMS**

Max. Marks: 100

Duration: 3 Hours

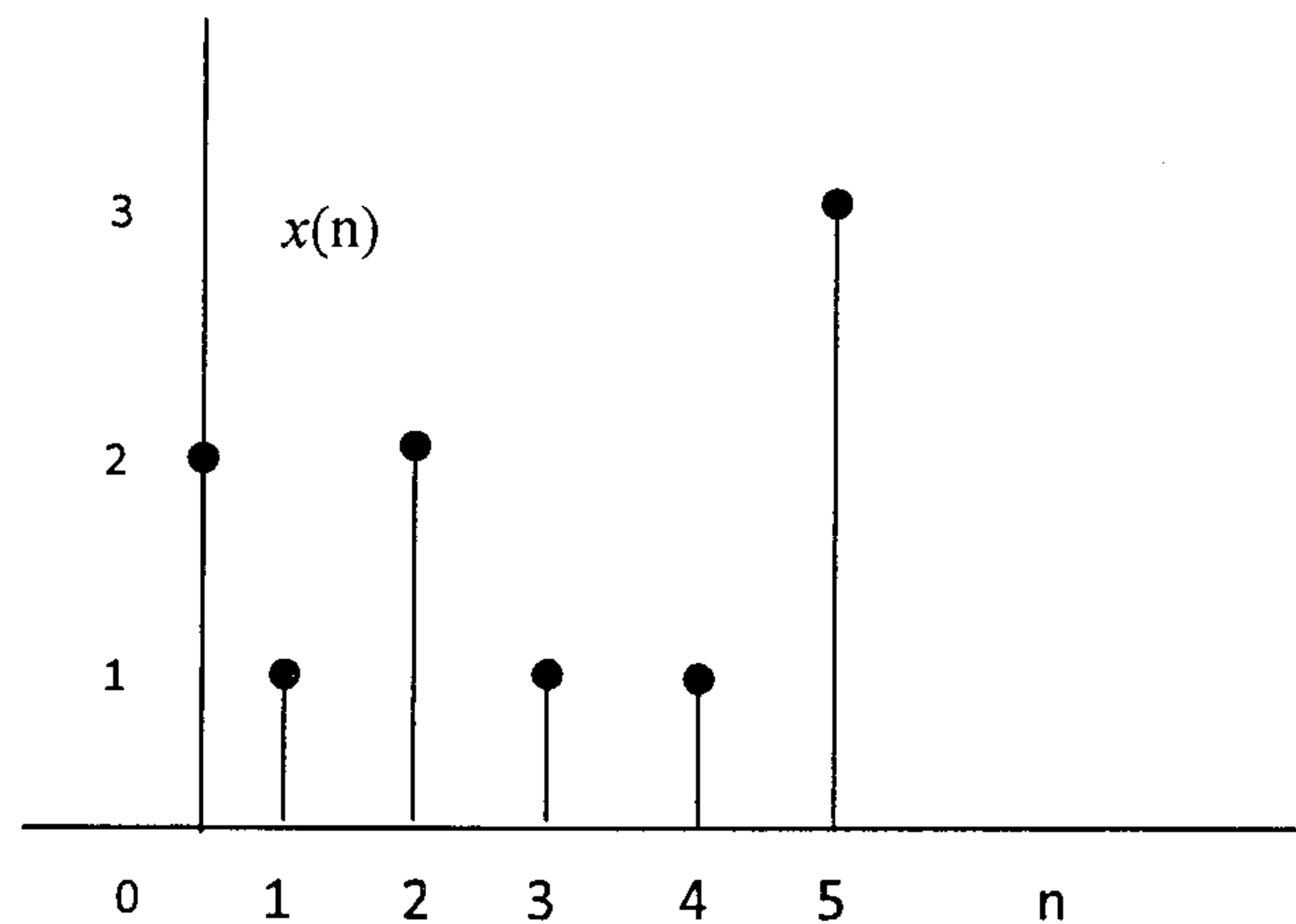
**PART A**

*Answer any two questions*

- 1 a) Observe the given signal and sketch the following: 2x3=6

(i)  $y(n) = 2x(-2n + 1)$

(ii)  $z(n) = -x\left(\frac{n}{2} - 2\right)$



- b) Compute the power and energy of the following signals and check whether they are power signals or energy signals 2x3=6

(i)  $x(n) = \left(\frac{1}{3}\right)^n u(n)$

(ii)  $y(t) = (1 + e^{-5t})u(t)$

- c) Define, sketch and list the properties of continuous time impulse function. 3

OR

- 2 a) Find the convolution of the given signals and sketch the result: 9



- b) Find the CTFT of the signal  $x(t) = te^{-at}u(t)$  using an appropriate property. 7  
State and prove the property used.
- 5 a) Find the response of a system with transfer function  $H(s) = \frac{1}{(s+1)(s+0.5)}$  5  
for unit step input.
- b) A causal LTI system is described by the relation 6  
$$\frac{d^2y(t)}{dt^2} + 6\frac{dy(t)}{dt} + 8y(t) = 2x(t)$$
  
Find the impulse response of the system applying Fourier Transform
- c) Obtain the transfer function of an ideal integrator in s domain. 4
- 6 a) Find the inverse Laplace transform of the following function: 5  
$$X(s) = \frac{3s^2 + 8s + 6}{(s+2)(s^2 + 2s + 1)}, Re(s) > -1$$
- b) Find the Fourier transform of unit step function 5
- c) State and prove Parseval's theorem for Fourier series. 5

### PART C

*Answer any two questions*

- 7 a) Show that Fourier transform of the signal 8  
$$x(n) = \sin\left(\frac{\pi n}{2}\right)u(n)$$
  
is given by  $X(e^{j\omega}) = \frac{e^{-j\omega}}{1+e^{-j2\omega}}$
- b) Find the z-transform and ROC of the following signals: 3  
(i)  $x(n) = a^{|n|}; |a| < 1$  5  
(ii)  $y(n) = \frac{1}{2}n^2\left(\frac{1}{3}\right)^{n-1}u(n-1)$  4
- c) Prove that convolution in time domain is equivalent to multiplication in Z 4  
domain
- 8 a) Determine the impulse response of the following system using Fourier 8  
Transform method:  $y(n) - \frac{1}{6}y(n-1) - \frac{1}{6}y(n-2) = x(n)$
- b) Plot the pole-zero diagram and assess the stability of the following system: 8  
$$y(n) = y(n-1) - 0.5y(n-2) + x(n) + x(n-1)$$
- c) Find the DTFT of the signal if z-transform is given by 4  
$$X(z) = \frac{z}{(z-0.2)(z+0.9)}$$



- 9 a) A discrete time LTI system is characterised by the impulse response 8

$h(n) = \left(\frac{1}{2}\right)^n u(n)$  Use Fourier transform to determine the response of the

system to the input  $x(n) = \left(\frac{3}{4}\right)^n u(n)$

- b) Determine the z-transform and plot the ROC of the signal starting from 8  
definition of z-transform

$$x(n) = a^n u(n) - b^n u(-n - 1)$$

- c) Establish the correspondence between s-plane and z-plane

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