microprocessor can access 2^{12} points which is 256
As we have 8 bit memory = 1 byte
1×256 = 256 bytes

Ans: 2^{256} p-

64bit
2.64KB.
128KBV

Department of Computer Systems Engineering,
University of Engineering and Technology, Peshawar,
Pakistan

Midterm Exam (Fall 2017)
Time: 2 Hours
Paper: CSE-304 Computer Organization and Architecture
Marks: 25

Note: Attempt all questions on answer sheet.

Question No. 1 (Marks=8):

The hypothetical machine is shown in Figure 1 also has two I/O instructions.

(a) Instruction format

2100

(b) Integer format

PUSH A
MOV SP
PUSH B
DEC SP
PUSH C
POP

Program counter (PC) = Address of instruction
Instruction register (IR) = Instruction being executed
Accumulator (AC) = Temporary storage

(c) Internal CPU registers

0001 = Load AC from memory
0010 = Store AC to memory
0101 = Add to AC from memory

(d) Partial list of opcodes

Figure 1: Characteristics of hypothetical Machine

1. 0011 Load AC from I/O
2. 0111 Store AC to I/O

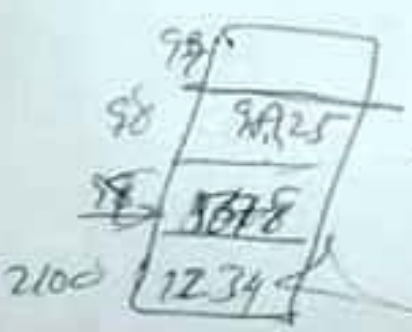
In these cases, the 12-bit address identifies a particular I/O device. Show the program execution (using the format of Figure 2) for the following program:

2097
2098
2099
2100
5678H
1234H

1. Load AC from device 5.
2. Add contents of memory location 940.
3. Store AC to memory location 941.
4. Store AC to device 6.

Assume that the next value retrieved from device 5 is 3 and that location 940 contains a value of 2.

SP = 2098
SP = 2100
SP = 20



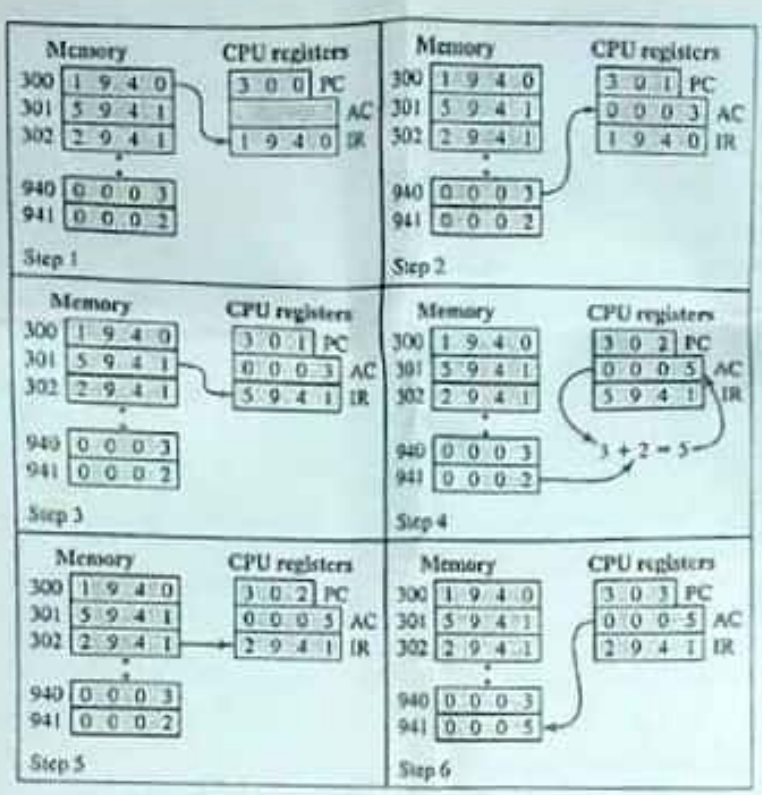


Figure 2: Example of program execution

Question No. 2 (Marks=6)

Consider a hypothetical microprocessor generating a 32-bit address and having a 32-bit data bus.

1. What is the maximum memory address space that the processor can access directly if it is connected to a "32-bit memory"?
2. What is the maximum memory address space that the processor can access directly if it is connected to an "16-bit memory"?

Question No. 3 (Marks=6)

Given x=0101 and y=1010 in twos complement notation (i.e. x=5, y=–6), compute the product $p=x \times y$ with Booth's algorithm.

Question No. 4 (Marks=5)

What is stack? How it works for the following program:

PUSH A
PUSH B
PUSH C
POP D

Status of registers:

SP=2100H; A=1234H; B=5678H; C=9A25H

Where;

SP(stack pointer), A, B, C, D are 16 bit-registers while each memory location is of 8-bit size.

Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, Pakistan

Subject:	**Engineering Economics**
Exam:	**Final Term**
Max Marks:	**50**
Time Allowed:	**2 Hrs**

DIRECTIONS:

1. *Be clear and precise in your answers. Do NOT include unnecessary details.*
2. *Do not forget drawing the cash flows where necessary.*
3. *Bring your own calculator, no exchange allowed*
4. *Annuity Tables or anything else found in possession would be tantamount to cheating.*

---

1. Find the current price of a ten-year bond paying ***9%*** per year (payable semi-annually) that is redeemable at par value, if bought by a purchaser to yield ***15%*** per year. The face value of the bond is ***$3000***.

2. A bond with a face value of ***$7000*** pays interest of ***5%*** annually. This bond will be redeemed at par value at the end of its ***15*** year life, and the first interest payment is due 1.5 year from now.

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Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, Pakistan

Subject:	**Engineering Economics**
Exam:	**Mid Term**
Max Marks:	**25**
Time Allowed:	**2 Hrs**

DIRECTIONS

1. *Be clear and precise in your answers. Do NOT include unnecessary details.*
2. *You are expected to have brought the Interest and Annuity Tables for Discrete Compounding along with calculator, and anything else found in possession would be tantamount to cheating.*
3. *No sharing of tables and calculators is allowed during exam.*

---

1. (a) What is the general Price-Demand relationship? Illustrate with graph.
   (b) Describe various types of costs.
   (c) Define the phases of life cycle and their relative cost. Illustrate with graph.

2. A company produces and sells a consumer product, and thus far has been able to control the volume of the product by varying the selling price. The company is seeking to maximize its net profit. It has been concluded that the relationship between price and demand, per month, is approximately $p = 280 - 0.05D$, Where p is the price per unit in dollars. The fixed cost is Rs.56,000 per month, and the variable cost is Rs.67 per unit. Obtain the answer to the following questions:

   (a) What is the optimal volume for this product?
   (b) What is the maximum profit/loss per month? Mention if profit or loss has occurred.
   (c) What are the breakeven sales quantities (range of profitable demand volume)?

3. Devise the Plan1-Plan4 for the given scenario:
   Repayment of Rs.35,000 in 7 years with interest rate 13%.

   Plan1: Pay in 7 equal End-of-Year Payments
   Plan2: Pay Interest and Principle in one payment at end of 7 years
   Plan3: Pay only interest due at End-of-Year and Principle at end of 7 years
   Plan4: Pay Rs 4000 as End-of-Year Payments

2) For the interconnection of LTI systems shown in Figure 2; (3+2 Marks)

a) Find the overall impulse response h[n] of the system

b) Find the response y[n] when the input signal x[n] is passed through the system.

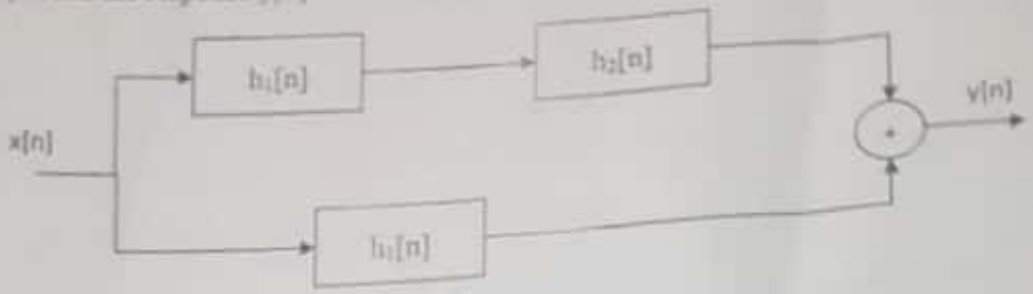

Figure 2

$h_1[n] = \{-1, 2, -1\}$, $h_2[n] = \{1, -2, 1\}$ and $x[n] = \{1, 2, 2\}$

3) Determine the direct form II realization for the LTI system described by the differenc equation, (2 Mark

$$y[n] = \frac{3}{4}x[n] - \frac{1}{2}x[n-2] - 3x[n-4] + 2y[n-2]$$

4) Write down the difference equation for the discrete-time system shown in Figure 3 below, (1 Mark

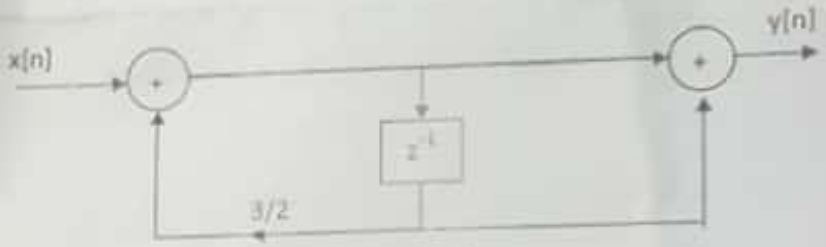

Figure 3

Question 3:

1) Determine the z-transform of the following signals using the properties of z-transform Mention the property used are every step (4 Mark

a) $x[n] = \left(\frac{1}{3}\right)^n (u[n-1] - u[n-5])$

b) $x[n] = n(\frac{1}{2})^{n-2}u[n-1]$

2) Find the causal signal x[n] if its z-transform X(z) is given by; (3 Mark

$$X(z) = \frac{1}{1 - z^{-1} + \frac{1}{2}z^{-2}}$$

Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, Pakistan

Subject:	**Engineering Economics**
Exam:	**Mid Term**
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2) Use convolution integral to find the response y(t) when signal x(t) is passed through the LTI system with impulse response h(t). Where x(t) and h(t) are as given in Figure 2. **(4 Marks)**

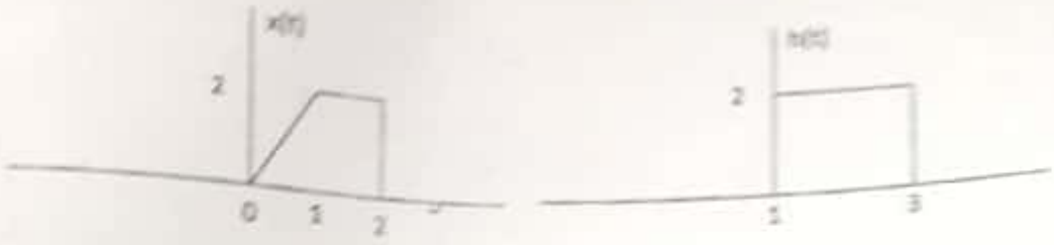
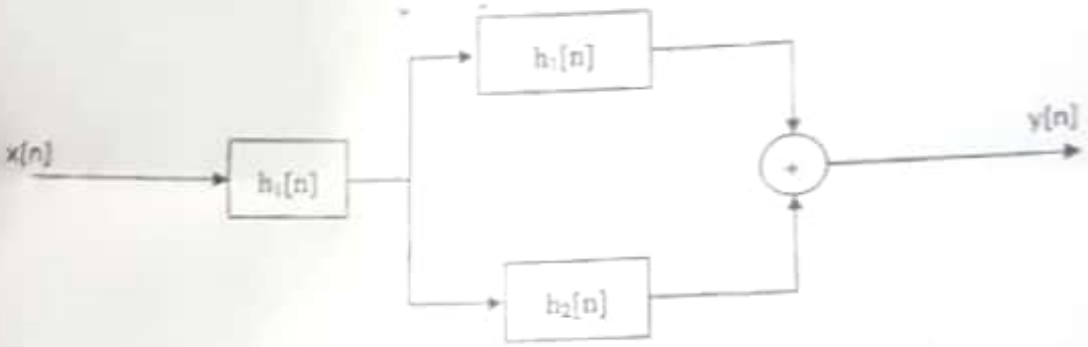


Figure 2

Question 3:

1) How can we find from the impulse response h(t) or h[n] of an LTI system if: **(2 Marks)**
   a) The system is memoryless or with memory.
   b) The system is causal.
   c) The system is stable.
2) Find the overall impulse response h[n] for the interconnection of LTI systems shown in Figure 3. **(3 Marks)**



$h_1[n] = \{1,1,1\}$, $h_2[n] = \{1,2,2\}$,

3) Draw the block diagram of the following difference and differential equations. **(3 Marks)**

$$y[n] - \frac{3}{4}y[n-1] = \frac{1}{2}x[n] - \frac{2}{3}x[n-1]$$

$$\frac{dy(t)}{dt} + \frac{1}{2}y(t) = 2x(t)$$

2) Express the signal x(n) shown in Figure 1, in terms of $\delta[n]$ and $u[n]$. Find the response y[n] if this signal x[n] is passed through the system with impulse response h[n] given bellow, **(1+3+1 Marks)**

$$h[n] = \begin{cases} 1, & -2 \le n \le 0 \\ 0, & otherwise \end{cases}$$

Is the system given by h[n] causal or non-causal system?

Question 3:

1) Find the equivalent system h[n] for the interconnection of systems shown in Figure 2. State the property of convolution used in each step. Also find the response y[n] when the signal x[n] is passed through this combination of systems. **(3+2 Marks)**

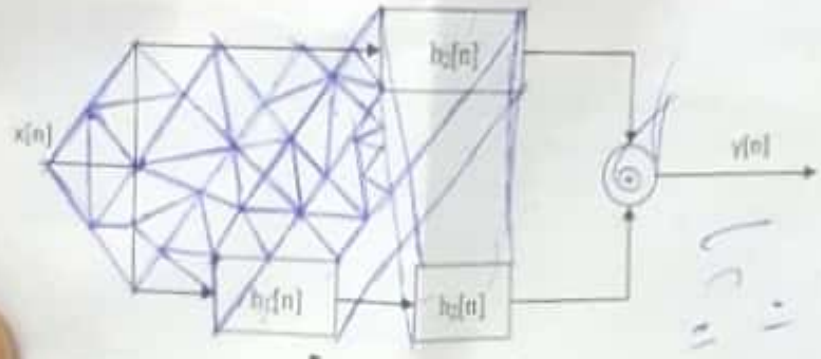


Figure 2

$h_1[n] = \{2, 1, 2\}$, $h_2[n] = \{1, 0, 2\}$ $x[n] = \{2, 1, 2\}$,

2) Find the natural solution of the system given by the following difference equation with given initial condition. **(2 Mark)**

$$y[n] - 3y[n-1] - 4y[n-2] = x[n] + 2x[n-1]$$

$$y[-1] = 5, y[-2] = 10$$

3) Write the difference equation for the filter shown in Figure 3. **(1 Mark)**

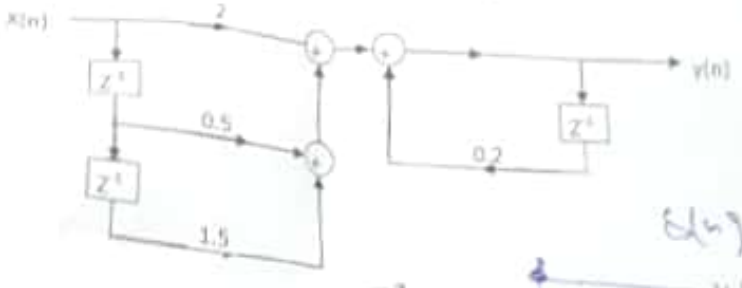


Figure 3

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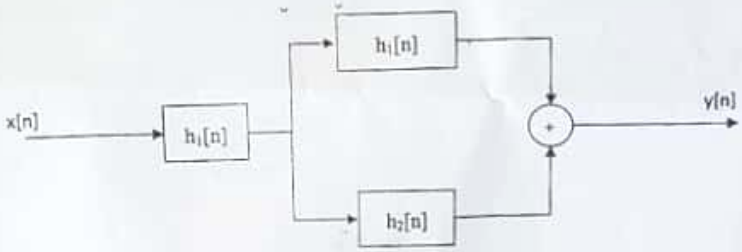

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$$\frac{dy(t)}{dt} + \frac{1}{2}y(t) = 2x(t)$$

Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Digital Signal Processing (5th Semester)
Exam: Mid Term (Fall 2016)
Max Marks: 25

Attempt All Questions. Time allowed 2 hours

Question1:

1) What is sampling of analog signals and how it can be made lossless? What happens if the condition of lossless sampling is not met? **(2+1 Marks)**

2) What is the Nyquist sampling rate for the signal x(t) given bellow? What will happen if the signal x(t) is sampled with a sampling frequency of Fs = 100Hz. Find the discrete time signals $x_1[n]$ and $x_2[n]$ obtained by using sampling frequency Fs = 100Hz and Fs = Nyquist rate, respectively. **(1+1+1 Marks)**

$$x(t) = 2\cos(100\pi t) + 3\cos(200\pi t) + 5\cos(300\pi t)$$

3) What is quantization error $e_q(t)$? How is it related to the quantization step size Δ in case of (a) rounding (b) truncation? How quantization step size is related to number of quantization levels and bit size b? **(1+1+1 Marks)**

Question 2:

1) For the discrete time signal x(n) shown in Figure 1, find and sketch **(3 Marks)**

a) $x(2n+1)$

b) $-2x(-2n-1)$

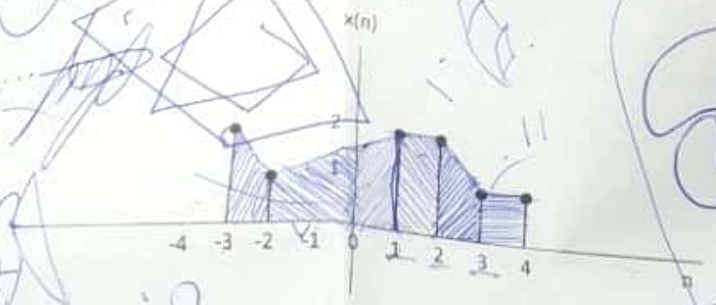

Figure 1

(P.T.O)

$\delta[n+3] + \delta[n+2] + 2\delta[n+1] + \delta[n-2] + \delta[n-3] + \delta[n-4]$

2) Express the signal x(n) shown in Figure 1, in terms of $\delta[n]$ and $u[n]$. Find the response y[n] if this signal x[n] is passed through the system with impulse response h[n] given bellow, **(1+3+1 Marks)**

$$h[n] = \begin{cases} 1, & -2 \le n \le 0 \\ 0, & otherwise \end{cases}$$

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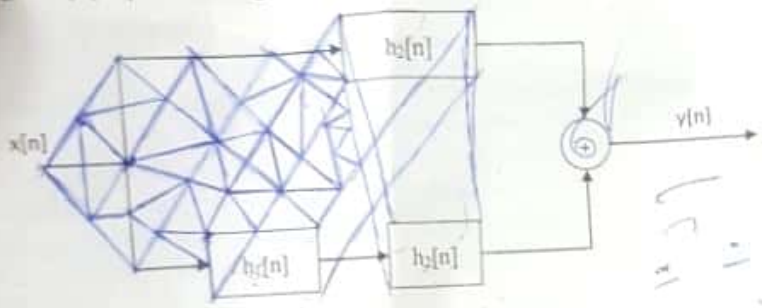

Figure 2

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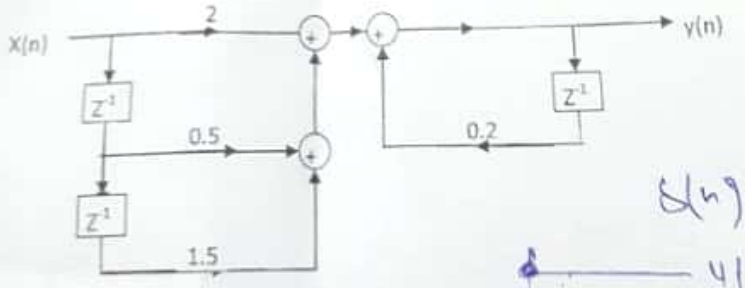

Figure 3

$\delta(n) \Rightarrow u(n)$

$\delta[n] = u(n) - u(n-1)$

$\delta(n-1) = u[n-1] - u[n-2]$

Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Digital Signal Processing (5th Semester)

Exam: Mid Term (Fall 2015)

Max Marks: 25

Attempt All Questions. **Time allowed : 2 hours**

Question1:

1) An analog signal with frequency F is sampled with a sampling frequency F_s. The frequency of the resultant discrete time signal is f. Derive the relation between F, F_s and f. Discuss how the sampling frequency F_s affects the frequency f of the discrete time signal. **(2 Marks)**

2) Consider an analog signal $x(t)=2\cos(50\pi t)$. **(3 Marks)**

a. What is the Nyquist sampling frequency for x(t)?

b. What is the frequency f of discrete signal x[n] obtained by sampling x(t) using a sampling frequency of $F_s=200$.

c. Sketch two periods of the signal x(t) along with the samples of x[n] obtained in (b).

Question 2:

1) **Consider the signal shown in Figure 1, determine and sketch** **(3 Marks)**

a. $x[3-n]$
b. $x[n^2]$
c. $2x[3n]$

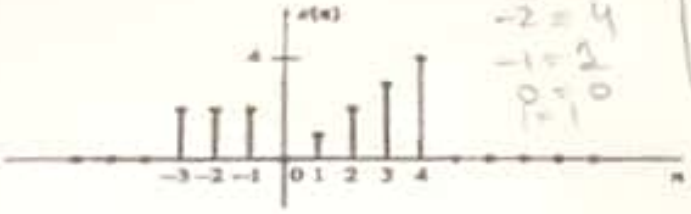

Figure 1

2) Find and sketch the even and odd components of the signal shown in Figure 2. **(3 Mark)**

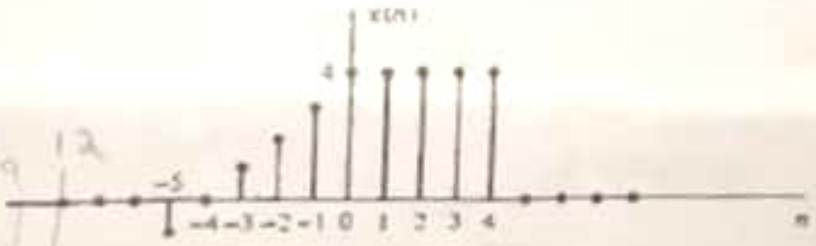

Figure 2

(P.T.O)

Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, Pakistan

Subject:	**Engineering Economics**
Exam:	**Final Term**
Max Marks:	**50**
Time Allowed:	**2 Hrs**

DIRECTIONS:

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Department of Computer Systems Engineering
University of Engineering & Technology
Peshawar, PAKISTAN

Subject: Digital Signal Processing

Exam: Mid Term (Summer 2017)

Max Marks: 25

Attempt All Questions. **Time allowed : 2 hours**

Question1:

1) What are periodic and aperiodic signals? Under which condition the discrete-time sinusoidal signals are periodic signals? **(1+1 Marks)**

2) Determine if the following discrete-time signals are periodic or aperiodic signals? Find the period if the signal is periodic signal. **(1+1 Marks)**

   a) $\cos\left(\frac{30\pi}{105}n\right)$ Periodic

   b) $\sin\left(\frac{2}{3}n\right)$ Aperiodic

(1+1+1 Marks)

3) Answer the following:

   i. What is sampling?
   ii. When sampling is lossless?
   iii. What happens if condition of lossless sampling is not fulfilled?

Question 2: **(3 Mark)**

1) For the discrete-time signal x[n] is given in Figure 1, find

   a) x[3-2n]
   b) Even part of x[n]

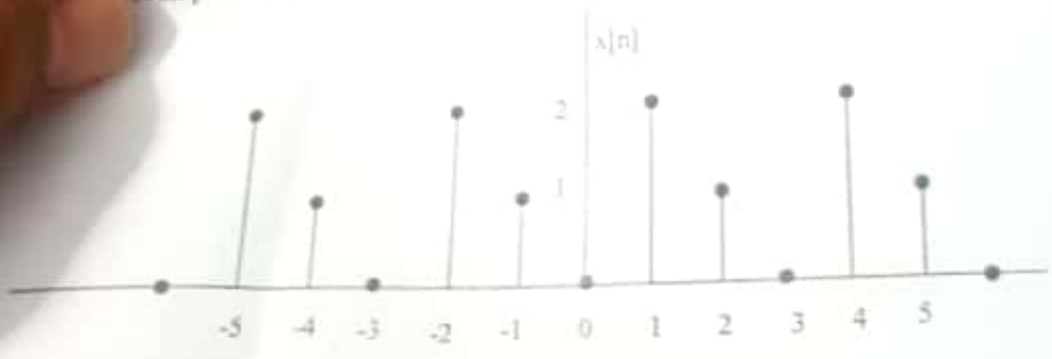

Figure 1