



**DAH-003-0498003**

Seat No. \_\_\_\_\_

**B. Sc. / M. Sc. (Applied Physics) (Sem. VIII)  
(CBCS) Examination**

**April - 2022**

**Paper - VII : Signal Processing & Communication**

**Faculty Code : 003**

**Subject Code : 0498003**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Numbers in the right margin indicate marks.

- 1** Attempt any **seven** short questions : (two marks each) **14**
- (1) Define Signal.
  - (2) What is meant by processing of signal ?
  - (3) Define System.
  - (4) "Every static system is always causal."  
- True or False ? Justify your answer.
  - (5) Define Modulation.
  - (6) "A periodic Signal can be considered as a signal with  
Time period infinite." True or False? Justify your  
answer.
  - (7) Write formula for autocorrelation.
  - (8) Why Phase Locked Loop (PLL) is used in FM  
demodulation ?
  - (9) Differentiate energy and power signals.
  - (10) What is meant by impulse response of system ?
- 2** (a) Write answers of any **two** : (five marks each) **10**
- (1) Explain how signals are classified ? Explain each  
category of signal in detail.
  - (2) Which are standard test signals ? Explain them  
with neat sketches.
  - (3) What is meant by transformation of independent  
variables in signal processing ?
  - (4) What is linear convolution ? Explain its formula.
- (b) Write answer of any **one** : **4**
- (1) Given  $x[n] = \{4,3,2,1\}$  plot the graph for
    - (a)  $x[2-n]$
    - (b)  $x[n+3]$
  - (2) Find Convolution of  $x[n] = \{1,2,3\}$  and  $y[n] = \{3,0,2\}$   
using graphical method.

- 3 (a) Write answers of any **two** : (five marks each) **10**
- (1) Explain how systems are classified ? Explain each type of system in detail.
  - (2) What is meant by cross correlation ? Explain its formula with sketch.
  - (3) Write and explain properties of LTI systems.
  - (4) Classify following systems :
    - (a)  $y[n] = 2x[n]$
    - (b)  $y[n] = x[n-2]$
    - (c)  $y[n] = x[n^2]$
- (b) Write answer of any **one** : **4**
- (1) Given  $x[n] = \{4,3,2,1\}$   $y[n] = \{1,2,3,4\}$  using mathematical formula, find the convolution of x and y.
  - (2) Find autocorrelation of  $x[n] = \{1,2,0,3,4\}$  using tabular method.
- 4 (a) Write answers of any **two** : (five marks each) **10**
- (1) Draw the block diagram of electronic communication and explain each block in brief.
  - (2) How Bandwidth is an important resource for any communication ? And why is it limited ? Also explain information capacity.
  - (3) Write about transmission modes of communication.
  - (4) Explain in brief functions of following devices in communication
    - (a) Oscillators
    - (b) Mixer circuits.
- (b) Write answer of any **one** : **4**
- (1) Draw and explain Amplitude Modulated waveform.
  - (2) What is Modulation Index ?  
Draw all diagrams clearly for  $m < 1$ ,  $m = 1$  and  $m > 1$  for AM.
- 5 (a) Write answers of any **two** : (five marks each) **10**
- (1) Explain how signals are frequency modulated ?
  - (2) Why do we need modulation of information signal ? Also explain phase modulation.
  - (3) What is meant by SNR? What is the unit of SNR ? Explain why do we need to analyse noise so seriously in communication ?
  - (4) Explain frequency synthesizers.
- (b) Write answer of any **one** : **4**
- (1) Why do we need Low Pass filter to demodulate any signal ? Also explain AM demodulation.
  - (2) Explain Signal Generators in brief.