

SEMESTER EXAMINATION 2015

Diploma in Computer Engineering, Semester III, Examination Dec. 2015

Signals and Systems

Paper Core : DEE 303

Time : Three Hours

M.M. 60 marks

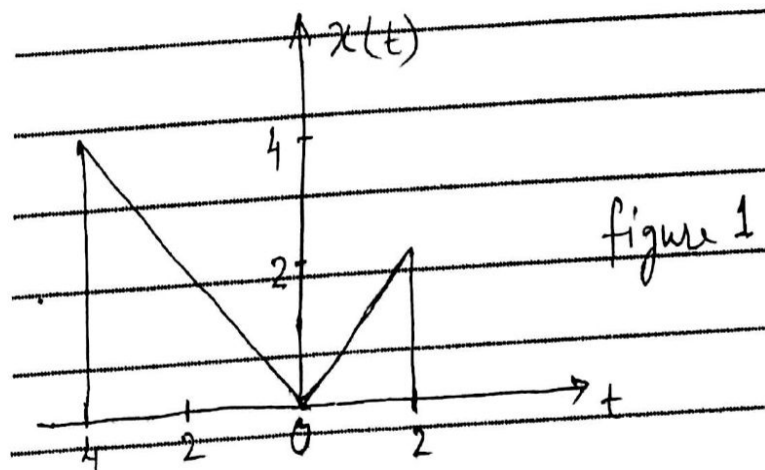
Instructions to candidate

1. Write your Roll No. on the top immediately on receipt of this question .
2. Attempt any two parts from each question. Assume missing data suitable, if any.

Q.1

- (a) Define continuous and discrete time signals. Briefly describe at least four basic continuous time signals. [6]

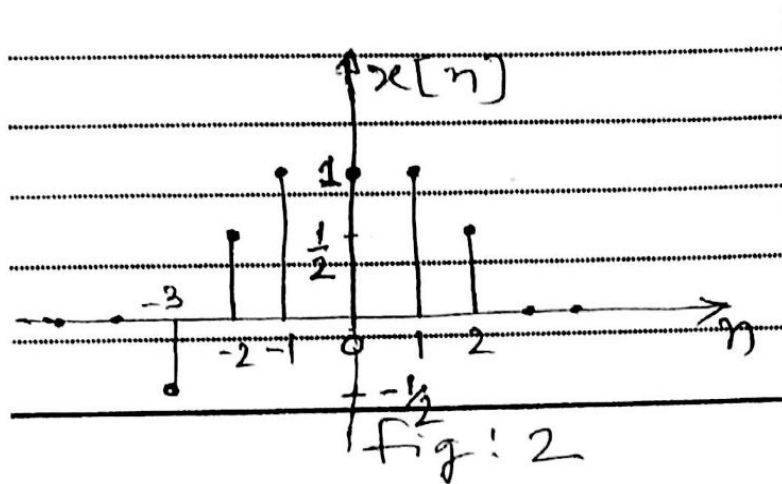
- (b) For signal $x(t)$ shown in figure 1, sketch the following :- [6]
- (i) $2 \cdot x(2 - t)$
 - (ii) $x(t) \cdot \delta(t - 1)$
 - (iii) $x(2t - 1)$



(c) For signal $x(n)$ shown in figure 2, sketch the following :-

[6]

- (i) $x[3 - n]$
- (ii) $x[2n + 1]$
- (iii) $x[n] \cdot u[n - 2]$



Q.2

(a) What are time variant and time invariant systems? Describe the procedure for testing time invariant property of a system. [6]

(b) Find whether the following system is :- [6]

- (i) Static / dynamic
- (ii) Casual / Non-causal
- (iii) Linear/ Non-linear

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

(c) Define the following systems :- [6]

- (i) Static and Dynamic Systems
- (ii) Casual and Non-causal Systems
- (iii) Linear and Non-linear Systems

Q.3

(a) What is modulation? Why it is needed? What are the basic types of modulation? [6]

(b) What is Multiplexing? Describe time division multiplexing in brief. [6]

- (c) The output current of a 60 percent modulated AM generator is 1.5 A. To what value will this current rise if the generator is modulated additionally by another audio wave, whose modulation index is 0.7? What will be the percentage power saving if the carrier and one of the sidebands are now suppressed.? [6]

Q.4

- (a) State sampling theorem. Determine the sampling rate so that original rate so that original signal can be recovered from its sampled version for the following signals :- [6]

(i) $x(t) = 1 + \cos(200 \pi t) + \sin(400 \pi t)$

(ii) $x(t) = \cos(150 \pi t) \cdot \sin(100 \pi t)$

- (b) With the help of neat sketches, show the recovery of signal when it is under sampled and over sampled. [6]

- (c) Consider the continuous time signal. [6]

$$x(t) = \cos(100 \pi t)$$

- (i) Determine the minimum sampling rate required to avoid aliasing.
 (ii) Suppose that the signal is sampled at the rate of 75 samples per second. What is the discrete time signal obtained after sampling.
 (iii) What discrete signal is obtained after sampling if it is sampled at nyquist rate?

Q.5

- (a) Briefly describe an open loop and closed loop control system with their advantages and disadvantages. Give one example of each control system. [6]

- (b) What is Routh-Hurwitz stability criterion. Check the stability of a system whose characteristic equation is given by [6]

$$2S^4 + 2S^3 + S^2 + 3S + 2 = 0$$

- (c) What is root-locus? Write down the rules for the construction of root locus. [6]