CBCS Scheme

18EE54

USN										

Fifth Semester B E Degree Examination Dec. 2020/Jan.2021
Model Question Paper
Signals and Systems

Time: 3 hrs **Max. Marks: 100**

NOTE: Answer any FIVE full questions, choosing ONE full question from each module.

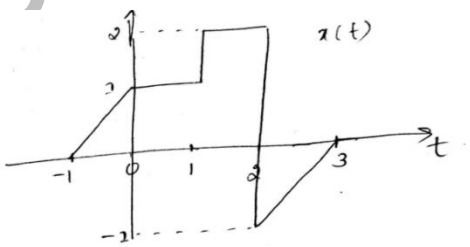
Module 1

1

a) Define Signals and Systems. And explain classificaion of Signals. **(8 Marks)**

b) Obtain even and odd part of the given signal x(t)=cos(t) +sin(t)+ sint cost **(4 Marks)**

c) Skect the signal y(t)={x(t) + x(2-t) } u(1-t) for the signal in fig (1.c) **(8 Marks)**



Fig(1.c)

OR

2

a) Explain the properties of Systems. **(6 Marks)**

b) For the triangular wave shown below in fig(2.b). find the average power. With time period T=2 sec. **(8 Marks)**

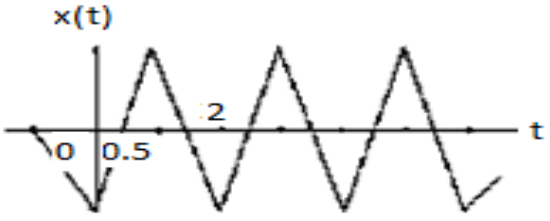


Fig (2.b)

c) Determine the system Y(t) =x(t/2) is i) Linear ii) Time invarient iii) Memory iv) casual v) stable. **(6 Marks)**

Module 2

3

a) Consider a continuous time LTI system with unit impulse response. h(t) = u(t) and input $x(t) = e^{-at} u(t)$; where a >0. Find out put y(t) of the system. **(10 Marks)**

b) Solve the difference equation y(n) – (1/9)y(n-2) = 2x(n-1) with initial conditions y(-1) = 1, y(-2) = 0,For x(n) = u(n) find the total overall response, natural response, forced response, zero input response and zero state response **(10 Marks)**

OR

4

a) Represent the differential equation given below in direct form I and direct form II:

(10 Marks)

$$\frac{d^2y(t)}{dt^2} + \frac{dy(t)}{dt} + 2y(t) = \frac{d^2x(t)}{dt^2} + \frac{dx(t)}{dt}$$

b) The impulse response of the systems is given by, $h(t) = e^{2t} u(t-1)$ and $h(n) = e^{3n} u(-n)$. Check whether the system is stable, casual and memoryless. **(10 Marks)**

Module 3

5

a) Find Fourier Transform of the signal $x(t) = e^{-3|t|} \sin(2t)$, using appropriate property. **(10 Marks)**

b) Find the frequency response of a containious time LTI sysstem represnted by the impulse response. **(10 Marks)**

$h(t) = e^{-|t|}$

OR

6

a) Find the frequency response and impulse response of the system having $y(t)= e^{-2t} u(t) + e^{-3t} u(t)$, for the input $x(t)=e^{-t} u(t)$ **(10 Marks)**

b) Find the inverse Fourier transform of i) $k(j\omega) = \frac{j\omega}{(2+j\omega)2}$

ii) $X(j\omega)=(5j\omega+12) / ((j\omega)^2 +5j\omega +6)$ **(10 Marks)**

Module 4

7

a) State and explain parseval's theorem of discrete time Fourier transform. **(10 Marks)**

b) A discrete time LTI system described by $y(n) – (1/2)y(n-1) = x(n) + (1/2) x(n-1)$

I. Determine the frequency response $H(\Omega)$

II. Find the impulse response h(n) of the system **(10 Marks)**

OR

8

a) Using the appropriat properties, find the DTFT of the following signal. $X(n)=\sin(\frac{\pi}{4}n) (\frac{1}{4})^n u(n-1)$. **(10 Marks)**

b) Find the Fourier transform of the signal **(10 Marks)**

I. $x(n) = a^{|n|}$; $|a| < 1$

II. $x(n) = (\alpha^n \sin (\Omega n))u(n)$

Module 5

9

a) Explain the properties of ROC. **(8 Marks)**

b) Find the Z transform and ROC of the functions i) $\alpha^n u(n)$ ii) $a^{|n|}$ **(12 Marks)**

OR

10

a) Determine whether the system described below is casual and stable. **(12 Marks)**

i) $H(z)=\frac{2Z+1}{Z2+Z-5/16}$

ii) $H(Z)=(1+2Z^{-1}) / (1+ \frac{14}{8}Z^{-1} +\frac{49}{64} Z^{-2})$

b) Explain the properties of Z transform. **(8 Marks)**