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B.E. /B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

ELECTRONICS AND COMMUNICATION ENGINEERING BRANCH

THIRD SEMESTER

EC9203- SIGNALS AND SYSTEMS

(REGULATIONS 2008)

Time : 3hr

Max. Marks : 100

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Find the period of the given signal if it is periodic

$$x[n] = e^{j\left(\frac{\pi}{8}\right)n}$$

2. Determine whether the given system is causal or not. Justify

$$y[n] = x[2n]$$

3. Give the modulation property of Fourier transform

4. State Parseval's theorem

5. The step response of a system is given by $y(t) = 2at$, $a < 1$. Find the impulse response of the system

6. Find the Laplace transform of $x(t) = e^{-2t} u(t)$

7. Find the inverse z transform of

$$X(z) = z^2 + 0.5z - 2.5 + z^{-1}$$

8. The transfer function of a system is given below. Find the frequency response of the system

$$H(z) = \frac{1}{(1 - az^{-1})}, \quad |z| > |a|$$

9. Draw the block diagram representation of the system given by

$$H(z) = \left(\frac{1}{1 - \frac{1}{4}z^{-1}} \right)$$

10. Define the term 'state' of a system

PART – B (5 x 16 = 80 Marks)

- 11a)i) A DT system is described by the difference equation

$$y[n] + 0.1y[n-1] - 0.2y[n-2] = x[n] + x[n-1]$$

Find the impulse response of the system

(8)

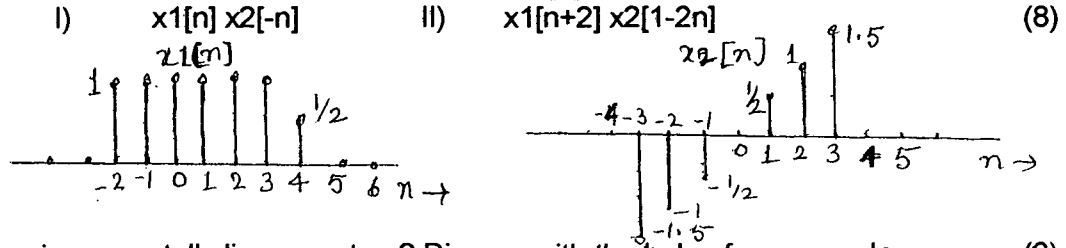
- ii) Find the output of the system if input $x[n]$ and impulse response $h[n]$ are given by

$$x[n] = \{-1, 1, 2, -1, 3, 2\}$$

$$h[n] = \begin{cases} (-1)^n, & 0 \leq n \leq 2 \\ 2, & 3 \leq n \leq 5 \\ 0, & \text{otherwise} \end{cases}$$

(8)

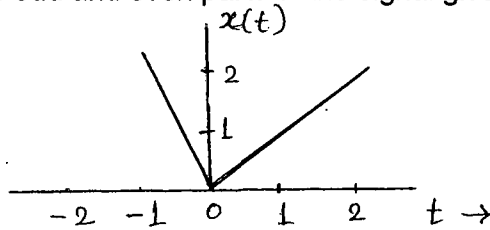
12a) i) Plot the result of the following if $x_1[n]$ and $x_2[n]$ are given as in fig. below. (8)



ii) What is an incrementally linear system? Discuss with the help of an example (8)

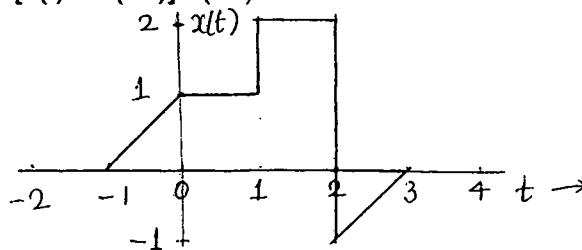
(OR)

12b)i) Determine the odd and even parts of the signal given in figure below (8)

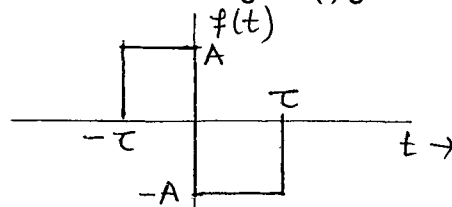


ii) Find the following when $x(t)$ is as given in figure below (8)

- i) $y(t) = x(t) [\delta(t+1.5) - \delta(t-1.5)]$
 ii) $y(t) = [x(t) + x(2-t)] u(1-t)$



13a) i) Find the Fourier transform of the signal $f(t)$ given in figure below (8)



ii) State Dirichlet's conditions. Give examples of signals which do not satisfy these conditions (8)

(OR)

13b)i) Determine the time function $x(t)$ for the given $X(s)$ and associated ROC (8)

$$X(s) = \frac{(s+1)}{(s^2 + 5s + 6)}, \quad \text{Re}\{s\} < -3$$

ii) Give the relation between Fourier series and Fourier transform. Hence find the Fourier transform of $\sin \omega_0 t$ (8)

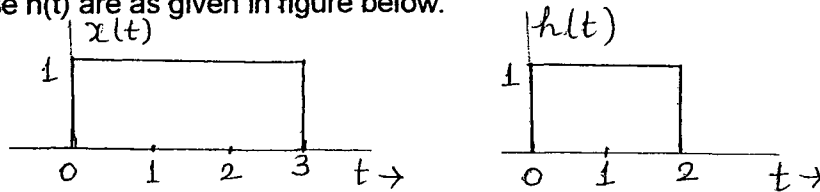
14a) Find the transfer function $H(s)$ of the system if it is described by

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

Also plot its pole zero pattern. Find and plot the ROC if the system is to be (i) causal (ii) stable (iii) both stable and causal

(OR)

14b) Find graphically the output $y(t)$ of the system by convolution technique if input $x(t)$ and impulse response $h(t)$ are as given in figure below.



15a) State and prove sampling theorem

(OR)

15b) Find the DTFS coefficients of the signal given below

