

AA

(3 Hours)

[Total Marks : 80

QP Code : 5497

N.B.:

1. Question no.1 is compulsory
2. Attempt any three questions out of the remaining five.
3. Assume suitable data wherever necessary.

1. _____ (20)

a) Determine the fundamental period of the following signals.

i) $x(t) = 2\cos\frac{2\pi t}{3} + 3\cos\frac{2\pi t}{7}$

ii) $x[n] = \cos^2\left[\frac{\pi}{4}n\right]$

b) Prove and explain time scaling and amplitude scaling property of Continuous time Fourier Transform.

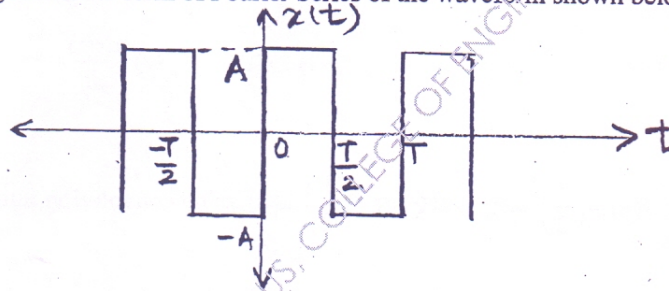
c) For the given system, determine whether it is, i) memory less, ii) causal, iii) time-invariant $y[n]=nx[n]$

d) Find out even and odd component of the following signal.

$x(t) = \cos^2\left(\frac{\pi t}{2}\right)$

2.

a) Determine the trigonometric form of Fourier Series of the waveform shown below. (10)



b) State duality property of Fourier Transform. If Fourier Transform of $e^{-t}u(t)$ is $\frac{1}{1+j\Omega}$, then find the Fourier Transform of $\frac{1}{1+t}$ using duality property. (10)

3.

a) Obtain inverse Laplace transform of the function. Write down and sketch possible ROCs. (10)

$X(s) = \frac{8}{(s+2)^3(s+4)}$

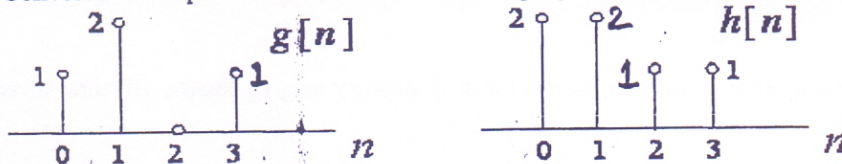
- b) Using the z transform, solve the difference equation and find out impulse response. (10)

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

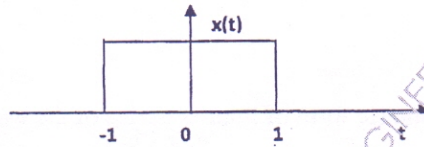
4.

- a) State and explain different properties of ROC of Z transform. (5)

- b) Convolve the sequences shown in the following figure using circular convolution (5)



- c) A continuous time signal is shown below. Sketch the following transformed versions of the signal. (10)



- i) $x(t-3)$ ii) $-2x(t)$ iii) $x(t-3)-2x(t)$ iv) $\frac{dx(t)}{dt}$

5.

- a) Convolve $x[n] = \left(\frac{1}{3}\right)^n u[n]$ with $h[n] = \left(\frac{1}{2}\right)^n u[n]$ using convolution integral. (10)

- b) A second order LTI system is described by $\frac{d^2 y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = x(t)$. Determine the transfer function and the poles and zeros of the systems. Evaluate zero-state response to $x(t)=u(t)$ (10)

6.

- a) For the periodic signal $x[n]$ given below find out Fourier series coefficient. (10)

$$x[n] = 1 + \sin\left(\frac{2\pi}{N}n\right) + 3\cos\left(\frac{2\pi}{N}n\right) + \cos\left(\frac{4\pi}{N}n + \frac{\pi}{2}\right)$$

- b) The input and impulse responses of continuous time system are given below. Find out output of the continuous time systems using appropriate method. (10)

$$x(t) = u(t) \quad h(t) = e^{-2t}u(t)$$

Course: S.E. (SEM. IV) (REV -2012) (CBSGS) (E & TC ENGG.) (PROG-T1424)

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Correction:

Question no.: 4 (C)

The amplitude of the signal $x(t)$ shown in the corresponding figure is to be taken as 'A' units.

Query Update time: 17/12/2015 04:25 PM

ETC 4021	Faiiz	}	Block No-10
ETC 4018	Ajmer		<u>Altaf</u> 17/12/15
ETC 4050	Harv	}	Block No-11
ETC 4054	Harv		<u>Harv</u>
ETC 4068	Shubham	}	Block No. 12
ETC 4076	SHUBH		<u>Shubham</u> 17/12/15