Amrita Vishwa Vidyapeetham,
Amrita School of Engineering
Amritapuri Campus
Signals and Systems
III Semester: ECE,EEE
Second periodicals October 2008

Time: 2 hours Max. Marks: 50

*Answer **all** questions.*

Q.1 $x(t) * \delta(t-t_0) = \ldots$ (2 marks)

Q.2 Find the Fourier coefficient of (2 marks)

$$x[n] = \sum_{l=-\infty}^{\infty} \delta[n-lN]$$

Q.3 Find the time domain signal corresponding to DTFS (4 marks)

$$X[k] = cos(\frac{4\pi k}{11}) + 2jsin(\frac{6\pi k}{11})$$

Q.4 Find the **particular solution** of the following differential equation (4 marks)

$$\frac{d}{dt}y(t) + 5\frac{d}{dt}y(t) + 4y(t) = \frac{d}{dt}x(t)$$
$$y(0^-) = 0, \frac{d}{dt}y(t)|_{t=0^-} = 1, x(t) = sin(t)u(t)$$

Q.5 Find the **total solution** of the following difference equation (5 marks)

$$y[n] - \frac{1}{9}y[n-2] = x[n-1],$$
$$y[-1] = 1, y[-2] = 0, x[n] = u[n]$$

Q.6 Draw the **Direct form I** and **Direct form II** form implementations of the following differential equations. (5 marks)

$$\frac{d^2}{dt^2}y(t) + 5\frac{d}{dt}y(t) + 4y(t) = \frac{d}{dt}x(t)$$

Q.7 Find the **step response** of the following LTI systems represented by the following impulse response (4 marks)

$$h(t) = \frac{1}{4}(u(t) - u(t-4))$$

Q.8 For each of the following impulse responses, determine whether the corresponding systems are (i)memroyless, (ii)causal and (iii)stable (6 marks)

$$(i)\ h(t) = e^{-2t}u(t-1)$$
$$(ii)\ h(t) = 3\delta(t)$$

Q.9 Find the inverse DTFT of (5 marks)

$$X(e^{j\Omega}) = \begin{array}{l} 1, |\Omega| < W \\ 0, W < |\Omega| < \pi \end{array}$$

Q.10 Find the inverse FT of $X(j\omega) = 2\pi\delta(\omega)$ (5 marks)

Q.11 Determine whether each of the following statements concernig LTI systems are True or false. Justify your answer (8 marks)

(a) If $h(t)$ is the impulse response of the LTI system and $h(t)$ is periodic and nonzero, the system is stable.

(b) if $h[n] \leq k$ for each n, where K is a given number, then the LTI system with $h[n]$ as its impulse response is stable.

(c) If an LTI system is causal,it is stable.

(d) The cascade of a noncausal LTI system with causal one is ncessarily noncausal.