Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: SIGNALS AND SYSTEMS [ELE 2201]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 14 JUNE 2017** **Max. Marks: 50**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Transform Table may be supplied.

1A. Given the sequence $x[n]=\left\{-3,\ 1,\ \underset{\uparrow}{2},\ -1,\ 3,\ 2\right\}$, sketch and label carefully each of the following signals (a) $x[2-n]$; (b) $x[2n+2]$; (c) $x[n+1]\delta(n+2)$ ***(03)***

1B. Determine whether the following signal is energy or power signal and also find the energy and power of the signal $x(t)=e^{-2|t|}$ ***(03)***

1C. The input to a continuous-time LTI system is $x(t)$ whose impulse response is $h(t)$.

Find the response of the system $y(t)=x(t)*h(t)$, where $x(t)=u(t)-u(t-3)$ and $h(t)=u(t)-u(t-2)$ ***(04)***

2A Check whether the following time signal is periodic. If periodic determine the fundamental period. (i) $x(n)=3e^{j\frac{2}{3}\pi\left(n+\frac{1}{3}\right)}$ (ii) $x(t)=\sin\left(\frac{\pi}{7}t\right).\cos\left(\frac{\pi}{3}t\right)$ ***(03)***

2B. Find the response of LTI discrete time system using convolution sum $y(n)=x(n)*h(n)$. Given $x(n)=\alpha^n u(n);\quad h(n)=\begin{cases}1; & for\ \ 0\le n\le 9\\ 0 & ;otherwise\end{cases}$ and $|\alpha|<1$ ***(04)***

2C. Determine the overall impulse response $h(n)$ of LTI system shown Fig.Q2C. The unit sample response of subsystems are: $h_1(n)=\alpha^n u[n]$; $h_2(n)=u[n-2]$ and $h_3(n)=u[n-3]$. ***(03)***

3A. Find the trigonometric Fourier series for the periodic square wave signal $x(t)$ shown in Fig. Q.3A and sketch the amplitude spectrum. ***(04)***

3B. Obtain the forced response of a discrete time L.T.I system that is described by the difference equation: $y[n]-\frac{1}{4}y[n-1]-\frac{1}{8}y[n-2]=x[n]+x[n-1]$; Given $x[n]=\frac{1}{2}u[n]$ ***(03)***

3C. Use defining equation of DTFS to obtain the time signal for

$$X(k)=Sin\left(\frac{2\pi}{5}k\right)$$ ***(03)***

4A. Find the CTFT of a continuous time aperiodic signal $x(t)=e^{-a|t-t_0|}$, also plot magnitude and phase spectra. Use properties. ***(04)***

4B. Use defining equation to find aperiodic continuous time signal for its Fourier representation given as: $X(j\omega)=e^{-|\omega|}$ ***(03)***

4C. Find the Fourier transform $X[e^{j\Omega}]$ of aperiodic discrete time signal $x[n]$ given as:

$x[n]=\left[\frac{\sin\frac{\pi}{4}n}{\pi n}\right]*\left[\frac{\sin\frac{\pi}{4}[n-2]}{\pi[n-2]}\right]$; Symbol * represents convolution. Use properties. ***(03)***

5A. Find time domain signal $x[n]$ for the given magnitude and phase of $X\left[e^{j\Omega}\right]$ as:

$$\left|X\left[e^{j\Omega}\right]\right|=\begin{cases}1\ ; & \frac{\pi}{2}\le\Omega\le\pi\\ 0\ ; & otherwose\end{cases}\quad\text{and}\quad Arg\left\{X\left[e^{j\Omega}\right]\right\}=-4\Omega$$ ***(04)***

5B. Determine the Z-Transform and the ROC of the two-sided signal

$x[n]=7\left(\frac{1}{3}\right)^n u[n]-6\left(\frac{1}{3}\right)^n u[-n-1$ ***(03)***

5C. Use the partial fractions technique to determine the time domain signal corresponding to the following. $X(z)=\frac{1+\frac{4}{5}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)\left(1+\frac{1}{4}z^{-1}\right)}$; $|z|>\frac{1}{2}$ ***(03)***

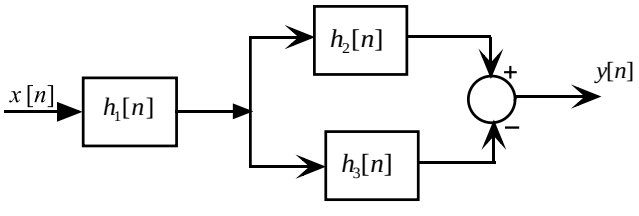

Fig.Q2C

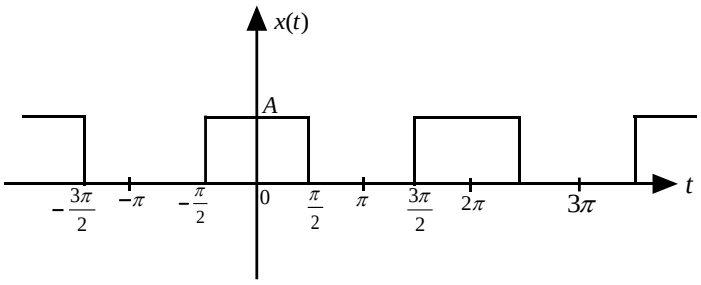

Fig.Q.3A