Government College of Engineering, Amravati

(An Autonomous Institute of Government of Maharashtra)

B. Tech. (Computer Science & Engineering)

Summer – 2017

Course Code: CSU802

Course Name: Digital Signal Processing

Time: 2 Hr. 30min. **Max. Marks: 60**

Instructions to Candidate

1) All questions are compulsory.
2) Assume suitable data wherever necessary and clearly state the assumptions made.
3) Diagrams/sketches should be given wherever necessary.
4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
5) Figures to the right indicate full marks.

1 **Solve any Two**

a What do u understand the by the term signal and signal processing? Explain the basic element of DSP system **6M**

b Determine the given system are causal or non-causal, linear or non-linear, time variant or time-invariant **6M**

i. $Y(n)=x(-n+2)$

ii. $Y(n)=x(2n)$

Contd..

	c	Determine the convolution sum of two sequence $X(n)=\{3,3,1,2\}$ and $h(n)=\{1,2,1,2\}$ using mathematical method	6M	
2	a	Determine the response $y(n),n>=0$ of the system describe by the second order difference equation $Y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$ when input sequence $x(n)=4^n u(n)$	6M	
	b	Determine the cross correlation sequence $r_{xy}(l)$ of the sequence $X(n)=\{.....0,0,2,-1,3,7,\underset{\uparrow}{1},2,-3,0,0,....\}$ and $Y(n)=\{...0,0,1-1,2,-2,\underset{\uparrow}{4},1,-2,5,0,0...\}$	6M	
3	a	State and prove the following property of Discrete Fourier transform 1. Circular time shift of a sequence	4M	
	b	Given $x(n)=\{0,1,2,3,4,5,6,7\}$ find x(k) using DIT FFT algorithm	8M	
		Solve any Two		
4	a	What is ROC ? determine the z transform of following signal i. $X(n)=(\cos \omega_0 n)\, u(n)$ ii. $X(n)=(\sin \omega_0 n)\, u(n)$	6M	
	b	Determine the zero state response of the system $X(n)=1/2\ y(n-1)+4x(n)+3x(n-1)$ to the input	6M	
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$X(n)= e^{jw0n}\, u(n)$ what is steady-state response of the system

c Determine the inverse z transform of the following system using partial fraction expansion **6M**

$$X(z)= \frac{1}{1-1.5\, z^{-1}+0.5\, z^{-2}}$$

Solve any Two

5 a Differentiate between FIR and IIR filter with example. **6M**

b Convert the analog filter with the system function. **6M**

$$H_a(s)= \frac{s+0.1}{(s+0.1)^2+9}$$

Into digital IIR filter by means of impulse invariance method

c Draw the Direct form I and Direct Form II structure for IIR filter **6M**

$$H(Z)=\frac{b0+b1\, z^{-1}+b2\, z^{-2}}{1+a1\, z^{-1}+a2\, z^{-2}}$$