Ref No.EX/IT//T/325 (OLD)/2017

# BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY EXAMINATION, 2017

## DIGITAL SIGNAL PROCESSING
## 3RD YEAR, 2ND SEMESTER

**TIME : 3 Hr** **FULL MARKS: 100**

**Attempt any *five* of the following :**

1. a) Write down some applications of digital signal processing.Also write down some advantages and disadvantages of digital signal processing 5+3

   b) What is Sampling? Explain the process sampling and quantization of an analog signal. What is sampling theorem? 7

   c) Check whether the given signal is a energy or power signal?
   $y(n) = (\frac{1}{2})^n u(n+1)+\sin(n)$ 5

2. a) What is ROC? Write down the relationship between Fourier Transformation and Z transformation 4

   b) Find out the Z transformation for the given system
   $x(n) = a^{n+1} u(n+1)+b^n u(n-1)$ 6

   c) Find out the inverse Z transformation for the given response
   $H(z) = \frac{1}{(1-3z^{-1})(1-2z^{-1})}$ for

   i) ROC : $|Z|<2$ ii) ROC : $|Z|>3$ iii) ROC : $2<|Z|<3$ 4+6

3. a) if $X_1(Z)$ and $X_2(Z)$ are the Z transformation of sequences $x_1(n)$ and $x_2(n)$ respectively then prove that $Z\{ x_1(n) * x_2(n) \} = X_1(Z) X_2(Z)$. 5

   b) Find out the response of a system using graphical method whose impulse response is $h(n)= \{ 3,1,2,2\}$ and then excitation is $x(n) = \{ 1,2,1,2\}$ 10
   ↑ ↑

   c) What is ROC? Draw the ROC of a non causal infinite sequence. 2+3

4. a) Find out the 8-point DFT for the sequence, $x(n)=\{2,1,3,2,1\}$. 10

   b) Find out the circular convolution for the system for $x(n)= \{2,1,2,3\}$ and $h(n) = \{1,1,2\}$ using concentric circle method. 10

5. a) Find out the linear convolution using overlap save method for the system which impulse response is $h(n) = \{2,2,1\}$ and which is excited by

x(n) = {2,1,1,2,1,3,2,1,2,1,1,2,1}. 10

b) DFT is possible for all sequences- justify this argument whether it is true or not? 5

c) Check whether thegiven system is a LTI or not?
$y(n)=x(n^2)+x(n-1)$ 5

6. a) Find out the 8-poinht DFT of the sequence x(n) = {1,2,1,2,3,2,1} using radix-2 DIT-FFT algorithm. 15

b) Why Z-transformation is known as many to one point mapping? 5

7. Realize the system
y(n) = 0.65 y(n-1) + 0.25 y(n-2) + x(n) + 0.21 x(n-1) by 5×4=20

a) Direct Form-I structure
b) Direct Form-II structure
c) Cascade Form
d) Parallel Form
e) Transpose Form