Reg. No. | | | | | | | | | | | | |

Question Paper Code : 51459

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electrical and Electronics Engineering

EC 2314/10144 EC 502/EC 2361/10133 EE 502 – DIGITAL SIGNAL PROCESSING

(Common to Electronics and Communication Engineering and Instrumentation and Control Engineering)

(Regulations 2008/2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define unit step function.
2. Compare energy and power signal.
3. State the initial value and final value theorem of Z transform.
4. Find the convolution of the following two sequences $x(n) = \{ 2, -1, 3\}$ and $h(n) = \{ 1, 2, 2.3\}$
5. Draw the basic butterfly diagram of radix 2 DIT and DIP FFT.
6. State Parsevals theorem of discrete Fourier transform.
7. Define group delay and phase delay of FIR filter.
8. What are the advantages of bilinear transformation ?
9. List out different stages in pipelining.
10. What are the different buses of TMS320 C5X ?

PART – B (5 × 16 = 80 marks)

11. (a) Explain the classification of discrete time system with suitable example. **(16)**

OR

(b) State and explain sampling theorem with necessary diagram. **(16)**

12. (a) (i) Find the impulse response and frequency response of the following System :

$y(n) = 1/2\ y(n-1) + x(n) + 1/3\ x(n-1)$ **(8)**

(ii) Determine the circular convolution of the following sequences :

$x(n) = \{1, 0.5, 1, 0.5, 1, 0.5, 1, 0.5,\}$

$h(n) = \{0, 1, 2, 3\}$ **(8)**

OR

(b) Using long division method, determine the inverse Z transform of

$X(Z) = 1/1 - (3/2)\ Z^{-1} + (1/2)\ Z^{-2}$

When ROC : $|Z| > 1$ and ROC : $|Z| < ½$ **(16)**

13. (a) Compute 8 point DFT of the sequences using DIT-FFT algorithm

$x(n) = \{0.2, 0.1, 0.2, 0.1, 0.2, 0.1, 0.2, 0.1\}$ **(16)**

OR

(b) State and prove all the properties of DFT. **(16)**

14. (a) Design a low pass filter of order 7 and cut off frequency of 1 rad/sec. Use rectangular window . Also plot the magnitude response of the filter. **(16)**

OR

(b) Design a digital butterworth filter satisfying the following specification :

$0.707 \leq |H(e^{jw})| \leq 1 ; \quad 0 \leq w \leq \pi n/2$

$|H(e^{jw})| \leq 0.2 ; 3\pi/4 \leq w \leq \pi.$

Using bilinear transformation technique with T = 1 sec. **(16)**

15. (a) Write short notes on :

(i) Multiplier and accumulator unit **(8)**

(ii) Arithmetic Logic Unit **(8)**

OR

(b) Explain the different addressing modes of TMS320C5X with suitable examples. **(16)**
