Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ECE) (2012 to 2017) (Sem.–5)

DIGITAL SIGNAL PROCESSING

Subject Code : BTEC-502

M.Code : 70546

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.**

SECTION-A

Write briefly :

1. Verify whether the given system is linear or non-linear $y(n) = \cos x(n)$.
2. What is the difference between convolution and correlation?
3. Give the significance of ROC in Z-transform.
4. What do you mean by truncation and rounding errors?
5. What do you mean by circular shift of a sequence?
6. What do you mean 'Twiddle Factor' of DFT & show how it is cyclic?
7. Differentiate between FIR and IIR filter.
8. What is frequency warping effect?
9. What is the significance of barrel shifter?
10. Write any two features of DSP processor.

SECTION-B

11. Explain different types of discrete time systems with examples.

12. Compute the linear convolution of the given sequences :

$x(n) = [1, 2, 4]$

$$h(n) = \begin{cases} 1 & for -1 \le n \le 1 \\ 2 & for\ n = 2 \end{cases}$$

13. Obtain inverse Z-transform of

$$X(Z) = \frac{1 - \frac{1}{2}z^{-1}}{1 - \frac{1}{4}z^{-2}} \qquad |z| > \frac{1}{2}$$

14. Determine the Z-transform and sketch the ROC of :

$$x(n) = \cos(\omega_0 n)\, u(n)$$

15. Determine the direct form-I and direct form-II structure for the system described by the system function

$$H(z) = \frac{1 - 0.8z^{-1} + 0.15z^{-2}}{1 + 0.1z^{-1} - 0.7z^{-2}}$$

SECTION-C

16. With the help of N = 8, explain radix-2 decimation-in-time (DIT) FFT algorithm for computation of DFT.

17. Explain in detail design methodologies impulse invariance and bilinear transformation for the design of IIR filter.

18. The desired frequency response of a symmetric FIR filter is

$$H_d(\omega) = \begin{cases} 0, & -\pi/6 \le \omega \le \pi/6 \\ e^{-j7\omega}, & \pi/6 < |\omega| \le \pi \end{cases}$$

Stopband attenuation is > 40 dB

Determine the frequency response H ($e^{j\omega}$) using window method.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.