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

Total No. of Questions : 18

B.Tech. (EE) (2011 Onwards Elective-II) (Sem.–7)

DIGITAL SIGNAL PROCESSING

Subject Code : BTEE-804C

M.Code : 71938

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. What is an Energy and Power signal?
2. Define recursive and non-recursive system.
3. Determine the fundamental period of the signal.

$$x(n) = \cos\left(\frac{30\pi n}{105}\right)$$

4. Check for following system is stable or unstable.

$$y(n) = x\left(\frac{1}{2n}\right)$$

5. State the convolution property of Fourier Transform.
6. What is ROC in Z-Transform?
7. State the time reversal property of Z-transform.
8. Why the result of circular and linear convolution is not same?
9. What are the various methods to design IIR filters?
10. Write the steps involved in FIR filter design.

SECTION-B

11. Explain the classification of discrete systems.

12. Find the Z-transform and sketch the ROC :

$$x(n) = a^n \cos \omega_0 nu(n)$$

13. Obtain inverse Z-transform of :

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

14. Compute the Fourier Transform of $x(n) = 2^n u(n)$.

15. Determine the length-4 sequence from its DFT :

$$X(K) = [2, 1 - j, 0, 1 + j]$$

SECTION-C

16. The system function of analog filter is as given

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

17. Design a FIR low pass filter using Kaiser Window having following specifications :

    Pass-band cut-off frequency = 150 Hz

    Stopband cut-off frequency = 250 Hz

    Passband ripple = 0.1 dB

    Stopband attenuation = 40 dB

    Sampling frequency = 1000 Hz

18. a) State and prove convolution property of DFT.

    b) Determine the length-4 sequence from its DFT

    $X(K) = [2, 1 - j, 0, 1 + j]$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.