Reg. No. :

**Question Paper Code : 41296**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth Semester
Information Technology
IT 6502 – DIGITAL SIGNAL PROCESSING
(Common to Computer Science and Engineering/Mechatronics Engineering)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. Define ROC.
2. Find the convolution of x(n) = {1, 2, 3, 1, 2, 1, 1} and h(n) = {1, 2, 1}.
3. Is DFT of a finite duration sequence is periodic ? If so, state the theorem.
4. Why FFT is needed ?
5. What is warping effect ?
6. Mention the methods for converting analog into digital IIR filter.
7. Compare Hanning and Hamming window.
8. What is Linear phase FIR filter ?
9. Mention the types of quantization errors.
10. What is zero input limit cycle oscillations ?



PART – B (5×13=65 Marks)

11. a) i) Find the Z transform and ROC of
    a) $x(n) = \delta(n)$
    b) $x(n) = [3(3)^n - 4(2)^n]\, u(n)$ (6)
    ii) Check whether the system $y(n) = nx^2(n)$ is static or dynamic, linear or non-linear, time variant or invariant, causal or non-causal. (7)

(OR)

b) Determine the response of the system described by the difference equation $y(n) = 0.7\ y(n-1) - 0.12\ y(n-2) + x(n-1) + x(n-2)$ to the input $x(n) = nu(n)$. **(13)**

12. a) Starting from the key equation of DFT, with necessary equations explain DIT – FFT algorithm. **(13)**

(OR)

b) Find the 8 point DFT of $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$ using DIF-FFT algorithm. **(13)**

13. a) Convert the analog filter with transfer function $H(s) = \frac{2}{(s+1)(s+2)}$ into digital filter using impulse invariant method. **(13)**

(OR)

b) Design a digital filter which exhibits equiripple behaviour only either in pass band or stop band and monotonic characteristics either in pass band or stop band and satisfying the constraints.

$0.8 \le |H(e^{j\omega})| \le 1$ for $0 \le \omega \le 0.2\ \pi$

$|H(e^{j\omega})| \le 0.2$ for $0.6\ \pi \le \omega \le \pi$

using Bilinear transformation. **(13)**

14. a) Explain the procedure of designing FIR filters by windows. **(13)**

(OR)

b) Explain frequency sampling method of designing FIR filters. **(13)**

15. a) Explain the various quantization errors in detail. **(13)**

(OR)

b) Explain limit cycle oscillations in detail. **(13)**



PART – C **(1×15=15 Marks)**

16. a) Find the 8 point DFT of $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIT-FFT algorithm. **(15)**

(OR)

b) Explain the characteristics of limit cycle oscillation represented to the system described by $y(n) = 0.95\ y(n-1) + x(n)$. Determine the dead band of the filter. **(15)**

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