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Roll No ....

MEDC-103

M.E./M.Tech., I Semester

Examination, December 2016

DSP Application

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Determine if the system described by the following input output equation are LTI or not

   i) $y(n) = x(n) \cos w_0 n$

   ii) $y(n) = e^{x(n)}$

   iii) $y(n) = \sum_{k=-\infty}^{n} x(k)$

   iv) $y(n) = x(-n)$

   b) Discuss about recursive and non recursive discrete time systems.

2. a) Determine the Z-transform of the following signals

   i) $x(n) = \left[3(2^n) - 4(3^n)\right] u(n)$

   ii) $x(n) = (\cos w_0 n) u(n)$

   b) Determine the signal $x(n)$ whose Z-transform is given by $X(z) = \log(1 + az^{-1}) \; |z| > |a|$

3. a) Determine the system function and the unit sample response of the system described by difference equation

   $$y(n) = \frac{1}{2} y(n-1) + 2x(n)$$

   b) Determine the inverse Z-transform of

   $$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

   When

   i) ROC $|z| > 1$

   ii) ROC $|z| < 0.5$

4. a) Discuss how to design discrete time butterworth IIR filter.

   b) What is the effect of finite register length in filter design.

5. Discuss in detail the design of FIR filter using Hamming window.

6. a) Discuss about discrete time random process.

   b) Discuss the basic principles of spectrum estimation.

7. a) Discuss about multirate signal processing.

   b) Give a brief introduction to discrete Hilberts transform.

8. Write short notes on any two of the following:

   a) FFT

   b) Kaiser window design of FIR filter

   c) Haar transform

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