Code No.: 9A04603/R09

III B.Tech. II Semester Regular & Supplementary Examinations

Set-1

April/May - 2013

DIGITAL SIGNAL PROCESSING

(Common to EIE, E.Con.E, ECC and ECE)

Time: 3 Hours   Max. Marks: 70

*Answer any **FIVE** Questions*

*All Questions carry **Equal** Marks*

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1. State and prove following properties of DTFT,

   (i)   Periodicity

   (ii)   Time-shifting

   (iii) Multiplication by 'n' in time domain.

2. (a)   Show that DFS of periodic sequences $x_p(n)$ is periodic with same period.

   (b)   State and prove duality property of DFS.

3. Write short notes on the following,

   (i)   Butterfly computation

   (ii)   Goertzel algorithm

   (iii) In-place computations

   (iv) Bit reversal

4. Obtain the direct form realization of following system functions with minimum number of multipliers

   (i) $H(z) = (1/2) + (1/4)z^{-1} + (1/4)z^{-2} + (1/2)z^{-3}$.

   (ii) $H(z) = [(1-z^{-1}) [(1/2) - (1/4)z^{-1} + (1/2)z^{-2}]]$

5. (a)   Compare the backward and forward difference methods of digital filter approximations.

   (b)   Convert following analog filter transfer function into digital filter transfer function using backward difference method $H(s) = 1/(s + 2)^2 + 16$.

6. (a)   Explain characterization of FIR filters.

   (b)   Sketch and explain the frequency response of non-ideal digital highpass filter.

7. The signal x(n) is up sampled by factor 2, then it is passed through ideal low pass filter with cutoff frequency of F_C and down sampled by factor by 3. Sketch the input and output spectrum for the case X(F) = tri(4F) with $F_C = 0.15$.

8. (a)   Discuss about spectral analysis of sinusoidal signals.

   (b)   With necessary block diagrams explain about discrete multi tone receiver.