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**MEVD - 104**

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

Examination, June 2014

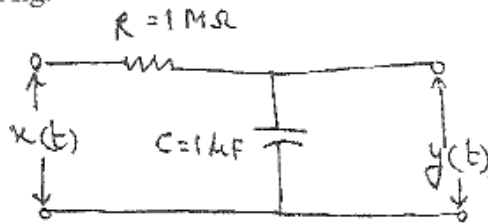
**Digital Signal Processing**

Time : Three Hours

Max. Marks : 70

- Note: i) Attempt any five questions out of the following.  
 ii) Each question carries equal marks.

1. a) i) Explain Recursive and Non-Recursive system.  
 ii) What is R.O.C. and also explain its properties for the Z-transform.
- b) For a low pass RC Network [R = 1MΩ and C = 1μF] Shown in fig.



Determine the equivalent discrete time expressions for the circuit output response  $y(n)$  when the input is  $x(t) = e^{-2t}$  and the sampling frequency  $f_s = 50\text{Hz}$ .

2. a) Use convolution to find  $X(n)$  if  $X(z)$  is given by

$$X(z) = \frac{1}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{4}z^{-1}\right)}$$

- b) Find the two sided Z-transform of

$$x(n) = \left(\frac{1}{3}\right)^n \quad n \geq 0$$

$$= (-2)^n \quad n \leq -1$$

3. Explain window techniques in detail.
4. a) A low pass filter has the desired response as given below

$$H_d(j\omega) = \begin{cases} e^{-j\beta\omega} & 0 \leq \omega < \pi/2 \\ 0 & \pi/2 < \omega \leq \pi \end{cases}$$

Determine the filter coefficient  $h(n)$  for  $(m = 7)$  using type-I frequency sampling techniques.

- b) Explain any one design techniques for FIR filters
  - i) Fourier series method
  - ii) Frequency sampling method

5. a) Convert the analog filter into the digital filter whose system function is

$$H(S) = \frac{S + 0.2}{(S + 0.2)^2 + 9}$$

Use the impulse invariant technique Assume  $T = 1$  sec.

- b) Explain Matched Z-transform.
6. a) Explain what is rounding and truncation errors.  
 b) Given  $x(k) = \{20, -5.828 - j2.414, 0, 0.172 - j0.414, 0, -0.172 + j0.414, 0, -5.828 + j2.414\}$

7. Given  $x(n) [1, 2, 3, 4, 4, 3, 2, 1]$  find  $X(k)$  using DIF FFT algorithm.

8. a) Explain signal design and integrity functions.  
 b) Explain Airborne Surveillance radar for air traffic control.