Mid-West University

Examinations Management Office

End Semester Examinations 2081

Bachelor level/ B.E. Computer/ 7th Semester — Full Marks: 50
Time: 3 hours — Pass Marks: 25
Subject: Digital Signal Analysis and Processing (EX 507)

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. a) Define LTI system and write its properties. **[5]**

b) Find the average power and total energy of the signal x(t)= A cost and state that whether it is energy signal or power signal or neither. **[5]**

2. Define Z-transform for a discrete time signal. Find inverse Z-transform for $H(z) = \frac{z}{3z^2-4z+1}$ using partial fraction method for $1/3 < |z| < 1$. **[5]**

3. Plot the magnitude and phase response of the system which has zeros at r = 0.6 and $\theta = \pi/2$. **[6]**

4. a) Draw the direct form I and form II for the system having the transfer function **[6]**
$H(z) = \frac{0.14z^2+0.1595z+0.02}{0.25z^3+0.15z^2+0.085z-0.1}$

b) Draw the cascaded realization for the system: $H(z) = \frac{z-4}{5+z-4z^2}$ **[4]**

5. Design the FIR filter for which desired frequency response is expressed as: **[6]**

$$H_d(\omega) = \begin{cases} e^{-j\omega\tau} & for|\omega| \le \omega c \\ 0 & else \end{cases}$$

The length of the filter should be 5 and $\omega_c = 1$ rad/sample. Use Bartlett Window as a prototype.

6. Design a digital filter using Butterworth approximation which satisfies the following condition: **[6]**
Passband attenuation = 25 dB
Stopband attenuation = 40 dB
Digital passband frequency = 0.2π
Digital stopband frequency = 0.6π

7. Find 8-point DFT of sequence x[n] = {1, 2, 3, 5, 0, 4, 6} using DIFFFT algorithm. **[7]**

The End