BE / ETRX / Sem-VII (R-2007) / Filter Design / May-17

Q. P. Code: 13255

(3 Hours)

Max. marks : 100

NB : 1. Question No. **1** is Compulsory
2. Answer any **FOUR** questions from remaining six questions

01 **(A)** Compare IIR and FIR filters [05]

(B) List any 5 window functions with their formulae. [05]

(C) Explain Impulse Invariant method. [05]

(D) Write short notes on Frequency warping [05]

02 **(A)** Explain frequency transformation technique for converting a low pass filter into the desired one [10]

(B) Obtain , by pole-zero placement method, The transfer function and the difference equation of a simple notch filter that meets the following specifications [10]

Notch frequency : 50 Hz

Band width : 10 Hz

Sampling frequency : 500 Hz

03 **(A)** Explain FDNR realization. [10]

(B) Explain Chebyshev filter and derive expression for its order 'N'. [10}

04 **(A)** Explain adaptive filtering in detail. [10]

(B) Apply Bilinear transformation to convert: [05]

$$H(s) = \frac{2}{(s+1)(s+3)}.$$

to H(z) with T = 0.1 sec.

PTO.

(C) Design a digital filter with a 3 dB bandwidth of 0.25π from the analog filter [05]

$$H(s) = \frac{\Omega_C}{(s + \Omega_C)}$$

Apply Bilinear transformation.

05 **(A)** A low pass filter is to be designed for the following desired frequency response :

$$H_d(\omega) = e^{-j2\omega} \quad : \quad \text{for } -\pi/4 \le \omega \le \pi/4.$$
$$= 0 \quad : \quad \text{otherwise}$$

Determine the filter coefficients $h_d(n)$ if window function is :

$$w(n) = 1 \quad : \quad \text{for } 0 \le n \le 4.$$
$$= 0 \quad : \quad \text{otherwise}$$

(B) Obtain the polyphase decomposition of the IIR system with T.F. [10]

$$H(z) = \frac{1 - 4z^{-1}}{1 + 5z^{-1}}$$

06 **(A)** Design a frequency sampling filter for the following specifications: [10]

$$H_d(j\omega) = e^{-j(N-1)\omega/2} \quad ; \quad 0 \le |\omega| \le \pi/2$$
$$= 0 \quad ; \pi/2 \le |\omega| \le \pi$$
$$M = 7.$$

(B) Explain sampling rate conversion by a rational factor [10]

07 Write short notes on :

(A) LMS algorithm [07]

(B) Inductance simulation [07]

(C) Matched Z Transform [06]

BE / Sem VII / Old (R-2007) / ETRX / PED / May 2017 **Q. P. Code: 13886**

(Time: 3 Hours) **[Total Marks:100]**

N.B.: (1) Question No. 1 is compulsory.
(2) Solve any four questions out of remaining six questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data if required.

1. Attempt the following :- 20
   (a) Give the comparison between circulating current and non-circulating current mode of dual converters.
   (b) What is meant by constant torque and constant power drives?
   (c) Explain the operation of class B chopper.
   (d) What are the limitations of series inverters? How these are modified?

2. (a) With the help of block diagram, discuss different configurations of UPS. 10
   (b) Discuss the variable frequency control method of 3-phase induction motor. Also, explain the operation for 2 different modes as: (i) below rated frequency (ii) above rated frequency. 10

3. (a) Describe, with appropriate voltage and current waveforms, the working of a single phase full converter fed dc drive. 10
   (b) Describe the working of McMurry- Bedford full bridge inverter using neat circuit diagram and relevant waveforms. 10

4. (a) With the help of circuit diagram and associated waveforms, explain the principle of operation of step up chopper. Also, derive the expression of output voltage. 10
   (b) Explain multiple pulse modulation as used in PWM inverter. 10

5. (a) Derive an expression for output voltage of a single phase fully controlled bridge converter by considering the following factors: (i) overlap angle (ii) source inductance. Also draw the waveform for the output voltage. 10
   (b) A separately excited d.c. motor, operating from a single phase half controlled bridge at a speed of 1400rpm, has an input voltage of 330 sin314t and a back emf of 80V. The SCR's are fired symmetrically at $\alpha = 30°$ in every half cycle and the armature has a resistance of 4 ohm. Calculate the average armature current and the motor torque. 10

6. (a) (i) With the help of block diagram explain the basic principle of operation of SMPS. 10
   (ii) List the distinct differences between flyback and forward converters.
   (b) Describe stator voltage control method for the speed control of a 3ϕ induction motor with neat diagram. 10

7. Write short notes on :-
   (a) Parallel inverter 07
   (b) Load commutated chopper 07
   (c) Static Kramer drive 06

7879AB9848BCA74B209B152B50853759

BE / ETRX / Sem-VII (OLD) / Digital Image Processing Design / May-17

Q.P. Code : 13258

[Time: Three Hours] **[Marks:100]**

N.B: Please check whether you have got the right question paper.
1. Question.No.1 is compulsory.
2. Solve any four remaining six questions.
3. Assume suitable data if needed.

Q.1 a) Explain image sampling and quantization. **(05)**
b) Explain why a Butterworth low pass filter is preferred to an ideal low pas filter. **(05)**
c) Differentiate between Huffman coding & Arithmetic coding. **(05)**
d) Give 3X3 masks for Laplacian filter, horizontal, vertical, +45°, -45° line detectors. **(05)**

Q.2 a) Draw and explain block diagram of JPEG encoder and decoder. **(10)**
b) What is segmentation? With the help of examples explain segmentation based on similarity. **(10)**

Q.3 a) Given below is the table of 8 symbols and their frequency of occurrences .Give Huffman code for each symbol. **(10)**

Symbol	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
Frequency	0.25	0.15	0.06	0.08	0.21	0.14	0.07	0.04

b) Explain any two image enhancement techniques in spatial domain. **(10)**

Q.4 a) Explain the following morphological operations with the help of examples. **(10)**
i) Erosion ii)Dilation iii) Opening iv)Closing
b) Define Haar Transform .Compute the Haar basis for N=2. **(10)**

Q.5 a) Discuss various Image representation schemes of digital image processing. **(10)**
b) Perform edge linking using Hough transform when the edge pixels (x,y) are :- (1,4), (2,3), (3,1), (4,1) and (5,0) **(10)**

Q.6 a) Write a note on Fast Hadamard Transform. **(10)**
b) For the 3 bit 4X4 size image shown, perform following operations. **(10)**
i) Thresholding T = 4
ii) Intensity level slicing with background $r_1 = 2$ and $r_2 = 5$
iii) Bit plane slicing for MSB and LSB planes
iv) Negation

4	2	3	0
1	3	5	7
5	3	2	1
2	4	6	7

Q.7 Write short notes on the following : **(20)**
a) Walsh transform
b) Moments
c) Finger print recognition
d) Fourier Descriptors
