College Of Engineering, Pune

END-SEM EXAM

(CT 305) Computer Algorithms in Signal Processing (CASP)

T.Y. B.Tech. (Computer Engineering)

Year: 2011-12 Semester: V Date: 28/11/2011

Duration: 3 hrs Max. Marks: 100

Instructions to candidates:

1. Answer any five questions.
2. Figures to the right indicate full marks.
3. Whenever the 0^{th} element in a signal is not explicitly mentioned by an arrow pointing to it, assume the first number mentioned in the given sequence as the 0^{th} element.
4. Draw neat diagrams wherever necessary.
5. Take appropriate examples wherever necessary.
6. Justify/elaborate important steps in solutions. Answers without proper justification will not get any mark(s).
7. Write precise answers. Use your judgment while writing proofs/justifications and avoid too short/too long answers (rough guideline is to write at most a full page for four marks).
8. Write all bits of a question together as far as possible.
9. Don't leave blank pages/space between answers.

Marks

Q.1 A. Prove each of the following equalities: **6**

(a) $\delta(n) = u(n) - u(n-1)$ (b) $u(n) = \sum_{k=-\infty}^{n} \delta(k)$ (c) $u(n) = \sum_{k=0}^{\infty} \delta(n-k)$

B. Prove that the convolution operation satisfies (i) Commutative law and (ii) Associative law **4**

Q.2 A. Consider the system **6**

$$y(n) = T[x(n)] = x(n^2)$$

Assume that $x(n) = 1, \quad 0 \le n \le 3$

$= 0, \quad$ elsewhere

(i) Sketch the signal x(n)
(ii) Determine and sketch the signal y(n) = T[x(n)]
(iii) Sketch the signal w(n) = y(n-2)
(iv) Determine and sketch the signal x2(n) = x(n-2)
(v) Determine and sketch the signal z(n) = T[x2(n)]
(vi) Compare the signals w(n) and z(n). Is T time invariant?

B. Determine the total solution for $n \geq 0$ of a discrete-time system characterized by the difference equation: $y[n] + y[n-1] - 6y[n-2] = x[n]$ for a step input $x[n] = 8u[n]$ and with initial conditions $y[-1] = 1$ and $y[-2] = -1$. **4**

Q.3 A. Consider the interconnection of LTI system as shown in (Fig – 1). **6**

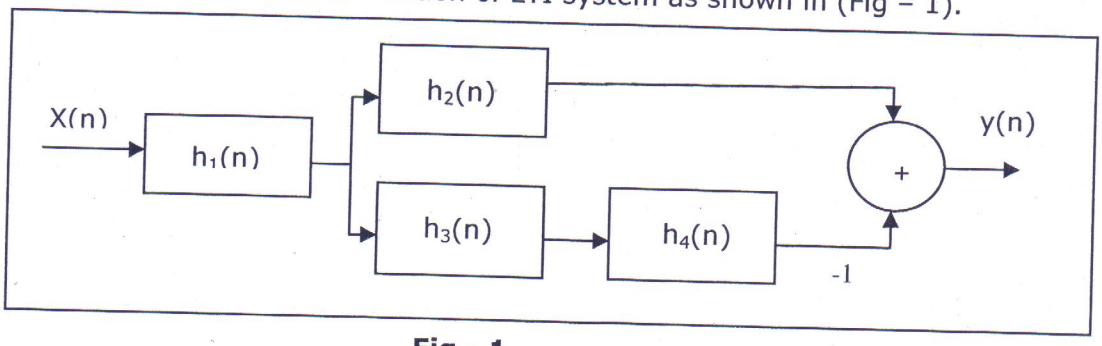

Fig - 1

(i) Express the overall impulse response in terms of $h_1(n)$, $h_2(n)$, $h_3(n)$ and $h_4(n)$.

(ii) Determine h(n) when $h_1(n) = \{1/2, 1/4, 1/2\}$, $h_2(n) = h_3(n) = (n+1)\,u(n)$ and $h_4(n) = \delta(n-2)$

(iii) Determine the response of the system if h(n) is as obtained in (ii) above and $x(n) = \delta(n+2) + 3\,\delta(n-1) - 4\,\delta(n-3)$

B. Prove that an LTI system is causal if and only if its impulse response is zero for negative values of n. **4**

Q.4 A. Compute the convolution of the following signals by means of z-transform. **6**

$$x_1(n) = (1/2)^n, \quad n \geq 0$$
$$= (1/2)^{-n}, \quad n < 0$$
$$x_2(n) = (1/2)^n u(n)$$

B. Determine the 4-point circular convolution of the sequences: $x1(n) = \{1, 2, 3, 1\}$ and $x2(n) = \{4, 3, 2, 2\}$ **4**

Q.5 A. Consider an LTI system with impulse response $h(n) = (1/2)^n u(n)$. Determine $H(\omega)$ and use it to find output for signal $x(n) = \cos(3\pi n/10)$, $-\infty < n < \infty$. **4**

B. Solve the following: **6**

(i) Show that Fourier transform of the signal

$$x(n) = 1, \quad -M \leq n \leq M$$
$$= 0, \quad \text{elsewhere}$$

is

$$X(\omega) = 1 + 2 \sum_{n=1}^{M} \cos(\omega n)$$

(ii) Show that if

$x_k(n) = x(n/k)$, if n/k integer
$= 0$, otherwise

Then

$X_k(\omega) = X(k\omega)$

(iii) Find the Fourier transform of the signal $x_1(n) = \{1, 1, \hat{1}, 1, 1\}$

(iv) Use (ii) and (iii) to get Fourier transform of

$x_2(n) = \{1, 0, 1, 0, \hat{1}, 0, 1, 0, 1\}$

Q.6 A. Derive the expression for N-point DFT in terms of two N/2-point DFTs of the decimated sequences (either in time or in frequency). **4**

B. Compute 8-point DFT V[k] of the length-8 real sequence v[n] given below: **6**

$v[n] = \{1, 2, 2, 0, 1, 1, 1\}$

Use the expression derived in (A) above recursively to compute all the required DFTs.

COLLEGE OF ENGINEERING PUNE

DEPARTMENT OF COMPUTER ENGINEERING & INFORMATION TECHNOLOGY

End-Semester Examination

(CT-304) Systems Programming

Class & Branch: Third year Computer Engineering **Semester: I**

Duration: 3 hour **Max Marks: 50**

Instruction: 1. All questions are compulsory.

2. Assume suitable data if necessary.

3. Figures to right indicate full marks.

4. Draw neat diagrams when necessary.

1. Explain in detail the Multi-Pass Assembler with suitable diagram and flowchart. [6]

2. a) Explain the term macro Expansion. What are the different types of macro expansion and the different facilities required for macro expansion. [4]

b) What are different types of nested macro? Explain with example each type. [4]

3. a) Explain recursive descent parser. [2]

b) Remove left recursion and construct a predictive parse for the following grammar. And show the behavior of the parser on the sentence (a,(a,a)). [4]

S -> (L) | a

L -> L, S | S

4. With a neat diagram explain the Editor Structure and its functions and explain different text editors. [6]

5. a) What is the importance of overlay structure? [2]

b) Explain the design of linking loader. [4]

6. a) What are the different compiler generation tools ,explain with proper examples. [3]
b) Explain and compare the various types of intermediate code forms. [3]

7. Explain in detail with proper examples [4X3M=12M]

(i) Dynamic Linking.

(ii) MS-DOS linker.

(iii) Single pass assembler.

(iv) Various phases of compiler.

COLLEGE OF ENGINEERING, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

END-SEM EXAM
(CT301) Computer Organisation
Program: T.Y.B. Tech (Computer Engineering)

Year: 20011-12 Semester I Date: 20/11/2011

Duration: 3 hrs Max. Marks: 100

Instructions:

1. Answer all questions.
2. Figures to right indicate full marks
3. Draw neat figures wherever required.
4. Assume suitable data, if necessary.

			Marks
Q.1		A computer system contains main memory of 32KB. It also has 4KB cache with 4 way set associative mapping, having block size of 64 bytes. Assume that cache is initially empty. The processor fetches bytes from locations 0^{th}, 1^{st}, 2^{nd}, 3^{rd}, 4^{th}, ……, 4351^{st} in that order. It then repeats this fetch sequence nine more times. The cache is 10 times faster than main memory. How is the main memory address interpreted for every access?	6
		Estimate the improvement resulting from the use of the cache. Assume LRU policy for replacement.	10
Q.2	a	Give the cache organisation in Intel core i7.	6
	b	Have following multiplications using both the techniques: Booth recoding and Bit pairing	12
		(i) - 29 x -15 (ii) -21 x 11	
Q.3	a	What is the support of legacy INT13h for accessing the hard disk with CHS addressing? What are the limitations therein?	8
	b	How is the support extended in INT13h for 64 bit LBA addressing?	10
	OR		
	b	What are the techniques for Bus Arbitration in multiprocessor system?	10
Q.4		Explain the microprogrammed control unit for generating the control signals in CPU. How does vertical microprogramming differ from horizontal microprogramming?	16

P.T.O.

Q.5 Attempt **any four** **16**

i) Represent the four bit data 1101. with appropriate hamming parity code.

ii) How does RISC support for handling procedure calls?

iii) What is the range and precision in double precision IEEE754 standard?

iv) How is writing a strip in RAID with block level parity i.e. RAID 4 is carried out?

v) How does disk bootstrap routine confirm whether disk contain copy of MS-DOS during MS-DOS loading?

Q.6 i) Considering the instruction pipeline with stages as Fetch instruction, Decode instruction, Execute instruction & Write result; indicate the timing diagram for instruction pipeline operation for executing twelve instructions. **6**

ii) What are the approaches for dealing with conditional branches in designing an instruction pipeline? **10**

OR

Q.6 Explain the following **16**

i) IBM PC monochrome display adapter

ii) SCSI standard

COLLEGE OF ENGINEERING, PUNE

Computer Engineering and IT Department

Class- T.Y.(Computer Engineering) Exam: End-Sem **Year – 2011-12**

Time: 3 hrs. **Subject: CT302 –Data Communication** **Marks: 50**

Instructions :-

1. **Draw neat figures wherever necessary**
2. **Assume suitable data wherever necessary**

Q.1 A Why do asynchronous communications require additional start and stop bits ?What is wrong with letting the first bit in a transmission acts as a start bit and the last one acts as a stop bit ? [3]

B Distinguish among simplex, half duplex, and full duplex communication. [3]

OR

C Distinguish between synchronous and asynchronous communication. [3]

D What is the bandwidth of a signal that can decompose into five sine waves with frequencies at 0, 30, 40, 120 and 300 Hz? All peak amplitudes are same. Draw the bandwidth. [2]

E A non – periodic composite signal contains frequencies from 10 to 40 KHz. The peak amplitude is 12 volt for the lowest and the highest signals and is 30 volt for the 20 KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum. [2]

Q.2 A List and explain the advantages of optical fiber over twisted – pair and coaxial cable. [3]

OR

B With respect to transmission media, compare Fiber Optics and Copper Wire. [3]

C What is line coding? Why is it necessary? Line code the stream 101011 using different schemes. [5]

OR

D Explain PCM with block diagram and different sampling methods with neat sketches. [5]

E Give any five advantages of digital communication over analog communication. [2]

Q.3 A What does the Nyquist theorem and Shannon capacity have to do with communications? Explain with proper examples. [4]

P.T.O.

B Digital data 11010101 is to be transmitted. Draw the resulting waveforms for the following methods.- [2]
i) Differential Manchester ii) AMI iii) Unipolar NRZ
iv) Polar NRZ-L.

C Explain the types of transmission modes with proper example. [4]

Q.4 A Which of the multiplexing techniques are used for analog signals and digital signals? Explain with proper example. [5]

B Why are spread spectrum techniques used in communication? Explain in detail the two techniques to spread the bandwidth. [5]

Q.5 A What are the major components of a telephone network? Compare and contrast a traditional cable network with a hybrid fiber-coaxial network. [5]

B Explain the following Communication Devices (any five) [5]
a) Hubs b) Switches c) Bridges
d) Router e) Gateway f) Repeaters