B.Tech. CS 4th year

B. Tech. IV Year VII Semester, First MID Term Examination, 2018-19

CSE7001: Digital Image Processing

Time: 01 ½ Hours   Total Marks: 20

Note:
1. Attempt **all** questions from Section-A, **any three** from Section-B and **any three** from Section-C.
2. Symbols have their usual meanings.

Section-A

Note: Attempt All Questions.   **[1X5=5 marks]**

I. Explain the term scotopic vision and photopic vision.
II. If an observer is looking at an object having a height 12m from a distance of 2m. Find out the size of the retinal image.
III. What is Checkerboard Effect?
IV. Consider a one dimensional signal f(x0=[60 60 60 100 100 100], what are the first and second derivatives?
V. Give two applications of image subtraction.

Section-B

Note: Attempt Any Three Questions   **[2x3 = 6 Marks]**

I. Discuss the different components of Digital Image Processing System.
II. Perform Grey Level Slicing on the following image assuming it is a 3-bit image. Let r_1=3 and r_2=5 Draw the modified image using background and without background transformations.

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

III.   Explain the RGB and HSI color model.

IV.   What is a Laplacian Filter? What will be the result of applying it on the following image?

Note: Clearly show the filter being used. Use zero-padding if required.

60	20	0
10	90	30
0	10	20

Section-C

Note: Attempt Any Three Questions   **[3X3=9 marks]**

I.   What is Digital Image Processing? Describe various applications of Digital image processing in detail.

II.   What is meant by histogram? Equalize the following histogram and give the histogram of output image.

Gray levels (r_k)	0	1	2	3	4	5	6	7
Number of pixels (n_k)	10	8	9	2	13	1	5	2

III.   Explain following image enhancement techniques and give their applications:

- Log transform
- Bit-plane slicing

IV. What is histogram specification. Perform histogram specification on the following 8x8 images. The gray level distribution of the images are given below:

Gray levels (rk)	0	1	2	3	4	5	6	7
Number of pixels (nk)	4	17	15	18	24	12	0	10

Gray levels (rk)	0	1	2	3	4	5	6	7
Number of pixels (nk)	0	0	0	36	24	12	8	20

First Term Examination, 2018-19
Course: B.Tech (CSE), Year: IV, Semester: VII
Advanced Computer Architecture (CSE 7002)

Time: 1.5 Hrs.   Total Marks: 20

Notes:

1. All parts of a question should be answered at one place.
2. Answer should be brief and to-the-point and be supplemented with neat sketches.
3. Any missing or wrong data may be assumed suitably giving proper justification.
4. Figures on the right-hand side margin indicate full marks.

Section A

Note: Attempt All Questions   (1x5=5)

I.   The CPU computations and I/O operations cannot be overlapped in a multiprogrammed computer. Given statement is True or False, Justify your answer with suitable reason.

II.   What do you mean by address translation in virtual memory?

III. Differentiate symmetric parallel processing and massive parallel processing.

IV.   Give four performance measure factors of Parallel Processing Systems with its mathematical formulae.

V.   How the performance and execution time of a computing device related to each other?

Section B

Note: Attempt any Three Questions   (2x3=6)

I.   Consider a cache (M_1) and memory (M_2) hierarchy with the following characteristics:

M_1 : 64k words, 5 ns access time.

M_2 : 4M words, 40 ns access time.

Assume 8-word cache blocks and a set size of 256 words with set-associative mapping.

a) Show the mapping between M_2 and M_1.

b) Calculate the effective memory access time with a cache hit ratio of h=0.95?

II. Differentiate implicit parallelism and explicit parallelism?

III. Discuss the different parallel processing mechanism for a uniprocessor system.

IV. A workstation uses a 1.5 GHz processor with a claimed 1000-MIPS rating to execute a given program mix. Assume a one-cycle delay for each memory access.

    a) What is the effective CPI of this computer?

    b) Suppose the processor is being upgraded with a 3.0 GHz clock. However, even with faster cache, two clock cycles are needed per memory access. If 30% of the instructions require one memory access and another 5% require two memory accesses per instruction, what is the performance of the upgraded processor with a compatible instruction set and equal instruction counts in the given program mix?

Section C

Note: Attempt any Three Questions   (3x3=9)

I. Discuss classification of Parallel Computers which is based on data and instruction flow using required diagram with suitable examples of each Parallel computers.

II. Explain how instruction set, CPU implementation and control, and cache and memory hierarchy affect the CPU performance and justify the effects in terms of program length, clock rate, and effective CPI.

III. Consider a two-level memory hierarchy, M_1 and M_2, with access times t_1 and t_2, costs per byte C_1 and C_2, and capacities S_1 and S_2, respectively. The cache hit ratio $h_1 = 0.95$ at the first level. (Note that t_2 is the access time between the CPU and M_2).

    a) Derive a formula showing the effective access time t_{eff} of this memory system.

    b) Derive a formula showing the total cost of this memory system.

    c) Suppose $t_1 = 20$ ns, t_2 is unknown, $s_1 = 512$ Kbytes, s_2 is unknown, $C_1 = 0.01$/byte, and $C_2 = 0.0005$/byte. The total cost of the cache and main memory is upper-bounded by 15,000.

    i)   How large a capacity of M_2 ($S_2 = ?$) can you acquire without exceeding the budget limit?

    ii) How fast a main memory of ($t_2 = ?$) do you need to achieve an effective access time of $T_{eff} = 40$ ns in the entire memory system under the above hit ratio assumptions?

IV. Compare the relative merits of the three cache memory organization also discuss the cache coherence problem and its solutions.

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First Term Examination, Odd Semester 2018-19

B. Tech. Computer Science and Engineering IV Year

Mobile Computing: CSE7003

Time: 90 Min   Max. Marks: **20**

Section- A

Note: Attempt All Five Questions.   1 x 5 = 5 marks

(I)   What is the uplink frequency of P-GSM system?

(II)   What are the three basic propagation mechanisms which impact propagation in a mobile communication system?

(III) What is the co-channel reuse ratio?

(IV) How and where is user-related data represented/stored in the GSM system?

(V)   What is near and far terminal problem?

Section- B

Note: Attempt Any Three Questions.   2x 3 = 6 marks

(I)   Can MACA still fail in case of hidden/exposed terminals? Explain your answer in detail.

(II)   How are guard spaces realized between users in CDMA?

(III) Describe the functions of the MS and SIM. Why does GSM separate the MS and SIM?

(IV) If a cellular operator is allocated 12.5 Mhz for each simplex band and if B_t is 12.5 Mhz, B_{guard} is 10khz and B_c is 30khz, then find the number of channels available in a FDMA system.

(I)   Explain the term interference in the time, frequency, and code domain. What are countermeasures in TDMA, FDMA, and CDMA systems?

(II)   How is localization, location update, roaming, etc. done in GSM and reflected in the data bases? What are typical roaming scenarios?

(III)   Consider a FDMA cellular system with 120 cites, a frequency reuse factor of N=12, and 900 overall two-way channels. Omni-directional antennas are used.

   a. Find out the 12-cell cluster including a cell A and its 11 neighboring cells, marked with B to L.

   b. Give the number of channels per cell, total number of channels available to the service provider, and the signal-to-interference ratio of the system.

   c. To expand the network, we decide to create an underlay-overlay system where the new system uses a frequency reuse factor of K=3. Give the number of channels assigned to inner and outer cells to keep a uniform traffic density over the entire coverage area. What is the total number of channels available now?

(IV)   What limits the number of simultaneous users in a TDM/FDM system compared to a CDM system? What happens to the transmission quality of connections if the load gets higher in a cell, i.e., how does an additional user influence the other users in the cell?

First Term Examination, Odd Semester 2018-19

Programme : B.Tech   Branch: CSE   Year:IV

Subject Name : Information Retrieval System

Subject Code: CSE 7025   Time :90 Min   Max. Marks : 20

Section- A

Note: Attempt All Five Questions..   1 x 5 = 5 marks

(I) Differentiate between exact match and best match?

(II) Enlist the steps for creating inverted index?

(III) Explain why IR techniques are essentially heuristics?

(IV) Explain with example trailing wildcard query?

(V) Define tf and Idf in IR system?

Section- B

Note: Attempt Any Three Questions.   2 x 3 = 6 marks

(I) Differentiate with different parameters for Boolean search and proximity search.

(II) Differentiate between information retrieval and data retrieval?

(III) In the permuterm index, each permuterm vocabulary term points to the original vocabulary term(s) from which it was derived. How many original vocabulary terms can there be in the postings list of a permuterm vocabulary term?

(IV) Discuss two situations with example where where wildcard queries are used?

Section- C

(I) Draw the inverted index that would be built for the following document collection and design the term-document incidence matrix for this document collection.

Doc 1 breakthrough drug for schizophrenia
Doc 2 new schizophrenia drug
Doc 3 new approach for treatment of schizophrenia
Doc 4 new hopes for schizophrenia patients

For the document collection shown above, what are the returned results for this query? **schizophrenia AND drug**

(II) What is query optimization and discuss the algorithm for the intersection of two posting lists P1 and P2?

(III) Explain permuterm index and permuterm vocabulary? How does this index help us with wildcard queries?

(IV) Recommend a query processing order for

(tangerine OR trees) AND (marmalade OR skies) AND (kaleidoscope OR eyes)

On the given postings list sizes:

Term	Postings size
eyes	213312
kaleidoscope	87009
marmalade	107913
skies	271658
tangerine	46653
trees	316812

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Programme: BTech   Branch: CSE   Year: IV

Subject Name: Business Intelligence   Sub Code: CSE7026

Time :90 Min   Max. Marks: 20

Section- A

Note: Attempt All Five Questions..

1 x 5 = 5 marks

(I) Explain in brief about the one key challenge with semi-structured data?

(II) Give two two examples of OLTP and OLAP systems.

(III) What are fact and dimension tables?

(IV) How ERP is different from BI?

(V) State few examples of strategic, tactical and operations decisions.

Section- B

Note: Attempt Any Three Questions.

2 x 3 = 6 marks

(I) In which categories the Business Intelligence (BI) applications can be divided, explain each category in brief.

(II) Differentiate between semi structured and structured data with the help of example.

(III) Do the comparisons between OLAP and OLTP on the basis of features they possess.

(IV) Define HOLAP and why we use it? Give the importance of HOLAP operations in BI.

Section- C

Note: Attempt Any Three Questions.

3 x 3 = 9 marks

(I) Explain the important OLAP operations with the help of suitable examples.

(II) Describe the business intelligence framework. State any two BI best practices.

(III) Explain the multidimensional data using an example. How is MOLP different from ROLAP?

(IV) Give examples to explain the various types of metadata: business metadata, application metadata, technical metadata and process metadata.

First Term Examination, 2018-19

Course: B.Tech.(CSE)   **Year: IV Semester: VII**

Data Mining & Warehousing (CSE7022)

Uni. Roll No: ....

Time: 1.5 Hrs.   **Total Marks: 20**
Notes:

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Section A

Note: Attempt All Questions   (1x5=5)

I.   What is numerosity reduction?

II. What is Binning?

III. Define MOLAP?

IV. How many cuboids in an n-dimensional cube with L levels?

V.   Discuss any two issues to consider during data integration.

Section B

Note: Attempt any Three Questions   (2x3=6)

I.   Suppose that the data to be reduced consist of tuples or data vectors described by n-attributes or dimensions, which method should be applied for dimensionality reduction in this scenario?

II. How are the Buckets determined and the attribute values partitioned, explain using a suitable example?

III. Define the Base and Aggregate cells, using a suitable example?

IV. Explain the Data Mart and Virtual data warehouse.

Section C

I. How concept hierarchies are useful in OLAP, explain any three OLAP operations using a suitable example.

II. Explain the three tier data warehouse architecture.

III. Define snowflake schema for the data warehouse. Also discuss how measures are computed.

IV. Draw a star schema diagram for the data warehouse, which consists of the four dimensions, date, spectator, location, and game, and the two measures, count and charge, where charge is the fare that a spectator pays when watching a game on a given date. Spectators may be students, adults, or seniors, with each category having its own charge rate.