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5E3257

Roll No. : _____ Total Printed Pages : 3

5E3257

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Computer Science
5CS6.2 Digital Signal Processing (Common for Computer & IT)

Time : **3** Hours] [Total Marks : **80**
[Min. Passing Marks : **24**

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Consider a discrete time system with the Input-Output relation

$$y(n) = T\{x(n)\} = x^2(n)$$

Determine whether this system is linear and time invariant or not. **10**

(b) Explain linear and non linear systems for discrete time systems. **6**

OR

1 (a) A system has impulse response

$$h(t) = \begin{cases} 1 & , \ 0 < t < 1 \\ 0 & , \ \text{Otherwise} \end{cases}$$

the input is $x(t) = e^{-t}\ u(t)$
Find the response of system evaluating the convolution integral. **10**

(b) Explain the important properties of LTI systems. **6**

UNIT - II

2 (a) Find the inverse Z-transform of $X(Z)$ using partial fraction expansion approach

$$X(z) = \frac{Z+1}{3Z^2-4Z+1} \quad ROC\ |Z|>|$$

10

(b) Prove that if $Y(n)$ represents the convolution of two descrete sequences $x(n)$ and $h(n)$ then
$Y(z) = H(z)\ X(z)$

6

OR

2 (a) State and explain the initial value theorem and final value theorem

8

(b) Find the Z-transform of the following
(i) $a^n\ u(n)$
(ii) $-b^n\ u(-n-1)$

4+4

UNIT - III

3 (a) Explain the sampling of discrete time signals in detail.

8

(b) State and prove sampling theorem and Nyduist rate of sampling.

8

OR

2 (a) Explain Interpolation Techniques for the Reconstruction of a signal from its samples with the help of appropriate example.

12

(b) Write short note on Mathematical theory of sampling.

4

UNIT - IV

4 Given the following sequence :

$$x(n) = \begin{cases} e^{j\omega_0 n} & , \ 0 \le n \le N-1 \\ 0 & , \text{ elsewhere} \end{cases}$$

(a) Find the DTFT of $x(n)$

5

(b) Find the N point DFT of $x(n)$

5

(c) Find the DFT of $x(n)$ for case $\omega o = \frac{2\pi Ko}{N}$ where K_o is an integer.

6

OR

4 (a) Draw the flow diagram for a 16-point radix-2 decimation-in-time FFT algorithm. Label all the multiplicis appropriately.

8

(b) Find the 8-point DFT of a real sequence
$x(n) = (1,2,2,2,1,0,0,0)$
using decimation in frequency FFT alrogithm.

8

UNIT - V

5 A Butterworth low pass filter has to meet the following specifications :

(a) Passband gain, Kp = -1 dB and Ω p = 4 rad/sec.

(b) Stopband attenuation greater than or equal to 20 dB at Ω s=8 rad/sec.

Determine the transfer function $H_a(s)$ of the lowest order Butterwork filter to meet above specifications.

16

OR

5 (a) The transfer function H(z) given below is designed using bilinear transformation method with T=2. Determine the parent causal transfer function $H_a(s)$

$$H(z) = \frac{5z^2 + 4z - 1}{8z^2 + 4z}$$

10

(b) Write short note on FIR filters.

6

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5E3252

Roll No. : _____ Total Printed Pages : 4

5E3252

B. Tech. (Sem. /) (Main/Back) Examination, December - 2013
Computer Science (Common for Computer & IT)
5CS3 Telecommunication Fundamentals

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) For an encoding scheme $\frac{E_b}{N_o}$ = 8.4 dB is required for a bit error of 10^{-4}. If the effective noise temperature is 290°K and the data rate is 2400 bps, what received signal level is required ?

5

(b) An NRZ-L signal is passed through a filter with r = 0.6 and then modulated onto a carrier. The data rate is 2400 bit/sec. Evaluate the bandwidth for ASK and FSK.

Assume Δf = 5 kHz for FSK.

4

(c) List two major functions performed at each layer of TCP/IP model. What are the major differences in the services at data link layer and transport layer ?

7

OR

1 (a) Explain the synchronization problem. How to solve it ? Explain with suitable diagrams.

6

(b) Calculate bandwidth required to transmit the video signal of T.V. made of 300,000 small picture elements. Each element can assume to distinguish brightness levels (such as black and shades of gray) for proper contrast, equally likely to occur. There are 30 picture frames being transmitted per second. Signal to Noise level is to be maintained 30 dB for satisfactory reproduction. 5

(c) A transmitter radiates 20 watts of power at a wavelength of 4 cm. Calculate the power received by an antenna at a distance of 100 km if the gain of the transmitting and receiving antenna are equal and have a value of 30 dB. 5

UNIT - II

2 (a) Generate the CRC code for message 1101010101. Given generator polynomial.
$g(x) = x^4+x^2+1$ 8

(b) Draw the sender and receiver window for a system using GO-Back-N-AKQ given the following :
(i) Frame 0 is sent, frame 0 is acknowledged
(ii) Frame 1 and 2 all sent' frame 1 and 2 are acknowledge
(iii) Frames 2, 4 and 5 are sent; frame 4 is acknowledged; timer for frame 5 expires. 8

OR

2 (a) Explain Linear Codes and how error you detect and correct using linear code techniques. 7

(b) Calculate the throughput for stop and wait flow control mechanism if the frame size is 4800 bits, bit rate is 9600 bps and distance between device is 2000 km. Speed of propagation over the transmission media is 2,00,000 km/s. 5

(c) A channel is operating at 4800 bps and propagation delay is 20 ms. What would be the minimum frame size for stop-and-wait flow control to get 50% link utilization efficiency ? 4

UNIT - III

3 (a) Explain the working of PPP with the help of phase diagram. List all the activities carried out during each phase. 6

(b) Show that the slotted ALOHA has a maximum throughput of twice the maximum throughput. 4

(c) A 1 km, 10 Mbps CSMA/CD LAN has a propagation speed of 200 m/μ sec. Data frames are 256 bits long, including 32 bits of header, check sum and other overhead for the receiver to capture the channel to send a 32-bit acknowledgement frame. What is the effective data rate, excluding overhead, assuming there are no collisions ? 6

OR

3 (a) Consider two stations on a baseband bus at a distance of 1 km from each other. Let the data rate be 1 Mbps, the frame length be 100 bits and the propagation velocity be 2×10^8 m/sec. Assume that each station generates frames at an average rate of 1000 frames/sec.

Find the probability of collision for a station which beings to transmit at time t for

(i) Pure ALOHA and

(ii) Slotted ALOHA 8

(b) Write short notes on :

(i) HDLC

(ii) Collision free protocol. 8

UNIT - IV

4 (a) Assume that the velocity of propagation on a TDM bus is 0.8 c (c = speed of light), its length is 10 m and the data rate is 500 Mbps. How many bits should be transmitted in a time slot to achieve a bus utilization of 99% ? 5

(b) Explain and compare synchronous TDM and statistical TDM. 4

(c) Explain the operations of ADSL using Discrete Multi Tone (DMT). Draw block diagram of DMT transmitter. 7

OR

4 (a) How a frame is constructed when N number of sources are multiplexed into a single channel using synchronous TDM if :

(i) All the sources are of equal data rates.

(ii) One source emits at twice the data rates than others. 6

(b) Explain routing in circuit switched networks. Why is it required ?

4

(c) Ten analog signals that are bandwidth limited to frequencies below 16 kHz and sampled at the nyquist rate, the digitizing error is to be held below 0.2%. The signals are to travel on a synchronous TDM channel. What is the data rate required for the channel ?

6

UNIT - V

5 (a) What are the tasks of PN sequences in multiusers wireless or personal communications CDMA system ?

5

(b) Explain working of FHSS. What are its advantages ?

4

(c) If W = 1.25 MHz, R = 9600 bps and a minimum acceptable E_b/N_o is found to be 10 dB, determine the maximum number of users that can be supported in a single cell CDMA system using

(i) Omni directional base station antenna and no voice activity detection.

(ii) Three sectors at the base station and activity with α = 3/8. Assume the system in interference limited.

7

OR

5 (a) An FHSS system employs a total bandwidth of W_s = 400 MHz and in individual channel bandwidth of 100 MHz. What is the processing gain of FHSS system ?

4

(b) Describe direct sequence spread spectrum technique.

4

(c) Write short notes on :

(i) PN sequence

(ii) Orthogonal codes in SS system.

8

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5E3161

Roll No. : _____ Total Printed Pages : 3

5E3161

B. Tech. (Sem. V) (Back) Examination, Decembe - 2013
Computer Science
5CS3 Data Base Management System (Common with CS and IT)

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) What are the main benefits of using a DBMS to manage data in applications involving extensive data access ? 8

(b) When would you store data in a DBMS instead of in operating system files and vice-versa ? 8

OR

1 (a) What is a transaction ? What guarantees does a DBMS offer with respect to transactions ? 8

(b) What are the responsibilities of a DBA ? If we assume that the DBA is never interested in running his or her own queries, does the DBA still need to understand query optimization? Why ? 8

UNIT - II

2 (a) What is the role of E-R model in Database design ? Draw an E-R diagram for Hospital Management system. 8

(b) Define the key constraint and participation constraint with an example of each. 8

OR

2 (a) Describe the differences in meaning between the following terms :
(i) Relation vs relation schema
(ii) Binary vs Ternary Relationship 8

(b) Discuss the following with example :
(i) Weak Entities
(ii) Class Hierarchies
(iii) Aggregation
(iv) Relationship set 8

UNIT - III

3 (a) Describe the set operations of relational algebra, including union, intersection, set-difference and cross-product. 8

(b) Explain how the renaming operator is used. Is it required ? That is, if this operator is not allowed, is there any query that can no longer be expressed in algebra ? 8

OR

3 (a) Relational algebra and relational calculus are said to be equivalent in expressive power. Explain what this means, and how it is related to the notion of relation completeness. 8

(b) Define the join operation and division operation with example. 8

UNIT - IV

4 (a) Consider following schema and write SQL for given statements.
Student (RollNo, Name, Age, Sex, City)
Student –Marks (Roll No, Sub1, Sub2, Sub3, Total, Average)
Write query to
(i) Display name and city of students whose total marks are greater than 225.
(ii) Display name of students who got more than 60 marks in each subject.

(iii) Display name of city from where more than 10 students come from.

(iv) Display name of female students whose age is greater than 25.

10

(b) What are nested queries and correlation in nested queries ? Why are they useful ?

6

OR

4 (a) What do you mean by trigger in database ? Explain with suitable examples.

8

(b) Discuss the following with suitable examples.

(i) Embedded SQL and Dynamic SQL

(ii) ODBC and JDBC

8

UNIT - V

5 What do you mean by functional dependencies ? Define 1NF, 2NF, 3NF and BCNF. What is the motivation for putting a relation in BCNF ? Gives the example of each.

16

OR

5 (a) What is a decomposition and how does it address redundancy ? What problems may be caused by the use of decompositions ?

8

(b) Explain schema refinement in database design.

8

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5E3254

Roll No. : _____ Total Printed Pages : 2

5E3254

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Computer Science (Common for Computer & IT)
5CS4 Data Base Management System

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Describe the structure of a DBMS. How it is different from RDBMS ? 8

(b) Explain DBA and data dictionary in brief. 8

OR

1 (a) Explain Network and object oriented model. What are the role of these models in database design ? 8

(b) Differentiate between :
(i) Ternary relationship and Aggregation
(ii) Entity and attribute. 8

UNIT - II

2 (a) What is the difference between relational algebra and relational calculus ? 8

(b) Explain expressive power of algebra and calculus. 8

OR

2 (a) Discuss the various types of keys that are used in relational model. 8

(b) Discuss the difference between five join operation : Theta join, Equijoin, Natural join, Outer join and semijoin. 8

UNIT - III

3 (a) Describe the concept of full functional dependency (FFD). 8

(b) Define BCNF. How does it differ from 3 NF ? Why it is considered a stronger form of 3 NF? 8

OR

3 (a) State the properties of transaction. 8

(b) Define recoverable and cascadeless schedule. 8

UNIT - IV

4 (a) Explain concurrency control. What is lock based protocol ? 8

(b) What is time stamp based protocol ? Explain its pitfall. 8

OR

4 (a) What are database failures ? Explain database recovery. 8

(b) Explain forward and backward recovery, also differentiate between them. 8

UNIT - V

5 (a) Distinguish between primary index and secondary index. 8

(b) What is splitting of node in B++ tree ? 8

OR

5 (a) What is Hash file organization ? What is hash index ? 8

(b) What is bit map index ? Explain with examples. 8

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5E3162

Roll No. : _____ Total Printed Pages : 3

5E3162

B. Tech. (Sem. V) (Back) Examination, December - 2013
Computer Science
5CS4 Computer Graphics

Time : **3** Hours] [Total Marks : **80**
[Min. Passing Marks : **24**

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Explain Raster scan display system with help of block diagram. 8

(b) A screen has 1024 scan lines with aspect ratio 4:3 and bit depth 24, what is the resolution of the screen and size of the frame buffer ? 8

OR

1 (a) Explain basic techniques used in producing colour display in colour CRT monitors. 8

(b) Write short note on :
(i) DVST
(ii) Random scan 8

UNIT - II

2 Explain mid point circle algorithm. Plot a circle having radius R = 10 units using mid point circle algorithms. 16

OR

2 (a) Explain Bezier curves and also discuss properties of Bezier curves. 8

(b) Consider the lines from(20,10) to (30,18). Use the Bresenhan's algorithm to rasterize the lines. 8

UNIT - III

3 (a) Describe different type of parallel projections used in computer graphics. 8

(b) Prove that the two scaling transformation commute i.e. $S_1 \cdot S_2 = S_2 \cdot S_1$. 8

OR

3 (a) Write 2×2 transformation matrix for each of the following rotation about the origin.

(i) Counter clockwise by π

(ii) Clockwise by $\pi/2$ 8

(b) What is perspective projection ? Explain various type of perspective projection. 8

UNIT - IV

4 (a) Explain Cohen-Sutherland line clipping algorithm. 8

(b) Explain Z-buffer algorithm for hidden surface elimination. 8

OR

4 Explain the followings :

(i) Diffuse reflection and specular reflection.

(ii) Phong shading

(iii) Ray testing

(iv) RGB and HSV colours model 16

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UNIT - V

5 (a) What are multimedia authoring tools ? Explain its various types. 8

(b) Write short notes on :
(i) JPEG life format
(ii) TIFF file format 8

OR

5 Write notes the following :
(i) MPEG and MPEG standards
(ii) Animation techniques 16

UNIT - II

2 (a) What is critical section problem ? How are semaphores used for solving critical section problem.

8

(b) Describe the solution of Dining-Philosophers problem.

8

OR

2 (a) Consider the following set of process with the arrival time and CPU burst time given in milliseconds :

Process	Arrival time	CPU burst time
P1	0	24
P2	3	7
P3	5	6
P4	10	10

Determine Average Waiting time and Average turn around time with the preemptive SJF scheduling.

8

(b) What is scheduling ? Explain short term and long term scheduling. Describe the performance criteria of a scheduler.

8

UNIT - III

3 (a) What is deadlock ? What are the necessary conditions for deadlock to occur ?

8

(b) Explain the following :

(i) Resource allocation graph

(ii) Recovery from deadlock.

4×2=8

OR

3 (a) Explain the difference between internal and external fragmentation.

6

(b) Explain the following :

(i) Logical and Physical address space.

(ii) Dynamic linking.

5×2=10

UNIT - IV

4 (a) Explain the various page replacement policies using a suitable example.

10

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5E3255

Roll No. : _____ Total Printed Pages : 3

5E3255

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Computer Science
5CS5 Operating System (Common for Computer & IT)

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Explain the following :
(i) Process
(ii) Thread
(iii) Kernel
(iv) System call.

4×2=8

(b) Define Operating System. Explain how operating system acts as a resource manager ? Differentiate between Multiprogramming and Multi-processing ?

8

OR

1 (a) Explain the various states of a process using a suitable diagram.

5

(b) Explain the various services that are provided by the operating system in brief.

5

(c) Differentiate between :
(i) User thread/Kernel thread
(ii) System call / function call.

6

(b) Under what circumstances do page fault occurs ? Describe the actions taken by the operating system when a page fault occurs. 6

OR

4 Explain the following :
(i) Demand Paging
(ii) Segmentation with paging scheme
(iii) Thrashing
(iv) Global versus local allocation

4×4=16

UNIT - V

5 (a) Explain various disk scheduling algorithms in brief. 8

(b) What are the various access methods for file system ? 8

OR

5 Explain the following :
(i) Tree structured directory
(ii) Spooling
(iii) File system mounting
(iv) Memory mapped files.

4×4=16

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5E3256

Roll No. : _____ Total Printed Pages : 2

5E3256

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Computer Science
5CS6.1 Advanced Data Structure (Common for Computer & IT)

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 Explain Huffman Trees in detail. Suppose we are given the following table of letter frequencies

a	*b*	*c*	*d*	*e*	*f*
1	2	3	4	5	6

Create a Huffman coding tree for this table. 16

OR

1 Describe 2-3 Trees with the help of an appropriate example. Explain various operations performed on the 2-3 tree. 16

UNIT - II

2 What are Binomial Trees ? Explain how we can implement Binomial Heaps and also explain its various operations. 16

OR

2 (a) Explain 2-3-4 Trees with the help of an example. Explain the function of insertion and deletion with an example. 12

(b) Write short note on Fibonacci Heap. 4

UNIT - III

3 Explain the following terms incorporated with graphs with the help of examples.

(a) Circuits
(b) Cut-sets
(c) Cut-Vertices Planer
(d) Dual graphs.

4+4

OR

3 (a) Write and explain SingleMin-Cut Max-Flow theorem of Network Flows.

8

(b) Write and explain Ford-Fulkerson Max Flow Algorithms.

8

UNIT - IV

4 What is SORTING NETWORK ? Explain zero-one principle and bitonic sorting and merging network sorter in detail.

16

OR

4 (a) Explain various operations on Disjoint sets also describe its union-find problem.

8

(b) Describe the concept of Priority Queues using 2-3 Trees.

8

UNIT - V

5 (a) Explain the use of number theoretic notions in data structures.

6

(b) Describe division theorem with the help of an appropriate example.

10

OR

5 (a) What is Modular Arithmetic ? Also explain methods to solve Modular Linear equation.

12

(b) Write short note on primality testing and Integer Factorization.

4

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Roll No. : _____ Total Printed Pages : 4

5E3251

B. Tech. (Sem. V) (Main/Back) Examination, December - 2013
Computer Science
5CS1 Computer Architecture (Common for Computer & IT)

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) If a computer has 128 operation codes and 512 k addresses, how many bits would be required for
(i) Single address instruction
(ii) Two address instruction

6

(b) What is instruction ? What are different parts of an instruction ? Explain the significance of each part of an instruction with an example.

6

(c) What do you mean by instruction set completeness ?

4

OR

1 (a) What is addressing mode ? Explain different addressing modes with suitable examples.

7

(b) Explain Von Neumann Architecture. What are its drawbacks ?

7

(c) What is the data transfer rate of PCI bus ?

2

UNIT - II

2 (a) What are the different conflicts that will arise in pipeline ? How do you remove the conflict ? Describe.

8

(b) Why do we require instruction pipelining ? Explain its working procedure. Discuss the pipeline performance measures.

8

OR

2 (a) Differentiate between synchronous and asynchronous data transfer method.

8

(b) Give the difference between RISCand CISC processor. Describe in detail.

8

UNIT - III

3 (a) Discuss how Booth's algorithm treats positive and negative multiplier uniformly.

6

(b) With the help of a block diagram discuss the construction and working of 8 bit carry look ahead adder. Also compute total time needed to perform one addition using gate delay of each gate 8 μs and no delay are involved in the connecting wires.

10

OR

3 (a) Using Booth's algorithm, Multiply (+14) and (–12) when the numbers are represented in 2's complement form.

8

(b) What is serial adder ? Discuss it briefly with diagram.

4

(c) Explain floating point addition and substraction with suitable example.

4

UNIT - IV

4 (a) How many 256 × 8 ROM chips are required to produce a memory capacity of 4000 bytes ? How many address lines are required to access 4000 bytes ? How many of these addresses will be common to all these chips ?

6

(b) What is Cache mapping ? Explain directmapping for 256 × 8 RAM and 64 × 8 Cache memory.

6

(c) Discuss the general characteristics of memory system. What is the use of virtual memory and discuss its concept.

4

OR

4 (a) A disk pack of 20 recording surfaces and has 400 cylinders. There is an average of 300 sectors per track. Each sector contain 512 bytes of data.

(i) What is the maximum number of bytes that can be stored in this pack ?

(ii) What is data transfer rate in bytes per second at a rotational speed of 3600 rpm?

8

(b) Explain the organization of a 1 k × 1 memory with neat sketch.

8

UNIT - V

5 (a) What is Direct Memory Access ? Explain the working of DMA.

8

(b) What are different type of DMA transfer ? Explain.

8

OR

5 Write short notes on :

(a) Priority interrupt

(b) IOP processor.

2×8=16