2011

This question paper contains 4 printed pages.

6623 *Your Roll No.* .....

B.Sc. (Hons.) Computer Science / V Sem. **B**

Paper – CS 501 : FILE STRUCTURES AND DATABASE SYSTEMS

(Admissions of 2001 and onwards)

Time : 3 hours *Maximum Marks* : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt all questions.
Parts of a question must be attempted together.

1)

a) Explain data independence. Why is data independence a desired goal for database approach? (3 +2)

b) Which type of user would perform the following functions for a billing system in a large company: (2)
(i) Responding to call from customer regarding the current balance due amount to them.
(ii) Write a program to generate monthly bills.
(iii) Make changes in physical schema to improve performance of the queries on the database.
(iv) Develop schema for a new billing system

c) List the database system utilities provided by most DBMSs and explain these utilities briefly. (4)

2)

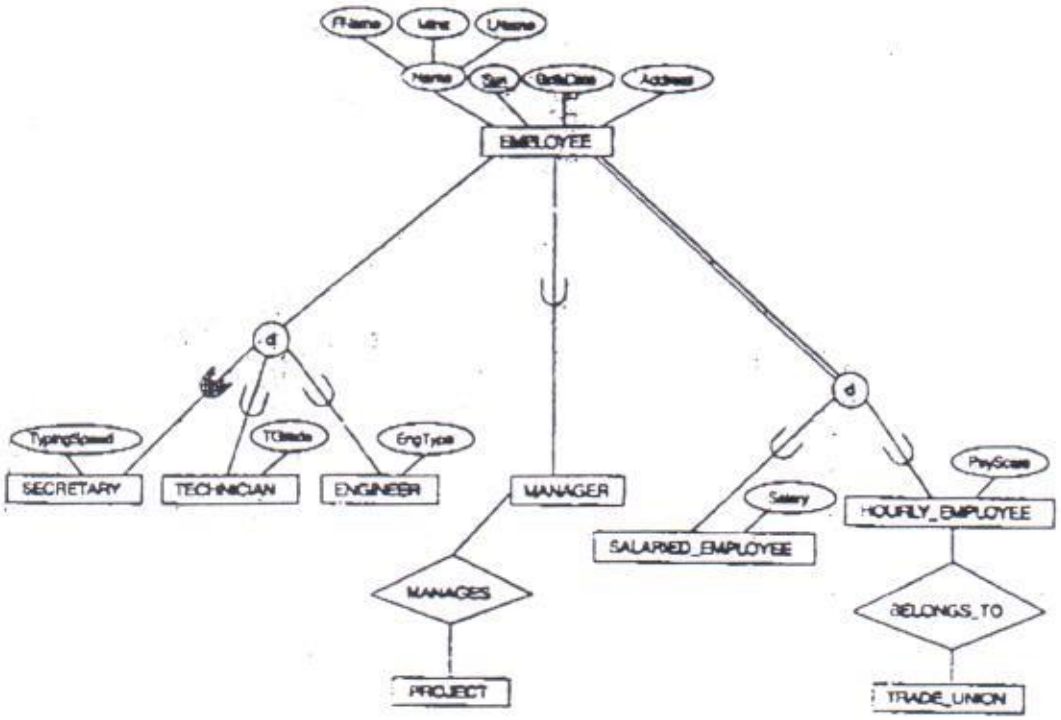
a) Draw the ER diagram specifying clearly Keys, cardinality and participation constraints for the following problem.

M-Series Music Company has decided to store information about musicians who perform on its album in a database.

- Each musician has (SSN, NAME, ADDRESS and PHONE NUMBER). No address has more than one phone. Each instrument used in songs recorded at the company has a UNIQUE ID NUMBER (UID), NAME (eg GUITAR, FLUTE etc.).
- Each album recorded has a UID, TITLE and COPYRIGHT DATE. Each song recorded has a TITLE and an AUTHOR.
- Each musician may play several instruments and an instrument may be played by several musicians.
- Each album has a number of songs but no same song can appear in more than one album.
- Each song is performed by one or more musicians and a musician may perform a number of songs.
- Each album has exactly one musician as its producer. However, a musician may produce several albums. (10)

Turn over

b) Map the following specialization into relations. (5)



3)

a) Differentiate between the followings giving one example each:
   i) Relation and views
   ii) Entity and Referential Integrity Constraints (2+2)

b) Find candidate keys for the following relation: (2)

Field1	Field2	Field3
A	10	e
B	20	f
C	30	g
D	10	h
A	15	h

c) Consider the following schema STUDENT_ENROLLMENT

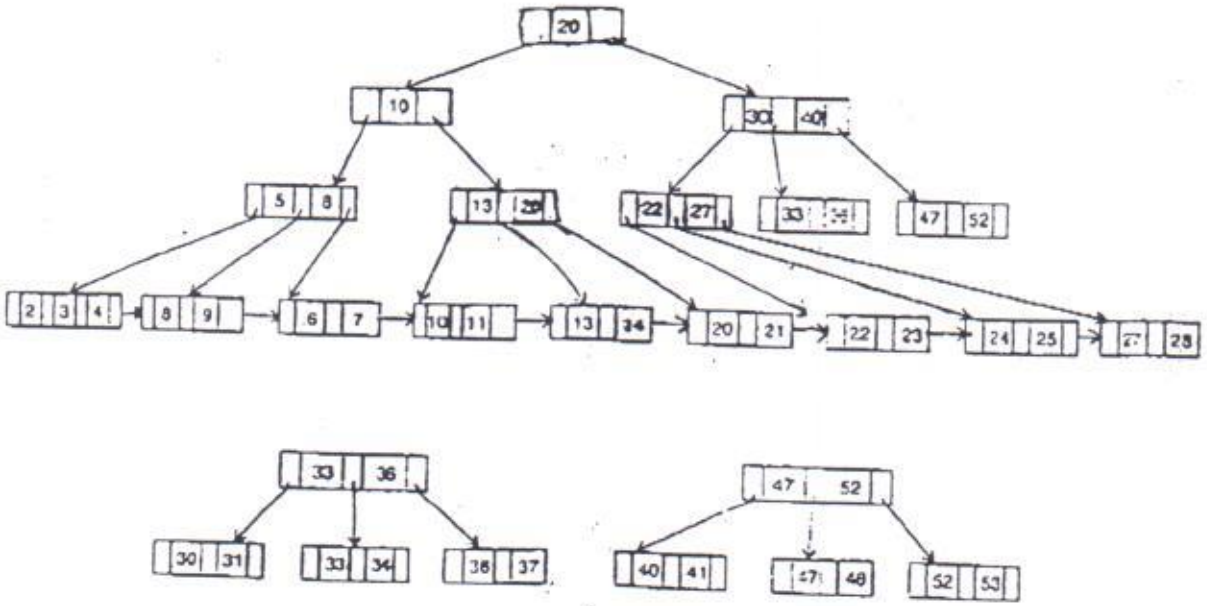
STUDENT(SSN, Name, Course#, Bdate)
COURSE(Course#, Coursename, Depttname)
ENROLL(SSN, Course#, Semester, Grade)
BOOK_ADAPTION(Course#, Semester, Book_ISBN)
TEXT(Book_ISBN, Book_title, Publisher, Author)

Write down following queries in Relational Algebra:
i) Retrieve a list of text books with course#, Book_ISBN, Book_title for courses offered by 'Computer Sc' department.
ii) List course name in which more than 2 books are used.
iii) List any department that has all its adapted books from the 'BPR' publisher (2x3)

4) Use schema STUDENT_ENROLLMENT (Q. No. 3(c)) to answer following queries in SQL
a) Create given tables with all possible constraints. Choose appropriate datatypes for attributes.
b) (3)

i) Insert a new course with codeCS405, name 'Software Engg' offered by deptt. of Computer Sc.
ii) Delete course in which no student is enrolled.
iii) Modify book_title to 'Database Systems' of the book with BOOK_ISBN 'B101'
iv) Display Course names in which at least 5 students have got Grade 'B'.
v) Retrieve student names studying in department 'Computer Sc.'
vi) Retrieve course name in which minimum students are enrolled (1+1+1+2+1+2)

5)
a) Given the tree structure as B+ tree (at the end of question paper). List all violations in the given tree, assuming the tree is of order four i.e. 4 keys and 5 pointers. (4)



b) Consider a file that contains records with the following search key values and is using extendable hashing:
2, 3, 5, 7, 11, 19, 23, 29, 31 (4)
Show the extendable hash structure for this file if the hash function is h(x)= x mod 8 and buckets can hold three records.

c) When is it preferable to use a dense index rather than a sparse index? Explain your answer. (1)

d) Let us assume that a disk block hold either three records, or ten key-pointer pairs. As a function of n, the number of records, how many blocks do we need to hold a data file and

i) A dense index ? ii) A sparse index ? (3)

6)

a) What are Armstrong's inference rules and why are they important? (2+1)

b) Given a relational scheme R(X,Y.Z.U,W) with FDs F={X→YZ, U →X, YZ→U}

i) Find candidate keys of R.

ii) Compute minimal cover of F.

iii) What normal form is R in? Normalize it further till it cannot be decomposed, stating reasons for decomposition. (2+2+4)

c) Explain insertion and modification anomalies with examples. (3)

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6597 *Your Roll No.* .....

B

B.Sc. (Hons.) COMPUTER SCIENCE / V Semester

Paper CS-502 : COMPUTER NETWORKS

(Admissions of 2001 and onwards)

Time : 3 hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

All *questions are compulsory. Parts of the question should be answered together.*

1. (a) Which of the OSI Layer(s) handles each of the following :–

(i) Flow Control

(ii) Synchronization

(iii) Routing decision (3)

(b) State whether a Connection-Oriented or Connectionless service is required for the following :–

(i) ATM

(ii) DNS Query

(iii) X.25

(iv) Real time traffic (4)

P.T.O.

(c) What do you understand by modulation ? Define various types of modulation schemes used in analog communication. Draw the constellation diagram for 16 QAM using 3 amplitude and 3 phases per quadrant. (1+2+2)

(d) Explain backward learning in Transparent Bridges. (3)

2. (a) What signal-to-noise ratio is needed to put a T1 carrier on a 50-kHz line ? (3)

(b) What will be the transmitted frame when original frame is 10100001101 and generator polynomial is 11001, using cyclic redundancy check ? (4)

(c) What is the difference between In-band signaling and Out-band signaling ? Which scheme does ISDN use ? (2+1)

(d) What is a URL ? List and explain its different components. (1+1+1)

(e) How is BOOTP different from DHCP ? (2)

3. (a) What are two types of switches ? Distinguish between them. (1+2)

(b) Diagrammatically explain IP-header and discuss the various fields including option field of header. (6)

(c) What do you understand by subnetting ? Extract the subnet address from the IP address 125.134.112.66 with subnet mask 255.255.244.0. (1+2)

(d) Discuss count to infinity problem in Distance Vector Routing. (3)

4. (a) What is the size of ATM cell ? Why is it small and of fixed-length ? (1+2)

(b) A signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lowest frequency ? Draw the spectrum if signal contains all integral frequencies of the same amplitude. (1+2)

(c) Explain the use of piggybacking ? Discuss the working of sliding window protocol. (1+3)

(d) A cable TV system has 150 commercial channels, all of them alternating programs with advertising. Is this more like TDM or like FDM ? (2)

(e) Describe three-way handshake connection establishment scheme in TCP ? (3)

5. (a) Explain the algorithm by which the collisions can be reduced in Ethernet. (4)

(b) Draw the waveform of the bit stream 101100111001 using the following encoding schemes :

(i) Manchester encoding

(ii) NRZ – I encoding

(iii) Differential Manchester encoding

(iv) RZ encoding (1+1+1+1)

(c) Discuss the technique that allows programmers to call procedures located on remote hosts along with its disadvantages. (4)

(d) What do you mean by well-known ports ? Name ports used by HTTP and SMTP. (1+2)

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6598 *Your Roll No. .....*

B.Sc. (Hons.) Computer Science/V Sem. B

Paper - 503 MICROPROCESSORS

(Admissions of 2011 and onwards)

Time : 3 Hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Answer All questions.

Parts of a question should be attempted together.

1. (a) Describe segment registers used in the 8086 microprocessor. 4

(b) What is the purpose of the TLB located within the 80486 microprocessor ? 2

(c) Determine the memory location addressed by the following real mode pentium 4 register combinations : 4

(i) SS = 8000 H and ESP = 00009000 H

(ii) DS = 1239 H and EDX = 0000A900 H

[P.T.O.

2. (a) How is the instruction MOV CL, DS; [1234 H] is different from MOV AL, DS : [1234 H] 2

(b) How many bytes of memory are used in for direct jump instruction ? What is stored in each of the bytes ? 3

(c) If EAX = 00001000 H, EBX = 00002000 H and DS = 0010 H. Determine the address accessed by following instruction, assuming it a real mode instruction : 4

(i) MOV [EAX + 2 + EB ×], CL

(ii) MOV ECX, [EAX + EBX]

3. (a) Write a short sequence of instructions that transfer data from a data segment memory array (ARRAY) to as I/O device at I/O address 3ACH. 5

(b) Differentiate between :- 4

(i) MOVSX and MOVZX

(ii) LEA SI, DATAI and MOV SI, OFFSET DATA

4. (a) Write a near procedure to find out the cube of the contents of the CX register. 4

(b) What is vector table ? Explain the operations of following instructions : 1+3=4

(i) INT 3

(ii) INT 0

(c) Which conditional jump instruction test both the Z and C flag bits ? 2

5. (a) What are the purposes of the status bits S3 and S4 in 8086 / 8088 microprocessor ? 3

(b) What is the purpose of the demultiplexed $\overline{BHE}$ signal on the 8086 microprocessor ? 2

(c) Explain the operations of the 8284 A clock generator ? 4

6. (a) Discuss two methods of interfacing I/O to the microprocessor ? 4

(b) Why $\overline{BLE}$ and $\overline{BHE}$ pins have no functions while selecting 16-bit wide I/O devices ? 3

7. (a) List the events that occur when a real mode interrupt become active to 8086 micro processor ? 3

(b) How are IF and TF flags are cleared and set in 8086 microprocessor ? 4

(c) What are the purposes of IR7-IRO pins of 8259 A programmable interrupt controller ? 2

8. (a) Discuss three software commands used to control the operations of the 8237 DMA controller. 3

(b) Describe the purpose of following pins of 8289 bus arbiter. 6

(i) SO - S2

(ii) $\overline{\text{BUSY}}$

(iii) $\overline{\text{LOCK}}$

(c) Describe the Internal structure of the pentium pro-microprocessor. 3

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6600 *Your Roll No.* .....

B.Sc. (Hons.) Computer Science / V Sem. B

Paper CS-505 : ECONOMICS

(Admissions of 2001 and onwards)

Time : 3 Hours *Maximum Marks : 75*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any **five** *questions.*

1. (a) Consider an economy in which there are only two inputs (labour and natural resources) producing two commodities (car and gasoline) with no improvement in society's technology over time. Show what would happen to the production possibility frontier overtime as natural resources are exhausted. How would technological improvement resolve this issue ? (6)

   (b) Explain how government failure might arise because of the various government regulations in the market. (5)

   (c) What is consumer surplus ? Explain in detail with the help of diagram. (4)

2. (a) There are 10,000 identical consumers and 1000 producers in the market for commodity X. The individual demand and supply functions are given

P.T.O.

respectively $Q_x^D = 12 - P_x$ and $Q_x^S = 20P_x$

(i) Find the market demand and supply function and also find equilibrium price and quantity.

(ii) What happens if the government imposes a price floor of Rs. 4 on commodity X ? (6)

(b) Explain the downward sloping demand curve with the help of equimarginal principle. (5)

(c) Explain the impact of gasoline tax on consumer and producer. (4)

3. (a) Find out the price elasticity of demand for the curve $Q_x = \frac{1000}{P_x}$. Draw the demand curve. (5)

(b) Explain the three stages of production in the short run and in which stage will the producer produce efficiently ? (5)

(c) Explain Break-even and shut down point in the perfectly competitive market structure. (5)

4. (a) Distinguish between Law of Returns to scale and law of variable proportions. (5)

(b) Consider a monopolist's demand function P = 30 – Q and the fixed cost of production is Rs. 10 lakh. There is no variable cost. Find out profit maximising level of output. (5)

(c) What is the difference between dominant strategy equilibrium and Nash equilibrium ? Solve the following Game :

		Firm–2	
		High Production	Low Production
Firm–1	High Production	Rs. 1500 Profit Rs. 1500 Profit	Rs. 1300 Profit Rs. 2000 Profit
	Low Production	Rs. 2000 Profit Rs. 1300 Profit	Rs. 1700 Profit Rs. 1700 Profit

(5)

5. (a) There are three firms A, B and C.

Purchases by Firm A	(Rs. Lakhs)
of raw materials from B	200
of services from C	300
from the Rest of the world	50
Sales by Firm A	
of intermediate products to Firm B	100
of fixed capital goods to Firm B	50
of intermediate products to Firm C	200
of Households	500

Find out a) Value added by Firm A, B and C
b) Net Exports
c) Private consumption expenditure (6)

(b) Given $C = 100 + 0.5Y_D$ $I = 200$, $G = 100$
$T = 100$; $Y_D = Y - T$

(i) Find out equilibrium level of income for the economy.

(ii) If government expenditure is increased to Rs. 150 cr. and tax is raised by Rs. 50 cr. What will happen with equilibrium level of income ? What will be the value of multiplier ? (6)

(c) Why is transfer payment not included in the estimation of National income ? (3)

6. (a) What is the difference between personal income and disposable income ? (3)

(b) Explain the effect of expansionary monetary policy on output and prices both in shortrun and long run. (6)

(c) What are Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) ? (6)

7. (a) Explain the process of commercial bank's deposit creation through multiplier approach. (4)

(b) Describe the different phases of business cycle and its characteristics. (5)

(c) Derive the investment demand curve. What are the factors that affect the investment demand curve ? (6)