



PJ – 578

III Semester M.C.A. Examination, January 2019
(CBCS)
COMPUTER SCIENCE
MCA 301 : File Structures

Time : 3 Hours

Max. Marks : 70

Instruction : Answer **any five** questions from Section – A and **any four** questions from Section – B.

SECTION – A

I. Answer any five.

(5×6=30)

- 1) Write a C++ program to display the contents of a generic file.
- 2) Define fields and records wrt file structures. Explain the methods for organizing the records of a file.
- 3) How to suppress a repeating sequence of characters in a file ? Explain with an example.
- 4) Explain the method of searching in a B-tree.
- 5) How does insertion and deletion of records affect a sequence set ? Explain.
- 6) Explain collision resolution in hashing through progressive overflow.
- 7) Given a text file with following characters and corresponding frequencies. Discuss a mechanism to compress the file. What is the compression ratio achieved ?

Character	a	f	i	u	o	m
Frequency	0.1	0.15	0.2	0.3	0.15	0.1

- 8) Define a buffer wrt file operations. Discuss various buffering strategies.

P.T.O.



SECTION - B

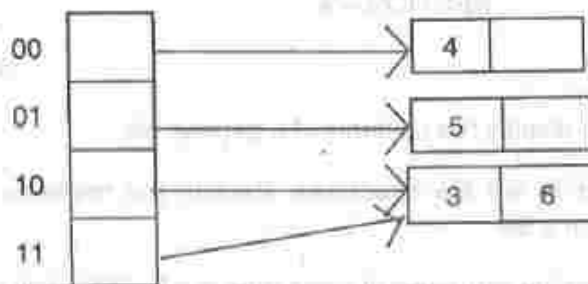
II. Answer any four.

(4×10=40)

9) Define extendable hashing. Demonstrate the same on following set of keys :

3, 6, 5, 4, 1, 8, 14, 9, 0, 2, 7

Bucket size is 2. First four elements are hashed as below.



- 10) Explain the method of keysorting with an algorithm and an example.
- 11) Given a B-tree of order 3 and leaf nodes with a capacity of 2 records. Build a B-tree for following records.
7, 9, 12, 0, 3, 19, 17, 14, 8, 2, 11
Delete elements 9 and 3. Indicate B-tree for every insertion and deletion operation.
- 12) Explain how to encapsulate a record related operations into a single class.
- 13) Define a prefix B⁺-tree. Differentiate between B-tree and prefix B⁺-tree. Explain complexities involved in searching inserting and deleting from a prefix B⁺ tree.
- 14) Explain a consequential merge procedure applied on two lists. List and explain the main components of the model.



III Semester M.C.A. Examination, January/February 2018
(CBCS Scheme)
COMPUTER SCIENCE
MCA 301 : File Structure

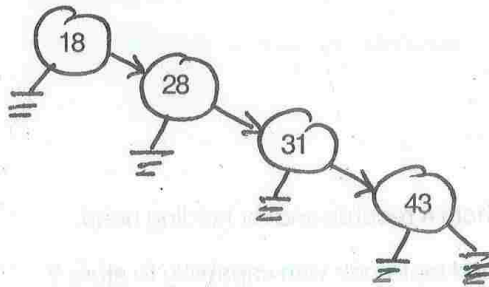
Time : 3 Hours

Max. Marks : 70

PART – A

Answer any five questions. Each carries 6 marks. (5×6=30)

1. Assuming 64 files, each with 128 records of size 32 bytes and a sector size in the hard disk as 512 bytes, discuss merits and demerits of storing these files using sequential file organization and indexed file organization methods.
2. Explain advantages of retrieving records using multiple keys.
3. List and explain UNIX commands used for directory operation and file operation.
4. What is the problem with the following Binary Search Tree (BST) ?



How do you overcome these problems using Balanced Trees.

5. What is data compression ? Compress the text "a man ran" using Huffman code. Use the following probability.

character	a	∅ (blank)	m	r	a
probability	0.3	0.25	0.15	0.125	0.175

P.T.O.



6. Using the hash function, $h(k) = k \text{ mod } 4$, find out hash key for the following records :
8, 7, 3, 5, 9, 0, 11, 13, 12
Where are the collisions ? How do you handle collision using Linear probing ?
7. Discuss methods of manipulating Buffers using class.
8. Discuss model for implementing consequential processes.

PART - B

(4×10=40)

Answer any four questions. Each question carries ten marks.

9. Explain file operations, open, close, read and write by assuming some buffer size. Write Syntax either in c or c++ to implement open, close, read and write operations.
10. What is k-way merging sort ? How does it differ from 2-way merge sort ? Given the following four files, sort these files using 4-way merge sort algorithm.

file 1	1	12	14	19	38	EOF
--------	---	----	----	----	----	-----

file 2	2	3	22	49	EOF
--------	---	---	----	----	-----

file 3	4	8	18	40	EOF
--------	---	---	----	----	-----

file 4	16	51	EOF
--------	----	----	-----

Assume that buffer space is available to hold 4 records and for holding heap.

11. Define B-Tree. Given B-Tree of order 3 and leaf-node with capability to store 2 records (bucket size = 2), build the B-Tree for the following records : (Please show or draw the tree for each new insertion).

,7, 9, 12, 0, 3, 19, 17, 14, 8, 2, 11

Delete elements 9 and 3 and redraw the B-Tree.



PG – 449

III Semester M.C.A. Examination, January 2017
(CBCS Scheme)
COMPUTER SCIENCE
MCA 301 : File Structures

Time : 3 Hours

Max. Marks : 70

PART – A

I. Answer **any five** questions. **Each** carries **six** marks. **(5×6=30)**

- 1) What are file OPEN, READ and CLOSE operations ? What is the effect on memory when these operations are performed ?
- 2) Discuss UNIX file system commands for operations on files.
- 3) What are the various file organization methods ? Compare sequential file organization and indexed file organization methods.
- 4) What are the various collision control mechanisms used for hashing ?
- 5) Discuss differences between B-Tree, B⁺ Tree and B*-Tree.
- 6) What is k-way merging ? Explain k-way merging with suitable examples.
- 7) How does one encapsulate record operation in a single class ?
- 8) Discuss methods for data compression with their advantages.

PART – B

II. Answer **any four** questions. **Each** carries **ten** marks. **(4×10=40)**

- 9) Write a program to copy contents of one text file to another text file. Discuss the effect of OPEN, READ and close on the memory management.
- 10) Define B-Tree. Assuming a B-Tree of order 3, with leaf node has the capacity to hold 2 elements, construct B-Tree for the following input elements :
15, 4, 6, 9, 1, 3, 8, 0, 18, 11, 93, 88.
- 11) Assume that 1000 crore Indians have Adhaar number and the records are stored using hashing technique. Given the hashing function $h(k) = k \bmod 100$ and chaining as collision control mechanism, discuss advantages, disadvantages of the method.
- 12) Given the following input, sort the numbers using 2-way merge sort :
14, 6, 1, 0, 9, 3, 14, 4, 2, 5, 7.

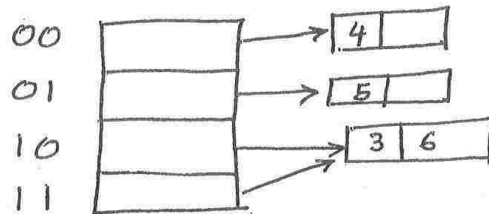
P.T.O.



13) What is extendable hashing ? What are the advantages of extendible hashing ?
 Assume the following key elements for hashing.

3, 6, 5, 4, 1, 8, 14, 9, 0, 2, 7

using bucket size as 2, elements 3, 6, 5, 4 are hashed in the following manner
 hash other elements using extendible hashing.



14) Discuss hard disk and compact disk as an efficient storage mechanism to handle files.



III Semester M.C.A. Examination, January 2016
(CBCS)
COMPUTER SCIENCE
MCA 301 : File Structures

Time : 3 Hours

Max. Marks : 70

PART – A

Answer **any five** of the following. **Each** question carries **six** marks. **(5×6=30)**

1. What is a track, sector and cylinder ? Discuss the working of the hard-disk drives.
2. Given the following records :
6, 5, 4, 3, 2, 1, 7
What are the disadvantages and advantages of storing these records using sequential file organization and indexed file organization method ?
3. Give a brief note on UNIX directory structure.
4. Given a text file with following characters and corresponding frequencies, discuss a mechanism to compress the text file. What is your compression-ratio ?

Character	a	f	i	u	o	m
Frequency	0.1	0.15	0.2	0.3	0.15	0.1
5. How do linear probing, quadratic probing and chaining manage collision ?
6. Define prefix B+ Tree. How does it differ from B-Tree ? What are the complexities of inserting, deleting and searching an element in prefix B+ Tree.
7. Define B-Tree. Represent B-Tree using object-oriented mechanism. Consider insert and search operations.
8. "The optical disk drives are used extensively to store large data and are reliable". Please comment whether the statement made here is true. If true, what makes optical drives more powerful compared to other drives ?



PART - B

Answer **any four** of the following questions. **Each** carries **10** marks. **(4x10=40)**

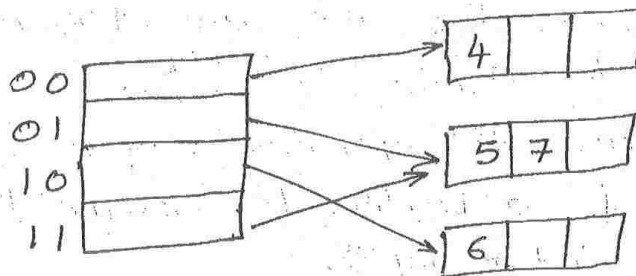
9. Consider the following record structure of a student :

Name	character of size 20
Age	integer
Register_number	integer
Gender	character
Marks	integer

Assume that there are 100 records in a file and the buffer size is 10.

Discuss the operations open, close, read and write for a problem to increase the marks of each student by 5.

10. Given a 2-3 Tree (B-Tree of order 3), with a leaf node capacity to hold 2 records, build B-Tree for the following inputs. (Show the tree at each insertion).
8, 18, 22, 4, 3, 6, 9, 28, 44, 13.
11. What is multi-level indexing ? Why does one use multi-level indexing ? Discuss advantages and disadvantages of multi-level indexing.
12. Given the bucket size of 3 and the following snapshot of hashing with a hashing function $h(k) = k$, insert the records : 9, 13, 22, 14, 0, 3, 2, 8 using extendible hashing.



13. Use 2-way external merge sort algorithm to sort the following numbers :

2, 6, 9, 4, 3, 2, 8, 1, 7

Mention the working of k-way merge sort algorithm.

14. What is the difference between internal sorting and external sorting ? When sorting large number of records using the internal sorting, what are the memory related issues ? How are these issues handled using external sorting ?