PART – A

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

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. \((4\times 10=40)\)

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 \(h(k) = k \mod 100\) 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:
\(14, 6, 1, 0, 9, 3, 14, 4, 2, 5, 7\).
13) What is extendable hashing? What are the advantages of extendable 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 extendable 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. (5x6=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?
   \[
   \begin{array}{cccccc}
   \text{Character} & a & f & i & u & o \\
   \text{Frequency} & 0.1 & 0.15 & 0.2 & 0.3 & 0.15 & 0.1
   \end{array}
   \]

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?


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?
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 extendable
    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?