

Sem ~~V~~ I.T

Q.P. Code : 594500

(3 hours)

Marks : 80

- Note : 1) Question No. 1 is compulsory
2) Solve any Three questions out of remaining five

- | | | |
|--------|---|----|
| 1. (a) | Explain Factless Fact table. | 5 |
| (b) | What is the role of Metadata in data warehouse? | 5 |
| (c) | Compare OLTP vs. OLAP. | 5 |
| (d) | Explain different types of transparencies in distributed database. | 5 |
| 2. (a) | Explain concurrency control in distributed database. | 10 |
| (b) | Create an ER model for a Railway system with following constraints: | 10 |
| | i) Stations | |
| | ii) Tracks, connecting stations. You can assume for simplicity that only one track exists between any two stations. All the tracks put together form a graph. | |
| | iii) Trains, with an ID and a name | |
| | iv) Train schedules recording what time a train passes through each station on its route. You can assume for simplicity that each train reaches its destination on the same day, and that every train runs every day. Also for simplicity, assume that for each train, for each station on its route, you store (a) time in, (b) time out (same as time in if it does not stop), and (c) a sequence number so the stations in the route of a train can be ordered by sequence number. | |
| | v) Passenger booking consisting of train, date, from-station, to-station, coach, seat and passenger name; for simplicity, don't bother to model passengers as entities. | |
| 3. (a) | Explain Discretionary access control based on granting and revoking Privileges. | 10 |
| (b) | Explain Star Schema. Draw Star Schema for Hospital Management. | 10 |
| 4. (a) | Explain Data warehouse architecture in detail. | 10 |
| (b) | Consider the following database that has to be distributed: | 10 |
| | PROJ(PNO, PNAME, BUDGET) | |
| | PAY(TITLE, SALARY) | |
| | EMP(ENO, ENAME, SALARY) | |
| | ASG(ENO, PNO, RESPONSIBILITY, DURATION) | |
| | 1. Show 2 examples of horizontal fragmentation | |
| | 2. Show 2 examples of vertical fragmentation | |
| | 3. Show 1 examples of derived fragmentation | |
| | 4. Show 1 examples of mixed fragmentation | |

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5. (a) Explain ETL phases in creating data warehouse. **10**
(b) Explain indexing techniques in a database. **10**
6. (a) Describe the following OQL concepts: **10**
i) Database entry points,
ii) Path expressions,
iii) Iterator variables,
iv) Named queries (views),
v) Aggregate functions, grouping, and quantifiers.
- (b) We have an ordered file with 30000 records stored on a disk with block size **10**
1024 bytes. File records are of fixed size and are unspanned, with record length
 $R = 100$ bytes. Ordering key field of the file is 9 bytes long, a block pointer is
6 bytes long and primary index has been constructed for the file. Find:
1. The Blocking factor bfr for the file.
2. The number of blocks b needed for the file.
3. The size of each index entry R_i .
4. The blocking factor for the index bfr_i .
5. The number of index blocks b_i .

N.B. : (1) Question 1 is compulsory.

(2) Attempt any **three** from remaining Questions.

(3) **Assume** suitable **data** wherever **necessary**.

(4) **Figure in right** indicates **marks**.

1. (a) What are fractals? Derive an equation $D = \log N / \log S$. 20
(b) Compare boundary fill and flood fill algorithm
(c) Explain VR application in education domain
(d) Differentiate between raster scan and Random scan display

2. (a) Explain Sutherland-Hodgeman polygon clipping algorithm with suitable **10**
example. Discuss its advantages and disadvantages.
(b) Derive the Bresenham's line drawing algorithm. What are its advantages? **10**
Take suitable example and draw a line between two points

3. (a) Write a short note on Homogeneous co-ordinate system. 10
(b) Explain graphical rendering pipeline. 10

4. (a) What are different types of projections? Derive the matrix representation **10**
for Perspective transformation in XY - plane and on negative Z- axis.
(b) Derive the matrix for Rotation about an arbitrary point for 2D Rotation. **10**

5. (a) Let ABCD be the rectangular window with A(20,20), B(90,20), C(90,70), **10**
and D(20,70). Find region codes for endpoints and use Cohen Sutherland
algorithm to clip the lines P1P2 with
P1 (10,30), P2 (80,90) and
q1q2 with q1(10,10), q2(70,60)
(b) Explain B spline curve 10

6. (a) Show that transformation matrix for reflection about line $y=x$ is equivalent **10**
to reflection to X axis followed by counter clockwise rotation of 90 degree.
(b) Derive mathematical representation for Beziers curve and state their **10**
property

Q.P. Code : 594200

(3 Hours)

[Total Marks : 80

- N.B.: (1) Question No. 1 is compulsory.
 (2) Solve any three questions out of remaining five.
 (3) Figures to right indicate full marks.
 (4) Assume suitable data where necessary.

1. (a) Describe the file systems of Windows. [5]
- (b) Write the deadlock detection algorithm [5]
- (c) What are the differences between user level-threads and kernel-level threads? Under what circumstances one better than the other? [5]
- (d) Describe how does critical section avoid race condition? What are the properties which data item should possess to implement critical section? [5]
- 2 (a) A page size of 4096 bytes and following page table [10]

Page No	In/out	Frame
0	out	333
1	in	300
2	in	1000
3	out	100
4	out	500
5	in	120
6	out	412
7	in	740

Which of the following virtual addresses would generate a page fault? For those that do not generate page fault , to what physical address would they translate?

- i) 21610 ii)35410 iii)27012 iv)10234

- (b) What is semaphore? Explain the counting semaphore with the help of example. [10]
- 3 (a) Consider a system running 10 I/O bound tasks and one CPU bound task. Assume that I/O bound task issues an I/O operation once for every millisecond of CPU computing and that each I/O operation takes 10 milliseconds to complete. Also assume that the context switching overhead is 0.1 millisecond and that all processes are long running tasks. What is the CPU utilization for a round robin scheduler when : [10]
 - i)The time quantum is 1 millisecond
 - ii) The time quantum is 10 milliseconds
- (b) Show that Peterson’s algorithm satisfies the requirements of a mechanism to control access to a critical section [10]

TURN OVER

- 4 (a) Consider the following snapshot of the process to be executed. Draw the Gantt chart [10] and determine the average waiting time and average turnaround time for FCFS, SJF(pre-emptive), SJF(nonpreemptive) and round robin (quantum=2) scheduling algorithm.

Process	Arrival Time	Burst Time
P1	0	7
P2	1	4
P3	3	3
P4	5	1
P5	7	5

- (b) What is a kernel? Describe briefly the approaches of designing kernel [10]

- 5 (a) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes. [10]
- How many bytes are in page frame?
 - How many bits in the physical address specify the page frame?
 - How many entries in the page table?
 - How many bits are in the logical address?

- (b) What criteria should be adopted for choosing type of file organization? Describe the implementation of file allocation techniques? [10]

- 6 (a) Consider the following snapshot of the system:- [10]

Process	Allocation			Max.			Available		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	2			
P2	0	2	0	4	4	2			
P3	0	6	3	2	6	3			
P4	1	1	2	2	2	3			

Answer the following questions using Banker's algorithm?

- Determine the total amount of resource of each type.
- What is the content of need matrix?
- Determine if the system is in safe state using safety algorithm.
- If a request from process p1 arrives for (1,1,0) can the request be granted immediately.

- (b) Explain the Android operating system. [10]

Sem V I.T (1849)

Q.P. Code : 594600

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Question number 1 is compulsory.
 (2) Attempt any Three questions from remaining.
 (3) Assume suitable data, if necessary.
 (4) Draw suitable diagram wherever necessary.

1. Attempt any four sub questions :-
 - a. Explain backup commands in Linux. 5
 - b. Describe role of init signal. 5
 - c. Explain permissions on directory and files. 5
 - d. Describe 'AndroidManifest.xml' file components. 5
2. a. Explain use of sed. Write script based on sed to convert all lowercase letters in a file to uppercase letter. 10
 - b. What is difference between **halt** and **shutdown**. Explain commands for mounting and unmounting file system in Linux. When is unmounting not possible? 10
3. a. What is an Activity? How is it created? Draw and explain activity life cycle. 10
 - b. Explain with example usage of given commands- grep, tr, cat, sort, export. 10
4. a. Explain networking commands- nslookup, traceroute, host, ping, ifconfig. 10
 - b. What is data persistency in Android? 10
5. a. Discuss significance of given files- /etc/passwd, /etc/shadow, /etc/group, /etc/gshadow. 10
 - b. Draw hierarchical structure of Linux File system and explain any five directories. 10
6. a. Explain modes of vi editor and give commands to move a cursor around, to insert text, to delete text, to cut & paste text, to save & quit files. 10
 - b. Briefly explain the concept of- Daemon Process, User Process, Parent Process, Child Process, Background-Foreground Process. 10

Q.P. Code : 594401

(3 Hours)

[Total Marks: 80]

N.B.:- (1) Question No. 1 is Compulsory.

(2) Solve any three questions from the remaining five questions.

(3) Figures to the right indicate full marks.

(4) Make suitable assumptions wherever necessary and state them clearly.

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|----|-----|---|----|
| 1. | (a) | Define Embedded System. Explain classification of embedded system. | 5 |
| | (b) | State the features of 8051 microcontroller. | 5 |
| | (c) | Explain Semaphores and Mutex in RTOS. | 5 |
| | (d) | Explain pipelining in ARM processor. | 5 |
| 2. | (a) | Explain the Embedded System architecture in detail. | 10 |
| | (b) | Explain the Timer/ Counter of IC 8051. | 10 |
| 3. | (a) | Write an assembly language program for 8051 microcontroller to generate a square wave of 2KHz on pin 1.0 assuming crystal frequency of 12 MHz. Justify the mode of operation. | 10 |
| | (b) | Explain the hardware and software interrupts of 8051 microcontroller. | 10 |
| 4. | (a) | Explain the addressing modes of ARM 7 Processor | 10 |
| | (b) | Explain the following instructions with suitable examples w.r.t ARM processor | 10 |
| | | (i) BLX | |
| | | (ii) CMN | |
| | | (iii) SWP | |
| | | (iv) MVN | |
| | | (v) LDC | |
| 5. | (a) | Explain the various methods to implement interprocess communication. | 10 |
| | (b) | Explain the addressing modes of 8051 microcontroller. | 10 |
| 6. | | Write note on (any two): | 20 |
| | (a) | Battery operated smart card reader | |
| | (b) | Digital clock as an Embedded system | |
| | (c) | Serial communication of 8051 | |
| | (d) | Assembler directives | |

