

**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 example. Discuss its advantages and disadvantages. 10  
 (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 : 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

**[TURN OVER]**



Q.P. Code : 594500

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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 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: 10
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  $b_i$ .



**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