

ws Sept, 2012 (b) 114
Con. 7895-12.

(3 Hours)

KR-7034

[Total Marks : 100

- N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Figures to the right indicate full marks.

1. (a) Find e^A , if $A = \begin{bmatrix} 3/2 & 1/2 \\ 1/2 & 3/2 \end{bmatrix}$ 5

(b) Find the orthogonal trajectory of the family of curves $x^3y - xy^3 = c$. 5

(c) Integrate the function $f(z) = x^2 + ixy$ from A (1, 1) to B(2, 4) along the curve $x = t, y = t^2$. 5

(d) Consider the following problem - 5

$$\begin{aligned} \text{Maximise } & Z = 2x_1 - 2x_2 + 4x_3 - 5x_4 \\ \text{Subject to } & x_1 + 4x_2 - 2x_3 + 8x_4 \leq 2 \\ & -x_1 + 2x_2 + 3x_3 + 4x_4 \leq 1 \\ & \text{and } x_1, x_2, x_3, x_4 \geq 0 \end{aligned}$$

Determine :

- (i) all basic solutions.
(ii) all feasible basic solutions.
(iii) optimal feasible basic solution.

2. (a) If $f(z) = u + iv$ is analytic and $u + v = \frac{2 \sin 2x}{e^{2y} + e^{-2y} - 2 \cos 2x}$ find $f(z)$ 6

(b) Compute $A^9 - 6A^8 + 10A^7 - 3A^6 + A + I$, 7

$$\text{where } A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 4 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

(c) Solve the following LPP by Simplex method - 7

$$\begin{aligned} \text{Minimise } & Z = x_1 - 3x_2 + 3x_3 \\ \text{Subject to } & 3x_1 - x_2 + 2x_3 \leq 7 \\ & 2x_1 + 4x_2 \geq -12 \\ & -4x_1 + 3x_2 + 8x_3 \leq 10 \\ \text{and } & x_1, x_2, x_3 \geq 0 \end{aligned}$$

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3. (a) Show that $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ is derogatory and find its minimal polynomial. 6

(b) Solve the following LPP by Big M-method - 7

$$\begin{aligned} \text{Minimise } & Z = 2x_1 + x_2 \\ \text{Subject to } & 3x_1 + x_2 = 3 \\ & 4x_1 + 3x_2 \geq 6 \\ & x_1 + 2x_2 \leq 3 \\ \text{and } & x_1, x_2 \geq 0 \end{aligned}$$

(c) Show that $f(z) = \sqrt{|xy|}$ is not analytic at the origin although Cauchy-Riemann equations are satisfied at that point. 7

4. (a) Evaluate $\int_c \frac{z+6}{z^2-4} dz$ where c is the circle (i) $|z|=1$, (ii) $|z+2|=1$. 6

(b) Show that the matrix $A = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$ is similar to a diagonal matrix. Also 7

find the transforming matrix and the diagonal matrix. 7

(c) Using Duality solve the following LPP -

$$\begin{aligned} \text{Minimise } & Z = 4x_1 + 3x_2 + 6x_3 \\ \text{Subject to } & x_1 + x_3 \geq 2 \\ & x_2 + x_3 \geq 5 \\ \text{and } & x_1, x_2, x_3 \geq 0 \end{aligned}$$

5. (a) Use the dual Simplex method to solve the following LPP - 6

$$\begin{aligned} \text{Maximise } & Z = -3x_1 - 2x_2 \\ \text{Subject to } & x_1 + x_2 \geq 1 \\ & x_1 + x_2 \leq 7 \\ & x_1 + 2x_2 \leq 10 \\ & x_2 \leq 3 \\ \text{and } & x_1, x_2 \geq 0 \end{aligned}$$

(b) Evaluate $\int_0^{2\pi} \frac{d\theta}{5+3\sin\theta}$ 7

- (c) Find the characteristics equation of the matrix $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ and verify that 7

it is satisfied by A and hence, obtain A^{-1} .

6. (a) Obtain Taylor's or Laurent's series for the function - 6

$$f(z) = \frac{1}{(1+z^2)(z+2)} \text{ for}$$

(i) $1 < |z| < 2$ and (ii) $|z| > 2$.

- (b) Obtain the relative maximum or minimum (if any) of the function 7

$$z = x_1 + 2x_3 + x_2 x_3 - x_1^2 - x_2^2 - x_3^2.$$

- (c) Evaluate $\int_c \frac{z^2}{(z-1)^2(z-2)} dz$ where c is the circle $|z| = 2.5$. 7

7. (a) Find the bilinear transformation which maps the points 2, i, -2 onto the points 1, i, -1. 6

- (b) Using the method of Lagrangian multipliers solve the following problem 7

$$\text{Optimise } Z = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$$

$$\text{Subject to } x_1 + x_2 + x_3 = 15$$

$$2x_1 - x_2 + 2x_3 = 20$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

- (c) Verify Laplace's equation for $u = \left(r + \frac{a^2}{r}\right) \cos \theta$. Also find v and f(z). 7

Computer Sem IV Rev

01/12/2012

DBMS

218-p3-4-mpq-SH KL12 B

Con. 9821-12.

KR-7136

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.

(2) Solve any **four** questions from remaining.

(3) Assume **appropriate** data where **necessary**.

(4) **All** questions carry **equal** marks.

1. (a) Construct an ER diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examination conducted. Convert ER diagram into tables. 10
- (b) List significant differences between file processing system and Database Management System. 5
- (c) What are the functions of Database Administrator. 5

2. (a) For the given employee database give an expression in SQL for the following : 10
Employee (empname, street, city)
Works (empname, company-name, salary)
Company (company-name, city)
Managers (empname, manager-name)
(i) Modify database so that 'swapnil' now lives in 'Navi Mumbai'.
(ii) Give all employees of 'IBM' a 40% raise.
(iii) List all the employees who lives in the same cities as their managers.
- (b) Define serializability. Explain conflict and view serializability. 10

3. (a) Explain following Relational algebra operations. 12
(i) Set Difference
(ii) Generalized projection
(iii) Natural Join
(iv) Rename.
- (b) What is deadlock ? Discuss different types of deadlock avoidance scheme. 8

4. (a) When it is preferable to use dense index rather than sparse index ? Also explain hash indices ? 10
- (b) What is view in SQL ? Discuss the problem that may arise when we attempt to update a view. How views are implemented ? 10

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5. (a) Discuss different security and authorization mechanism in Database Management System. **10**
- (b) Define Normalization ? What is the importance of Normalization in database design ? Explain 1NF, 3NF and BCNF with example. **10**
6. (a) Explain Time stamp ordering protocol and Thomas write rule in detail. **10**
- (b) Explain 'Undo' and 'Redo' operations for log based recovery. Also explain shadow paging recovery technique. **10**
7. Write short notes on (any four) :— **20**
- (a) Data Dictionary Storage
 - (b) Armstrong Axioms
 - (c) Triggers
 - (d) Buffer Management
 - (e) Generalization and Aggregation.
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(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) Assume **suitable** data if necessary and justify the **same**.

1. (a) Illustrate inside outside test. 5
(b) Explain 3D display methods. 5
(c) What is z-buffer algorithm? 5
(d) Write a note on Fractars. 5
2. (a) What is a display file structure? Also explain the need for display file interpreter. 10
(b) Write a pseudo-code to implement boundary fill and flood fill algorithm using 4 connected method. 10

3. (a)

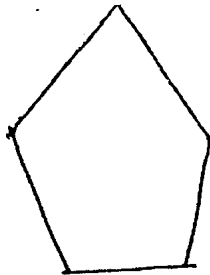


Fig (a)

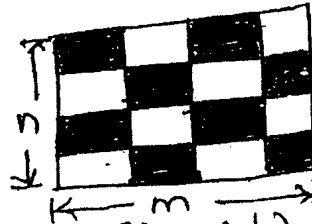


Fig (b)

Write an algorithm to fill polygon in **fig (a)** with pattern given in **fig (b)** of size $m \times n$.

- (b) Derive Bresenham's line drawing algorithm for lines with slope < 1 . 5
(c) Write different applications of computer Graphics. 5
4. (a) What do you mean by segment? What are the various attributes in segment table? State which operations can be done on segments and explain the same. 10
(b) Derive the steps required to perform 3D rotation about arbitrary axis. 10

5. (a) Find the clipping Co-ordinates to clip the line segment P1P2 against the window ABCD using Cohen Sutherland line clipping algorithm. **10**
P1 (10, 30) P2 (80, 90)
window ABCD A (20, 20) B (90, 20)
C (90, 70) D (20, 70)
- (b) What do you understand by terms parallel and prespective projection ? Also explain depth cueing. **10**
6. (a) Explain Gourad and Phong shading. **10**
(b) Explain Bezier curves and Bezier surfaces with equations. Explain properties of Bezier curve. **10**
7. Write short notes on (any four) :— **20**
- (a) Animation
 - (b) Dithering techniques
 - (c) Warnock's algorithm
 - (d) Half toning
 - (e) Raster techniques.
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(3 Hours)

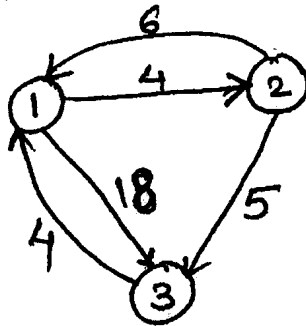
[Total Marks : 100

- N.B.:** (1) Q.1 is Compulsory.
(2) Attempt any 4 questions of remaining 6 questions.
(3) Figures to the right indicate full marks for the questions.
(4) Assume suitable data if required.
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|-------------|--|----|
| Q.1. | (a) Distinguish between AM & FM. | 5 |
| | (b) Explain Shannon's Theorem. | 5 |
| | (c) Distinguish between Analog & Digital Modulation. | 5 |
| | (d) Explain Cyclic codes. | 5 |
| Q.2. | (a) Explain phase modulation & demodulation. | 10 |
| | (b) Explain frequency modulators & demodulators. | 10 |
| Q.3. | (a) Explain sampling theorem for low pass & band pass filters. Also explain sampling technique principles. | 10 |
| | (b) Explain generation & detection of PAM. | 10 |
| Q.4. | (a) Explain TDM & FDM. | 10 |
| | (b) Explain PCM in detail. | 10 |
| Q.5. | (a) What is delta modulation & also explain adaptive delta modulation. | 10 |
| | (b) Explain ISI & how it reduce. | 10 |
| Q.6. | (a) What is effect of Gaussian Noise on digital communication. | 10 |
| | (b) Explain QPSK Transmitter & Receiver System. | 10 |
| Q.7. | Write Short Notes On : | 20 |
| | (a) Thermal Noise. | |
| | (b) QAM | |
| | (c) Noise Triangle. | |
| | (d) PCM waveform types. | |
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- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Solve any **four** questions out of remaining **six** questions.
 (3) **Figures** to the **right** indicate **full** marks.
 (4) Assume suitable **data** if necessary but justify the **same**.

1. (a) Arrange the following functions in increasing order 5
 $n, \log n, n^3, n^2, n \log n, 2^n, n!$
- (b) Explain general method of Dynamic programming. List different examples of it. 5
- (c) Justify Greedy approach for solving Knapsack problem. 5
- (d) State Graph coloring problem. State the strategy used to solve above problem. 5
2. (a) Sort the following numbers using Merge sort. Give the output of each pass. Write an algorithm for Merge sort. 10
 $27, 6, 18, 25, 48, 59, 98, 34$
- (b) Write an algorithm for minimum spanning tree using Prim's method. 10
3. (a) Explain N-Queen's problem using Backtracking with algorithm. 10
- (b) Consider the following set of frequencies 10
 $A = 2, B = 6, C = 4, D = 15, E = 7, F = 22, G = 9, H = 17$
 Find Huffman codes for the same.
4. (a) Describe 0/1 Knapsack problem. How to solve it using Branch and Bound ? 10
- (b) Write an algorithm for Binary Search. Derive its Best case and worst case complexities. 10
5. (a) For the following graph find all pair shortest path using Dynamic programming. 10



- (b) Explain optimal storage on tapes with example. 10
6. (a) Find Longest common subsequence of given two strings 10
 $X = \{ B \quad A \quad T \quad A \}$
 $Y = \{ T \quad A \quad T \quad A \}$
- (b) Explain single source shortest path using Dynamic programming. Write an algorithm for same. 10
7. Write short notes on the following :— 20
 - (a) Radix Sort
 - (b) Job Sequencing with Dead lines
 - (c) Strassen's Matrix Multiplication
 - (d) Branch and Bound Strategy.

Con. 7880-12.

KR-7589

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from remaining **six** questions.

1. (a) What is an Operating System ? Explain Objective and Functions of Operating System. **10**
 (b) Differentiate between Monolithic and Microkernel. **5**
 (c) Explain effect of page size on performance. **5**
2. (a) Explain Process Control Block (PCB) and its role. **10**
 (b) Explain difference between Process and Thread. Draw and explain five state process model. **10**
3. (a) What is deadlock ? Explain necessary and sufficient conditions to occur deadlock. Also explain Banker's algorithm for deadlock avoidance. **10**
 (b) Explain architecture of Window 2000. **10**
4. (a) Explain paging in detail. Describe how logical address is converted to physical address. **10**
 (b) Consider the following set of processes with CPU burst time given in table. **10**

Process	Burst Time	Arrival Time
P ₁	10	01
P ₂	04	02
P ₃	05	03
P ₄	03	04

- (i) Draw Gantt chart for FCFS, SJF, and Round Robin (Quantum = 03).
- (ii) Calculate average waiting time and average turn around time.
5. (a) Explain File allocation methods in detail. **10**
 (b) Calculate hit and miss using LRU, FIFO and OPTIMAL Page replacement methods for following page frame sequences; Page frame size is 3 :—
 4, 7, 3, 0, 1, 7, 3, 8, 5, 4, 5, 3, 4, 7 **10**
6. (a) Explain RAID with different levels. **10**
 (b) Explain different disk scheduling algorithms. **10**
7. Write short notes on :— **20**
 - (a) User level and Kernel level Threads
 - (b) Real time Operating System
 - (c) Semaphore
 - (d) Monitors.