SE/Com/Sem IV/
Analysis of Algorithm & Design

ws Oct- 10 Scan 24
Con. 6221–10.

20/12/10

GT–6462

(3 Hours) [Total Marks : 100

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

2) Attempt any four out of remaining six questions.

3) Assume Suitable data.

4) Figures to right indicate full marks.

1. (a) Explain Big-oh, Omega and Theta Notations with the help of diagram. How do we analyze and measure time complexity of algorithm? 10

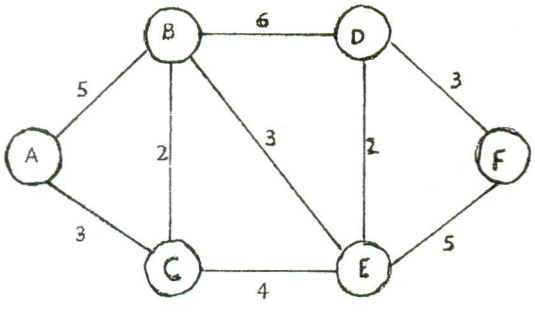
(b) Calculate variable length Huffman Code for the following frequencies:

A=1 B=2 C=1 D=4 E=8 F=5 G=14 H=22 10

2. (a) Prove that for the Quick Sort , 10
i) Worst Case efficiency is $T(N) = O(N^2)$
ii) Best Case efficiency is $T(N) = O(N\log N)$

(b) Explain the strassen's Matrix Multiplication. 10

3 .(a) Find MST of following graph using Prim's and 10
Kruskal's Algorithm.



(b) Explain optimal storage on tape with example. 10

[TURN OVER

4.(a) Explain Hamiltonian Cycle and give an algorithm to find all Hamiltonian cycle. 10

(b) Consider the following instance of the Knapsack problem: 10
No. of objects n=3 ,knapsack capacity m=20 , profits (p1,p2,p3)=(25,24,15) and weights (w1,w2,w3)=(18,15,10).

Find out the optimal solution using greedy method.

5.(a) Describe 8 queen Problem .Write an algorithm using backtracking to solve this problem. 10

(b) What is Travelling Salesman problem .How to solve the same problem using Branch and Bound. Explain with example. 10

6. (a) Describe the advantages of Dynamic programming . How it differ from Divide and Conquer. 10

(b) Sort the following list of elements in ascending order using merge sort technique. Give output of each pass. 10

90 20 80 89 70 65 85 74

7.(a) Define the knuth –Morris –Pratt Algorithm for string matching . Write a function to implement the concept of the same algorithm. 10

(b) Write Short note on: (Any two). 10

i) Tries

ii) Job Sequencing with Deadlines

iii) Randomized Algorithms.

SE/Com/Sem IV
Analysis of Algorithm & Design 30/12/10

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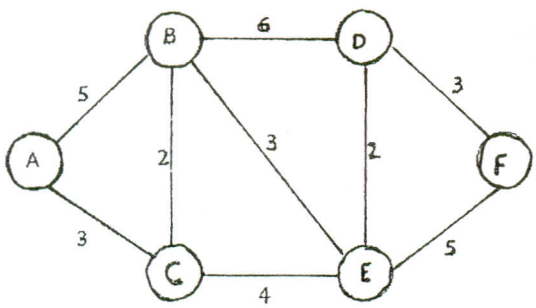

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S.E./Com/Sem IV

Applied Maths IV

Con. 5532-10. **GT-6465**

(3 Hours) **[Total Marks : 100**

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

1. (a) Diagonalize the Hermitian matrix **5**

$$\begin{bmatrix} -3 & 2+2i \\ 2-2i & 4 \end{bmatrix}$$

(b) Find the analytic function f(z) whose real part is $r^2 \cos 2\theta - r \sin \theta$ **5**

(c) Show that $\int_C \log z \, dz = 2\pi i$, where C is the unit circle in plane. **5**

(d) Find all basic feasible solutions of the following system of equations **5**

$$2x_1 + x_2 - x_3 = 2$$
$$3x_1 + 2x_2 + x_3 = 3$$

2. (a) Verify cayley-Hamilton Theorem for matrix A and Hence find A^{-1}, where **6**

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

(b) Prove that $f(z) = x^3 - 3xy^2 + 2xy + i(3x^2y - x^2 + y^2 - y^3)$ is analytic and find f(z) in terms of Z. **6**

(c) Construct dual of the following LPP and solve its dual **8**

Minimize $Z = 0{\cdot}7x_1 + 0{\cdot}5x_2$
Subject to $x_1 \geq 4$,
$x_2 \geq 6$,
$x_1 + 2x_2 \geq 20$,
$2x_1 + x_2 \geq 18$,
$x_1, x_2 \geq 0$.

3. (a) If $A = \begin{bmatrix} \pi & \pi/4 \\ 0 & \pi/2 \end{bmatrix}$, find cos A. **6**

(b) Solve the following LPP by Simplex method **6**

Maximize $Z = x_1 + 4x_2$
Subject to $2x_1 + x_1 \leq 3$
$3x_1 + 5x_2 \leq 9$
$x_1 + 3x_2 \leq 5$
$x_1, x_2 \geq 0$.

(c) Show that $\int_0^{\pi} \frac{d\theta}{3 + 2\cos\theta} = \frac{\pi}{\sqrt{5}}$ **8**

[TURN OVER

4. (a) Find a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic. **6**

(b) Find the bilinear transformation which maps the points $Z = \infty$, i, 0 onto the points 0, i, ∞. **6**

(c) FInd eigen values and eigen vectors of the matrix A where **8**

$$A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$

5. (a) Show that $A = \begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{bmatrix}$ is derogatory. **6**

(b) Find the image of the region bounded by **6**
$x = 0$, $x = 2$, $y = 0$, $y = 2$ in the Z-plane under transformation :
$W = (1 + i) Z$.

(c) Using the method of Lagranges Multipliers, solve the following NLPP **8**

Optimize $Z = x_1^2 + 5x_2^2$
Subject to $x_1 + 5x_2 = 7$
$x_1, x_2 \geq 0$.

6. (a) Find the orthogonal trajectory of the family of the curves $x^3y - xy^3 = c$. **6**

(b) Use the Kuhn-Tucker condition to solve the following NLPP. **6**

Maximize $Z = 10x_1 + 4x_2 - 2x_1^2 - x_2^2$
Subject to $2x_1 + x_2 \leq 5$
$x_1, x_2 \geq 0$.

(c) Evaluate $\int_C \frac{z+6}{z^2-4}\,dz$ where C is the circle. **8**

(i) $|z| = 1$ (ii) $|z - 2| = 1$ (iii) $|z + 2| = 1$

7. (a) Find Laurents series for $f(z) = \frac{2}{(z-1)(z-2)}$ when $1 < |z| < 2$. **6**

(b) By using residue theorem evaluate $\int_C \frac{\sin^6 z}{\left(z - \frac{\pi}{6}\right)^3}\,dz$ where C is $|z| = 1$. **6**

(c) Use the dual simplex method to solve the following LPP **8**

Minimize $Z = x_1 + x_2$
Subject to $2x_1 + x_2 \geq 2$,
$-x_1 - x_2 \geq 1$,
$x_1, x_2 \geq 0$.

SE/Com/Sem IV

2-12-10

Con. 5511-10. Database managment system GT–6474

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Make **suitable** assumptions if **needed**.

1. (a) Draw the E-R diagram for banking enterprise (State assumptions clearly). Convert E-R diagram into tables. 10
   (b) What is transaction ? Discuss state transition diagram and properties of transaction. 10

2. (a) Given the following relational schema.
   Division (div # , div-name, director)
   Department (dept # , dept-name, location, div #)
   Employee (emp#, emp-name, salary, address, dept #)
   State the following queries in SQL :
   (i) Get the employee name, dept-name and division name for all employees whose salary is above 20,000/- 3
   (ii) List the name of all employees who work in "Marketing" division. 3
   (iii) List the dept-name and employee names in that dept, for all department whose location is "Mumbai". 4
   (b) Explain following relational algebra operators with suitable example :— 10
   (i) Cartesian product
   (ii) Outer join
   (iii) Generalized Projection
   (iv) Set difference
   (v) Rename

3. (a) Give the advantages of DBMS over file system. 10
   (b) (i) What is the condition for a lossless decomposition of a relation ? Give example. 5
   (ii) Explain the terms total participation and partial participation with example. 5

4. (a) Define serializability. Explain conflict and view serializability. 10
   (b) What do you understand by deadlocks in database system ? Explain how it is prevented. 10

5. (a) Companies manufacture ranges of products which are purchased by customers. The relational schema for this operation is given as :— 12
   COMPANY (Company-code, Company-name, Director#, Director-name, { product-name, cost, { cust#, customer-name, address}}) where { } represents a repeating groups.
   (i) State the definitions of first, second and third normal forms.
   (ii) Normalize the above relation to third normal form.
   (b) Explain DDl, DML, TCL, DCL with example. 8

6. (a) Explain 2 phase locking protocol. 10
   (b) Explain following terms with example. 10
   (i) Simple and composite attributes
   (ii) Aggregation
   (iii) Ternery Relationship
   (iv) Weak entity set.

7. Write short notes on (any **four**) :— 20

(a) Hashing
(b) B^+ tree
(c) Triggers
(d) Views
(e) Shadow Paging.

SE/COMP/SemIV/
Industrial Eco. & management 27/12/10

Con. 6730-10. **GT–9798**

(3 Hours) **[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.
(4) Answer to **sub-questions** of an individual question should be written **together** and **one** below the other.

1. (a) Define money and explain its functions and importance. **10**
   (b) What do you understand by delegation ? What are the difficulties of managers and subordinates in delegation of authority ? **10**

2. (a) Describe various sources of Public Revenue. **10**
   (b) Explain Maslow's need hierarchy. Compare it with Herzberg's maintenance motivation theory. **10**

3. (a) What is demand ? Explain the law of demand. Are there any exceptions to this law ? **10**
   (b) What is cost associated with inventory ? Explain ABC analysis as an inventory control technique. **10**

4. (a) What are the determinants of economic development ? What are the characteristics of under development economy ? **10**
   (b) Explain barriers to effective communication. **10**

5. (a) Explain the functions of a Central bank. **10**
   (b) What are the principles and features of scientific management of Taylor ? **10**

6. (a) Explain the features of Monopoly and perfect competition. **10**
   (b) What do you know by Human Resource Development ? Explain its need and importance. **10**

7. Write short notes on any **four** of the following :— **20**
   (a) Decision Making Process
   (b) Production Planning and Control
   (c) New Economic Policy
   (d) Direct and Indirect Taxes
   (e) Advertising.

Lab SE/COM/Sem IV Computer Graphics 9/12/10

VI-Oct-10-36

Con. 5873–10. GT–6459

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Attempt any **four** questions from Q. Nos. **2** to **7**.
(3) Assume suitable data if **necessary**.

1. (a) Explain character Generation methods. **5**
(b) What is Phong's Shading Model ? **5**
(c) List and explain operations on segments. **5**
(d) Draw matrices for representing following operations :– **5**
(i) Translation
(ii) Scaling
(iii) Rotation.

2. (a) Derive Bresenham's line drawing algorithm. **10**
(b) Write pseudocodes for boundary fill and flood fill procedure. **10**

3. (a) Derive matrices for Rotation about an arbitary point. **10**
(b) Explain Warnock's Algorithm. **10**

4. (a) What do you understand by Diffuse Illumination and Point Source Illumination ? **5**
(b) Write a short note on Bezier Curves ? **10**
(c) Write down all the matrices for Reflection for – **5**
(i) line y = 0
(ii) line x = 0
(iii) line y = x
(iv) line y = –x
(v) about origin.

5. (a) Derive Mid point circle algorithm. **10**
(b) Explain Text clipping with help of appropriate examples. **10**

6. (a) What do you mean by specular Reflection ? **5**
(b) Explain fractals in brief. **5**
(c) What is a Display file structure ? Hence explain the need for display file interpreter. **10**

7. (a) Illustrate inside-outside tests with example. **10**
(b) Explain Midpoint Subdivision Algorithm. **10**

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BE/COM/Sem IV

ws Oct- 10 167

Analog & Digital Communication 14/12/10

Con. 5726–10. **GT–6468**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** question from the remaining **six** questions.
(3) Assume any **suitable** data wherever **required** but justify the **same**.
(4) Answer to questions should be grouped and written **together**.

1. (a) In an AM wave calculate power saving when the carrier and one sideband are suppressed corresponding to – (i) m = 1 (ii) m = 0·5. **10**
   (b) Define code word, code rate and hamming weight. Also write note on Hamming code. **10**

2. (a) Write short notes on :–
      (i) Convolution codes **5**
      (ii) Cyclic code. **5**
   (b) For a (7, 4) linear block code the generator matrix is given by, **10**

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

      (i) Find the code vector
      (ii) Find the parity check matrix.

3. (a) State and prove the sampling theorem for band pass filters. **10**
   (b) Explain PWM and PPM. **10**

4. (a) Define and explain various multiplexing techniques used in communication systems. **10**
   (b) What is line coding ? Draw the waveforms if the sequence is transmitted using :– **10**
      (i) Unipolar RZ
      (ii) Polar RZ
      (iii) AMI.
      (iv) Split Phase Manchester
      (v) M ary where M = 4

      Assume the binary sequence 1 1 0 1 0 0 1 1.

5. (a) Explain match filter and optimum receiver. **10**
   (b) Explain delta modulation and adaptive delta modulation and compare them. **10**

6. (a) Explain the concept of image frequency and double spotting. **10**
   (b) Explain block diagram of M-ary PSK and find the Eculidean distance for 8-ary PSK. **10**

7. Write short notes on any **three** of the following :– **20**
   (a) Intersymbol Interference
   (b) Various noise parameters
   (c) Ring Modulator
   (d) Companding
   (e) Pre-emphasis and De-emphasis.

27 Dec 2010

S.E/ Com/ Sem IV

Operating System

P4 Con No 103

Con. 6618–10. **GT–647**

(3 Hours) **[Total Marks : 10**

Instructions: - 1) Question No 1 is compulsory; solve any 4 questions from remaining 6 question.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

1. a) What is mutual exclusion. Explain semaphore used for mutual exclusion. (10)
   b) Explain LINUX concurrency control method. (10)

2. a) Explain Operating system as an extended machine while explaining its seven functions. (10)
   b) Explain different types of disk scheduling algorithm. (10)

3. a) What is deadlock. Explain Banker's algorithms for deadlock avoidance. (10)
   b) Explain segmentation in detail. Describe how logical address is converted in to physical address. (10)

4. a) Explain file allocation methods in detail. (10)
   b) Explain Virtual memory and Demand paging (10)

5. a) Explain file management method in LINUX OS. (10)
   b) Explain device handling in LINUX. (10)

6. a) What are the various mechanisms implemented by operating system for allowing file sharing. (10)
   b) Calculate hit and miss using various page replacement methods (LRU, OPTIMAL, FIFO) for following page frames sequence, page frame size is 3. (10)
   4,7,3,0,1,7,3,8,5,4,5,3,4,7

7. a) Draw and explain paging hardware with TLB. (10)
   b) What is buffer cache? Write advantages and disadvantages of buffer cache in LINUX OS. (10)