5|06|13 S. E. IV (Rev) MJB-B

Computer
Operating System.

ws Feb. 2013-(f) 15

Con. 6651–13. **GS–7443**

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

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **necessary** and mention it **clearly.**

1. (a) What is system call ? Explain any five system calls. **5**
(b) What is memory partitioning ? Explain different memory partitioning techniques. **5**
(c) Draw and explain five state process model. **5**
(d) Explain effect of page size on performance. **5**

2. (a) What is deadlock ? Explain necessary and sufficient conditions to occur deadlock. **10**
Explain deadlock avoidance, prevention and detection.
(b) The requested tracks in the order received are – **10**
54, 57, 40, 20, 80, 120, 150, 45, 180
Apply the following disk scheduling algorithm starting track at 90.
(i) FCFS (ii) SSTC (iii) CSCAN.

3. (a) Consider the following set of processes with CPU burst time given in table. **10**

Process	Burst Time	Arrival Time
P_1	08	00
P_2	10	01
P_3	05	00
P_4	06	02

(i) Draw Gantt chart for preemptive SJF, non-preemptive SJF and Round Robin (Quantum = 02).
(ii) Calculate average waiting time and average turn around time.
(b) Explain different file access methods. **10**

4. (a) What is mutual exclusion ? Explain semaphore used for mutual exclusion. **10**
(b) Explain various I/O buffering techniques. **10**

5. (a) What is paging and segmentation ? Explain LRU and FIFO page replacement policis for given page frame sequences. Page frame size is 4. **10**
2, 3, 4, 2, 1, 3, 7, 5, 4, 3, 2, 3, 1
Calculate Page hit and Page miss.
(b) Explain critical section problem and its different solutions. **10**

6. (a) Explain LINUX concurrency control mechanism. **10**
(b) What are the characteristics of real-time operating system ? Explain in brief real time scheduling. **10**

7. Write short notes on :– **20**
(a) User Level and Kernel Level Threads
(b) Process Control Block (PCB)
(c) Unix File System
(d) Virtual Memory.

S.E. (Computer) Sem IV
Analysis of Algorithm & Design

D : PH (April Exam) 273

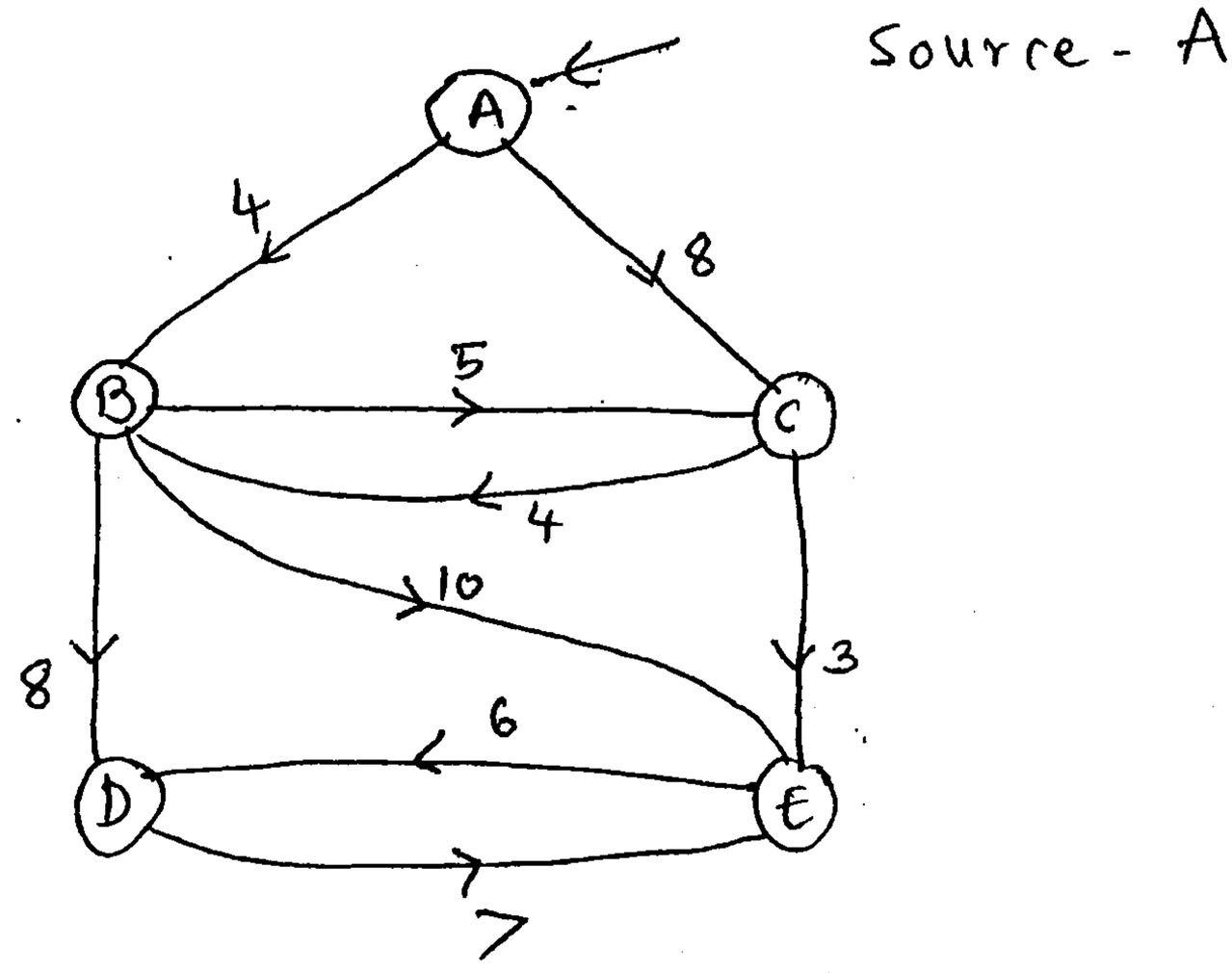
Con. 6646-13. **GS-7323**

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

N.B. (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **necessary.**

1. (a) Explain Divide and Conquer strategy. Write control abstraction (General method) for it. List any Four examples that can be solved by divide and conquer. **10**
   (b) Explain Asymptotic notations. Explain time complexity and space complexity in detail. **10**

2. (a) Explain Graph coloring problem using backtracking. Write algorithm for same. **10**
   (b) Find out single source shortest path for following graph using Dijkstra's algorithm. **10**



3. (a) Find the longest common subsequence from the given two sequences :– **10**
   P = (100101101101)
   Q = (0110)
   (b) Explain 15-puzzle problem using branch and bound. **10**

4. (a) Sort following numbers using Quicksort algorithm. Show all passes of execution. Also state the time complexity. **10**
   65, 70, 75, 80, 85, 60, 55, 50, 45
   (b) Explain and write Knunth –Morris Pratt algorithm. Explain with an example. **10**

5. (a) Explain job-sequencing with deadlines. Solve the following instance : **10**
   n = 5.
   $(P_1, P_2, P_3, P_4, P_5)$ = (20, 15, 10, 5, 1)
   $(d_1, d_2, d_3, d_4, d_5)$ = (2, 2, 1, 3, 3)
   (b) Solve following sum of subset problem using backtracking : **10**
   w = { 1, 3, 4, 5 }
   m = 8
   Find all possible subsets of 'w' that sum to 'm'.

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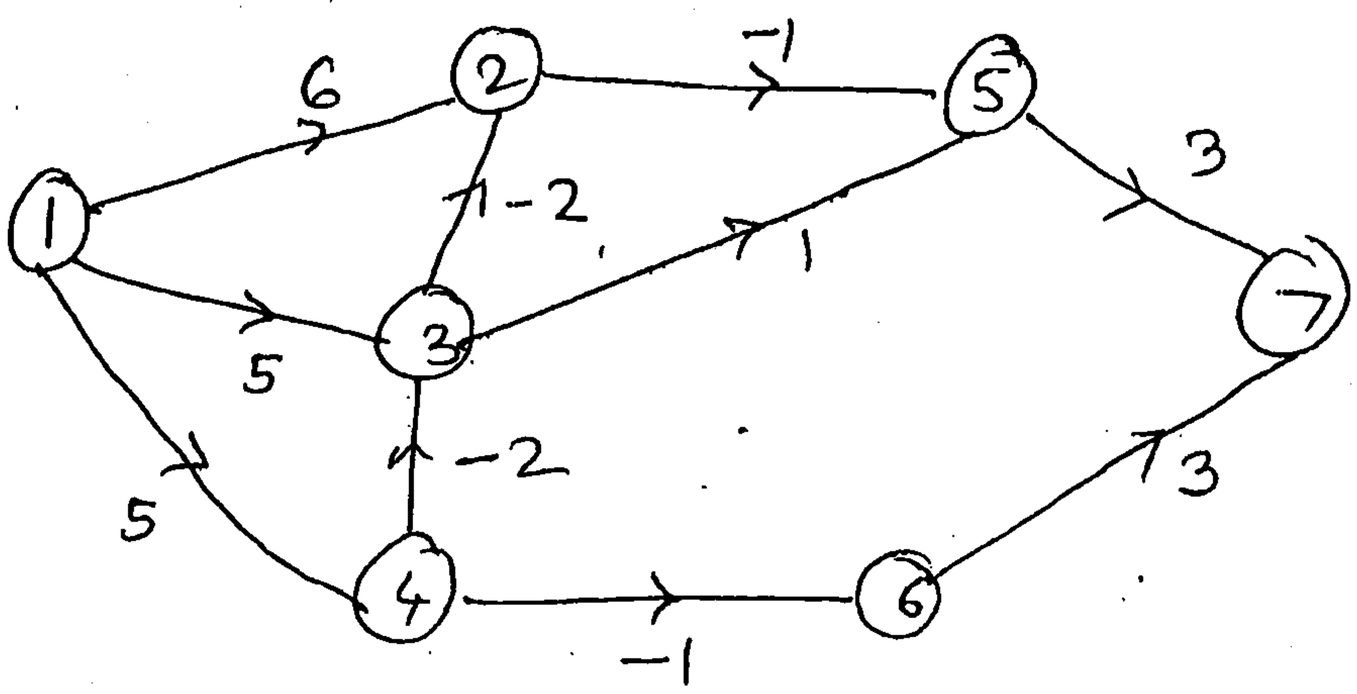
6. (a) Solve shortest path from source 1 for following graph using dynamic programming. **10**



(b) Explain travelling salesperson problem using branch and bound method. **10**

7. Write short notes :– **20**

(a) Differentiate between greedy approach and dynamic programming.

(b) Optimal storage on tapes.

(c) Radix sort

(d) Minimum spanning Tree using Kruskal's Algorithm.

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Analog & Digital Commn.

ws Feb. 2013-(e) 196

Con. 6556–13. **GS–7221**

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

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) Make **suitable** assumptions where **necessary**.

1. Attempt any **four** of the following :– **20**
   (a) What is the need of modulation in communication ?
   (b) What is companding ?
   (c) Explain bandwidth efficiency and power efficiency of AM, FM and PM.
   (d) Discuss the importance of Eucledian distance in ASK, FSK and PSK methods.
   (e) Explain FDM.

2. (a) A modulating signal 10 sin $(2\pi \times 10^3 t)$ is used to modulate a carrier signal 20 sin $(2\pi \times 10^4 t)$. Find the modulation index, percentage modulation, frequencies of the sideband components and their amplitudes. What is the BW of the modulated signal ? Draw the spectrum of the AM wave. **10**
   (b) Explain in detail superheterodyne AM receiver with the waveforms at various points. **10**

3. (a) State and prove sampling theorem for low pass signal. **10**
   (b) For the bit sequence b(t) = 1 1 0 1 0 0 1 0. Draw the following lien coding waveforms. **10**
      (i) NRZ – L
      (ii) AMI
      (iii) Manchester
      (iv) URZ
      (v) Polar RZ.

4. (a) Explain QPSK transmitter and receiver. Draw signal sapce representation. **10**
   (b) Compare PCM, DM, and ADM. **10**

5. (a) Explain the following :– **10**
      (i) Information
      (ii) Information Rate
      (iii) Entropy
      (iv) Channel capacity.

An analog signal is bandlimited to 4 kHz. It is sampled at the Nyquist rate and the samples are quantized into 4 levels. The quanitzation levels Q_1, Q_2, Q_3 and Q_4 are independent messages and have the probabilities $P_1 = P_2 = \frac{1}{8}$, $P_3 = P_4 = \frac{3}{8}$.

Find the information rate of the source.

[TURN OVER

(b) Explain the concept of image frequency and double spotting. **10**

6. (a) For a (7, 4) linear block code, the generator matrix is given by **10**

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

(i) Find all code vectors

(ii) Explain the procedure for error correction using syndrome vector. Give example.

(b) Compare ASK, FSK and PSK techniques. **10**

7. Write short notes on any **four** :– **20**

(a) Shannon's Theorem

(b) Diode Detector

(c) Thermal Noise

(d) Pre-emphasis and De-emphasis

(e) Ring Modulator.

Computer graphics CMP - Sem IV
21/5/13

115 : 1ST HALF-13 (r)-JP

Con. 6540–13. **GS–7110**

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

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

1. (a) Explain the method to draw a thick line using Bresenham's algorithm. **5**
   (b) Differentiate between Image space and Object space. **5**
   (c) What is aliasing ? Explain some antialiasing techniques. **5**
   (d) Derive the transformation matrix to magnify the triangle A (0, 0), B (1, 2) C (3, 2) to twice its size so that the point C (3, 2) remain fixed. **5**

2. (a) Explain Liang-Barsky line clipping algorithm. Apply the algorithm to the line with co-ordinates (30, 60) and (60, 25) against the window $(x_{min}, y_{min}) = (10, 10)$ and $(X_{max.}\ Y_{max}) = (50, 50)$. **10**
   (b) Explain parallel and perspective projections. Perform a perspective projection of the unit cube when the centre of projection is at $x_c = 10$ $y_c = 10$ on to $z = 0$ plane. **10**

3. (a) Derive the composite transformation matrix for reflection of an object about a line $y = mx + c$. Apply the derived matrix for the object A (4, 2) B (5, 3) C (6, 2) D (7, 1) on to the line $y = 2x$. **10**
   (b) Derive the midpoint algorithm for ellipse generation. **10**

4. (a) Explain Weiber-Atherton algorithm for polygon clippling. What are its advantages over other polygon clipping algorithms ? **10**
   (b) Explain the different raster techniques and the transformation associated with it. **10**

5. (a) Explain Painter's algorithm. **10**
   (b) Explain Gourand and Phong shading with their advantages and disadvantages. **10**

6. (a) Explain computer assissted animation and frame-by-frame animation concepts. **10**
   (b) Explain scan line fill algorithm with some suitable examples. **10**

7. (a) Explain RGB and CMY colar models. **10**
   (b) State the properties of Bezier curves. How can a Bezier surface be generated from a Bezier curve ? **10**

SE (comp) SEM IV (R) May 2013

14/5/2013 D.B.M.S.

VT-F.H.Exam. Apr(※)-13-131

Con. 6502–13. **GS–6996**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions from the **remaining** questions.
(3) Make **suitable** assumptions if **needed**.

1. Galleries keep information about artists, their names (which are unique), birthplaces, age and style of art. For each piece of artwork the artist the year it was made, its unique title, its type of art (eg. painting, sclupture, photograph) and its price must be stored-pieces of artwork are also classified into groups of various kinds. eg portraits, still life work By Picasso or works of 19th Century; a given piece of work may belong to more than one group.
Each group is identified by a name (like those given) that describes the group. Galleries keep into about customer's like persons (unique name, address, total amount spent and the artist and group of all that the customers like.
   (a) Draw the ER diagram for the databse. **8**
   (b) Explain the rules to map ER schema to relations. **6**
   (c) Explain Conflict seriliazibility. **6**

2. (a) Company manufactures ranges of products which are purchased by customers. The relational schema for this operation is given as :
   Company (company-code, cname, Director #.
   Director-name, {product-name, cost { cost #,
   Customer name, address} }) where {...} represents the repeating groups.
      (i) State the definitions of 1NF, 2NF and # NF. **6**
      (ii) Normalize the above relation to 3NF **6**
   (b) Explain 2 PL protocol. **8**

3. (a) What is recoverable schedule ? Why recoverability of schedule is desirable ? **10**
   Explain check point based recovery mechanism ?
   (b) What is the condition for lossless de-composition of a relation ? Give example. **5**
   (c) Explain Trigger with example. **5**

4. (a) EMP (*eid : inlegers*, ename : string, age : integer, salary : real).
   Works (*eid : integer, did : integer*, pctime : integer)
   DEPT (did : integer, dname : string, budget : real, managerid : integer)
      (i) Write SQL statement to create works relation. **2**
      (ii) Add Ram as an employee with eid = 101, age = 32, salary = ₹ 75000; **2**
      (iii) Give every employee 10% rise. **2**
      (iv) Find total no. of employees working in the department = 'Computer'. **2**
      (v) Arrange employees in descending order of their salary. **2**

[TURN OVER

(b) Explain organization of records in files, in the sequential file organization, why is an overflow block used even if there is at a given point only one overflow record ? **10**

5. (a) What is a transaction ? Discuss acid properties of a transaction. **10**
   (b) Explain data dictionary storage. **10**
   (c) Give the structure of B+ tree. **5**

   OR

   Explain static hashing.

6. (a) Explain UNDO and REDO operations for log based recovery. How are they used during recovery ? **8**
   (b) Give one protocol that prevents deadlock. **6**
   (c) Describe different methods of deadlock recovery. **6**

7. Write short notes on (any **four**) :– **20**
   (a) Views in SQL
   (b) Keys and Referential Integrity
   (c) Data Independance and its types
   (d) Timestamp and ordering protocols
   (e) Index definition in SQL.

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9/5/13

COMP Sem IV

Applied Mathematics - IV

Con.6426–13. **GS–6897**

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

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

1. (a) Check if the following function is harmonic. $f(\gamma,\theta)=\left(\gamma+\frac{a^2}{\gamma}\right)\cos\theta$ **5**

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

(c) Prove that the eigen values of an orthogonal matrix are +1 or −1. **5**

(d) Construct the dual of the followig LPP : **5**

Maximize $z = x_1 + 3x_2 - 2x_3 + 5x_4$
Subject to $3x_1 - x_2 + x_3 - 4x_4 = 6$
$5x_1 + 3x_2 - x_3 - 2x_4 = 4$
$x_1, x_2 \geq 0$, x_3, x_4 unrestricted.

2. (a) Evaluate $\oint_c \frac{e^z}{\cos\pi z}dz$ c is the circle $|z| = 1$. **6**

(b) Diagonalise the Hermitian matrix $A=\begin{bmatrix} -3 & 2+2i \\ 2-2i & 4 \end{bmatrix}$ **6**

(c) Use Simplex method to solve the LPP : **8**
Maximise $z = 1000x_1 + 4000x_2 + 5000x_3$
Subject to $x_1 + 2x_2 + 3x_3 \leq 14$
$3x_1 + 2x_2 \leq 14$
and $x_1, x_2, x_3 \geq 0$

3. (a) Evaluate $\int_{-\infty}^{\infty} \frac{x^2+x+2}{x^4+10x^2+9}dx$ using contour integration. **6**

(b) State Cayley-Hamilton theorem. Use it to find A^{-1} and A^4 **6**

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

[TURN OVER

(c) Use Penalty method to Minimise $z = x_1 + 2x_2 + x_3$ **8**

Subject to $x_1 + \frac{x_2}{2} + \frac{x_3}{2} \leq 1$

$$\frac{3}{2}x_1 + 2x_2 + x_3 \geq 8$$

$$x_1, x_2, x_3 \geq 0$$

4. (a) If $A = \begin{bmatrix} 4 & 3 \\ 7 & 8 \end{bmatrix}$ find A^{100} **6**

(b) If f(z) is analytic function, **6**

prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$

(c) Use Dual simplex method to Minimise $z = 3x_1 + 2x_2 + x_3 + 4x_4$ **8**

Subject to

$$2x_1 + 4x_2 + 5x_3 + x_4 \geq 10$$
$$3x_1 - x_2 + 7x_3 - 2x_4 \geq 2$$
$$5x_1 + 2x_2 + x_3 + 6x_4 \geq 15$$
$$x_1, x_2, x_3, x_4 \geq 0$$

5. (a) Find the bilinear transformation that maps the points 1, –i, 2 in z-plane onto the points 0, 2, –i in w-plane. **6**

(b) $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ is A^3 derogatory ? **6**

(c) Evaluate $\int_0^{2\pi} \frac{\sin^2\theta}{a + b\cos\theta} d\theta$ where $0 < b < a$ **8**

6. (a) If $A = \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$ where a, b, c are positive integers, then prove that **6**

(i) $a + b + c$ is an eigen value of A and

(ii) If A is non-singular, one of the eigen values in negative.

(b) Find the image of region bounded by $x = 1$, $y = 1$ and $x + y = 1$ under the transformation $w = z^2$ **6**

Con. 6426–GS-6897-13. 3

(c) Use Lagrangian Multiplier Method to Optimise **8**

$$z = 2x_1^2 + x_2^2 + 3x_3^2 + 10x_1 + 8x_2 + 6x_3 - 100$$

s.t. $x_1 + x_2 + x_3 = 20$

$x_1, x_2, x_3 \geq 0$

7. (a) Find Laurent's series for the function **6**

$f(z) = \dfrac{1}{(z-1)(z-2)}$ in the regions

(i) $1 < |z - 1| < 2$ (ii) $1 < |z - 3| < 2$

(b) Find the analytic function f(z) whose imaginary part is **6**
$e^{-x}[2xy \cos y + (y^2 - x^2) \sin y]$

(c) Using Kuhn Tucker method, **8**

Opimise the function $2x_1 + 3x_2 - \left(x_1^2 + x_2^2 + x_3^2\right)$

s. t. $x_1 + x_2 \leq 1$

$2x_1 + 3x_2 \leq 6$

$x_1, x_2 \geq 0$
