May 15

S.E. sem. IV - CBGS CMPN
Database Management Systems - 02/06/2015

C·B·G·S

Q.P. Code : 3549

(3 Hours)　　　　　　　　　　　　　[Total Marks : 80

N.B. :　(1)　Question No.1 is compulsory.
　　　　(2)　Attempt **Any Three** from remaining **Five Questions.**

1. (a)　Draw E-R diagram for online Ticket Railway Reservation System.
　　　　Convert E-R diagram into tables.　　　　　　　　　　　　　　　10

　 (b)　Explain following Relational algebra operations with examples.　10
　　　　(i)　Set difference　　(ii)　Generalized Projection
　　　　(iii) Natural join　　　(iv)　Rename

2. (a)　What is recoverable schedule? Why recoverability of schedule is desirable?　10
　　　　Explain recovery with concurrent transaction.

　 (b)　Explain following terms with suitable example　　　　　　　10
　　　　(i) Primary key (ii) Candidate key (iii) Foreign key (iv) Super key

3. (a)　What is transaction? Discuss ACID properties of transaction?　　10
　 (b)　Define Normalization? Explain 1NF, 2NF, 3NF and BCNF　　　10

4. (a)　For the following given database, write SQL queries:-　　　　10
　　　　Person (driver_id#, name, address)
　　　　Car (license, model, year)
　　　　Accident (reportno, date, location)
　　　　Owns (driver_id#, license)
　　　　Participated (drivercid, car, report_number, damage_amount)

　　　　(i)　Find the total number of people who owned cars that were involved in accident 2004
　　　　(ii)　Find the number of accidents in which the cars belonging to "HT" were involved
　　　　(iii) Update the damage amount for car with license number "Mum2011" in the
　　　　　　accident with report number "AR120" to Rs. 4000

　 (b)　Describe overall architecture of DBMS with diagram.　　　　10

5. (a)　Explain various types of constraints with an example.　　　　10
　 (b)　Explain sort-merge join algorithm in query processing.　　　　10

6. (a)　Write short notes on any four　　　　　　　　　　　　　20
　　　　(i)　Generalization and Aggregation
　　　　(ii)　Total Participation and Partial participation
　　　　(iii) Division Operator
　　　　(iv)　Shadow page recovery
　　　　(v)　Cost Based query optimization

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JP-Con. 11748-15.

(3 Hours)   [Total Marks : 80

N.B.: (1) Question No.1 is compulsory.
      (2) Attempt any three questions from Question No. 2 to 6.
      (3) Use of stastical Tables permitted.
      (4) Figures to the right indicate full marks.

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

   (b) If $A = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$ then find the eigen values of $4A^{-1} + 3A + 2I$.   5

   (c) It is given that the means of x and y are 5 and 10. If the line of regression of y on x   5
       is parallel to the line $20y = 9x + 40$, estimate the value of y for $x = 30$.

   (d) Find the dual of the following L.P.P.   5
       Maximise $Z = 2x_1 - x_2 + 3x_3$
       Subject to $x_1 - 2x_2 + x_3 \geq 4$
                          $2x_1 + x_3 \leq 10$
                          $x_1 + x_2 + 3x_3 = 20$
                          $x_1, x_3 \leq 0$, x_2 unrestricted.

2. (a) Evalute $\int_C \frac{z+2}{z^3 - 2z^2} \, dz$, where C is the circle $|Z - 2 - i| = 2$ 6

   (b) Show that $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$ is derogatory.   6

   (c) In a distribution exactly normal 7% of items are under 35 and 89% of the items are   8
       under 63. Find the probability that an item selected at random lies between 45 &
       56.

3. (a) A continuous random variable has probability density function $f(x) = 6(x - x)^2$,   6
       $0 \leq x \leq 1$. Find (i) mean (ii) variance.

   (b) Solve the following L.P.P. by simplex method   6
       Maximise $Z = 4x_1 + 3x_2 + 6x_3$
       Subject to $2x_1 + 3x_2 + 2x_3 \leq 440$
                          $4x_1 + 3x_3 \leq 470$
                          $2x_1 + 5x_2 \leq 430$
                          $x_1, x_2, x_3 \leq 0$

JP-Con. 9218-15.

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3. (c) Find all possible Laurent's expansions of the function 8

$$f(z) = \frac{7z - 2}{z(z-2)(z+1)} \quad \text{about} \quad z = -1$$

4. (a) Find the moment generating function of Binomial distribution & hence find mean 6
and variance.

(b) Calculate the correlation coefficient from the following data : 6

x	:	100	200	300	400	500
y	:	30	40	50	60	70

(c) Show that the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ 8

is diagonalisable. Find the transforming matrix and the diagonal matrix.

5. (a) Ten individuals are chosen at random from a population and their heights are found 6
to be 63, 63, 64, 65, 66, 69, 69, 70, 70, 71 inches. Discuss the suggestion that the
mean height of the universe is 65 inches.

(b) Evaluate $\displaystyle\int_0^\infty \frac{dx}{(x^2 + a^2)^3}$, $a > 0$ using contour integration. 6

(c) Use Kuhn - Tucker conditions to solve the following N.L.P.P. 8

Maximise $Z = 8x_1 + 10x_2 - x_1^2 - x_2^2$

subject to $3x_1 + 2x_2 \leq 6$

$x_1, x_2 \geq 0$

6. (a) A die was thrown 132 times and the following frequencies were observed. 6

No. obtained :	1	2	3	4	5	6	Total
Frequency :	15	20	25	15	29	28	132

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Q.P. Code : 3555

(3 Hours)   [Total Marks : 80

N.B.: (1) Question No. 1 is compulsory.
       (2) Attempt any three of remaining five questions.
       (3) Assume any suitable data if necessary and clearly state it.

1. (a) What are aliasing and antialiasing? Explain any one antialiasing method.   [05]
    (b) What are the disadvantages of DDA algorithm?   [05]
    (c) What is viewing transformation?   [05]
    (d) Define Shearing and give example.   [05]

2. (a) Explain the midpoint circle generating algorithm.   [08]
    (b) Explain the steps used in rotation of 2-D object about an arbitrary axis and   [12]
         derive the matrices for same.

3. (a) Expain Liang – Barsky line clipping algorithm with suitable example.   [10]
    (b) Explain Sutherland – Hodgeman polygon clipping algorithm in detail.   [10]

4. (a) What are Parallel and Perspective projections and derive the matrix for   [10]
         perspective projection.
    (b) Explain the properties of Bezier curves.   [10]

5. (a) What is the use of Scan line method and explain all the steps.   [10]
    (b) Define Koch curve? How do you construct the Koch curve?   [10]

6.   Write a short note on any four of the following   [20]
    (a) OpenGL.
    (b) Area Subdivision method
    (c) Composite transformation
    (d) Sweep representations
    (e) Flood fill algorithm

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QP Code : 3542

(3 Hours)   [Total Marks : 80

N.B. (1) Question No. **1** is compulsory.
(2) Attempt any **three** from the remaining five question.
(3) Assume suitable data if required.

1. (a) Write abstract algorithm for greedy design method.   5
   (b) Which are different factors considered for sorting elements.   5
   (c) Explain flow shop scheduling technique.   5
   (d) Explain three cases of master theorem.   5

2. (a) Write and explain sum of subset algorithm for   10
   $n = 5, W = \{2, 7, 8, 9, 15\}$ $M = 17$
   (b) Explain randomized version of Quick sort and derive its complexity   10

3. (a) Implement the bubble sort Algorithm and derive its best case and worst case   10
   complexity.
   (b) Find the Huffman code for the following message.   10
   "COLLEGE OF ENGINEERING"

4. (a) What is Hamiltonian cycle ? Write an algorithm to find all Hamiltonian cycles.   10
   (b) Suppose you are given n number of coins, in that one coin is faulty, its weight   10
   is less than standard coin weight. To find the faulty coin in a list using proper
   searching method. What will be the complexity of searching method.

5. (a) Explain Job sequencing with deadliner for the given instance.   10
   $n = 5, \{P_1, P_2, P_3, P_4, P_5\} = \{20, 15, 10, 5, 3\}$
   $\&$ $\{d_1, d_2, d_3, d_4, d_5\} = \{2, 2, 1, 3, 3\}$
   (b) Explain naive string matching algorithm with example.   10

6. Write note on : (any two)   20
   (a) Rabin karp algorithm
   (b) 15-puzzle problem
   (c) Travelling sales person problem
   (d) Strassen's matrix multiplication.

Computer (BSGS) TCS 08 May 2015 08 June 2015

QP Code : 3552

(3 Hours)

[Total Marks : 80]

N.B. (1) Question No. 1 is compulsory
(2) Attempt any **three** out of remaining five questions
(3) Assumptions made shoud be clearly stated
(4) Figures to the right indicate full marks
(5) Assume sutaible data whenever required but justify that.

Q.1 (a) Differentiate between NFA and DFA   [Total Marks : 80
 (b) State and Explain closure properties of Context Free Language   [5M]
 (c) Explain with an example the Chomsky hierarchy   [5M]
 (d) Compare recursive and recursively enumerable languages.   [5M]
                                                                            [5M]

Q.2 (a) Construct PDA accepting the language L={$a^n b^n$ |n>0}   [10M]
 (b) Design minimized DFA for accepting strings ending with 100 over alphabet (0,1). [10M]

Q.3 (a) Convert (0+ε) (10)*(ε+1) into NFA with ε-moves and obtain DFA   [10M]
 (b) Construct Turing machine that accepts the string over Σ={0,1} and converts every occurrence of 111 to 101. [10M]

Q.4 (a) Convert following Grammar to CNF and GNF   [10M]
 S →ASB/a/bb
 A → aSA/a
 B → SbS/bb

 (b) Design PDA to accept language L={ $a^{n-1} b^{2n+1}$ |n≥ 1}   [10M]

Q.5 (a) Design Moore Machine to generate output A if string is ending with abb, B if string [10M]
 ending with aba and C otherwise over alphabet (a,b).And Convert it to Mealy machine.

 (b) Construct TM to check wellformed ness of parenthesis   [10M]

Q.6   Write short notes on   [20M]
 (a) Rice theorem
 (b) Variant of TM
 (c) Applications of Regular Expression
 (d) Difference between PDA and NPDA

JP-Con. 12401-15.

(b) Using duality solve the following L. P. P.

Maximise $Z = 5x_1 - 2x_2 + 3x_3$ 6

Subject to

$$2x_1 + 2x_2 - x_3 \geq 2$$
$$3x_1 - 4x_2 \leq 3$$
$$x_1 + 3x_3 \leq 5$$
$$x_1, x_2, x_3 \geq 0.$$

(c) (i) A random sample of 50 items gives the mean 6.2 and standard deviation 10.24,   4
can it be regarded as drawn from a normal population with mean 5.4 at 5% level of
significance ?

(ii) Find the M.G.F. of the following distribution.   4

X :	-2	3	1
$P(X=x)$	$\dfrac{1}{3}$	$\dfrac{1}{2}$	$\dfrac{1}{6}$

Hence find first four central moments.

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