Sem V (TCS) CMPN (CBSE) 15/12/2014

SE

QP Code :12552

(3 Hours) **[Total Marks : 80**

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

1. (a) Give chomsky hierarchy of grammar with examples. **5**
(b) State and explain any 5 closure properties of regular languages. **5**
(c) Compare recursive and recursively enumerable languages. **5**
(d) State and prove equivalence of NFA and DFA. **5**

2. (a) Design a DFA to accept strings over the alphabet set {a, b} that begin with 'aa' but not end with 'aa'. **10**
(b) Convert $(0 + \in)(1\ 0)^*(\in + 1)$ into NFA with $\in$-moves and hence obtain a DFA. **10**

3. (a) Design a MOORE and MEALY machine to decrement a binary number. **10**
(b) Give statement of pumping lemma for regular sets and hence prove that $\{w\ c\ w^R \mid W \in (a+b)^*\}$ is not regular where w^R is reverse of w. **10**

4. (a) Obtain leftmost derivation, rightmost derivation and derivation tree fbr the string "cccbaccba". The grammar is **10**
$S \rightarrow SSa \mid SSb \mid c$
(b) Design Turing machine as generator to add two binary numbers and hence simulate **10**
for"110 + 10".
Hint : Assume two way infinite tape.

5. (a) Design a PDA tc accept language $\{ a^{n-1} b^{2n+1} \mid n \geq 1\}$. **10**
(b) Convert the below given grammar to Chomsky Normal Form (CNF) and Griebach Normal Form (GNF) **10**
$E \rightarrow E+E \mid E*E \mid (E) \mid id$
Consider "id" as a single terminal/symbol.

6. (a) Design a Turing machine as acceptor for the language $\{a^n b^m \mid n, m \geq 0 \text{ and } m \geq n\}$. **10**
(b) Design PDA to check even parentheses over $\Sigma = \{0,1\}$ **10**

S.E. Comp Sem IV (CBGS) 9/12/16
Database Mgmt Systems

QP Code :12512

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

N.B. (1) Question No. **1** is **compulsory.**
(2) Solve any **three** questions out of the remaining questions.
(3) Make **suitable** assumptions if **needed.**

1. (a) Define Specialization and Generalization with an example. **5**
   (b) Write about Aggregate Functions in SQL. **5**
   (c) Discuss Referential Integrity Constraints. **5**
   (d) Explain Total Participation and Partial Participation with example. **5**

2. (a) Explain the following Relational Algebra Operations with example :— **10**
   (i) Set Intersection (iii) Generalized Projection
   (ii) Division Operator (iv) Natural join
   (b) Draw an ER Diagram for a banking enterprise. Convert it into relational model. **10**

3. (a) What is Normalization ? Explain INF, 2NF, 3NF and BCNF giving examples. **10**
   (b) What is an attribute ? Discuss various types of attributes with examples. **10**

4. (a) Explain sort-merge join algorithm in query processing. **10**
   (b) Describe conflict serializability and view serializability with examples. **10**

5. (a) Explain database system architecture in detail. **10**
   (b) What do you mean by Data Modeling ? Discuss different types of Models. **10**

6. Write Short notes on :— **20**
   (a) ACID Properties
   (b) Steps in Query Processing
   (c) Data Control Commands in SQL
   (d) Security in Database.

COMP
T. E. Sem IV (CBGS) 3/12/14.
COA

QP Code :12476

(3 Hours) [Total Marks : 80

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining **five** questions.
(3) Assume suitable data if **required.**
(4) Draw neat diagram wherever **necessary.**

1. Solve any **four :** **20**
   (a) What are the types of pipeline hazards ?
   (b) Explain in brief memory mapped I/O.
   (c) Explain in detail cache coherence.
   (d) Draw flow chart of Booth's algorithm.
   (e) Define stored program concept and draw Von Neumann's Architecture.

2. (a) Explain in detail different types of addressing modes. **10**
   (b) Multiply $(-2)_{10}$ and $(-5)_{10}$ using Booth's Algorithm. **10**

3. (a) Explain Wilke's Engine (Hardwired Control Unit) in detail. **10**
   (b) Explain virtual memory with reference to memory hierarchy, segments and pages. **10**

4. (a) Explain features of RISC and CISC processors. **10**
   (b) Explain six stage instruction pipeline with suitable diagram. **10**

5. (a) Explain various high speed memories such as interleaved memories and caches. **10**
   (b) Explain LRU page replacement policy with suitable example. **10**

6. (a) What is Bus Arbitration ? Explain any two techniques of Bus Arbitration. **10**
   (b) Write short note (any **two**) : **10**
      (i) Nano programming
      (ii) DMA (Direct Memory Access)
      (iii) Plotter.

S.E. Comps Sem IV (CBGS)
A OA

2-11-14.

QP Code :12446

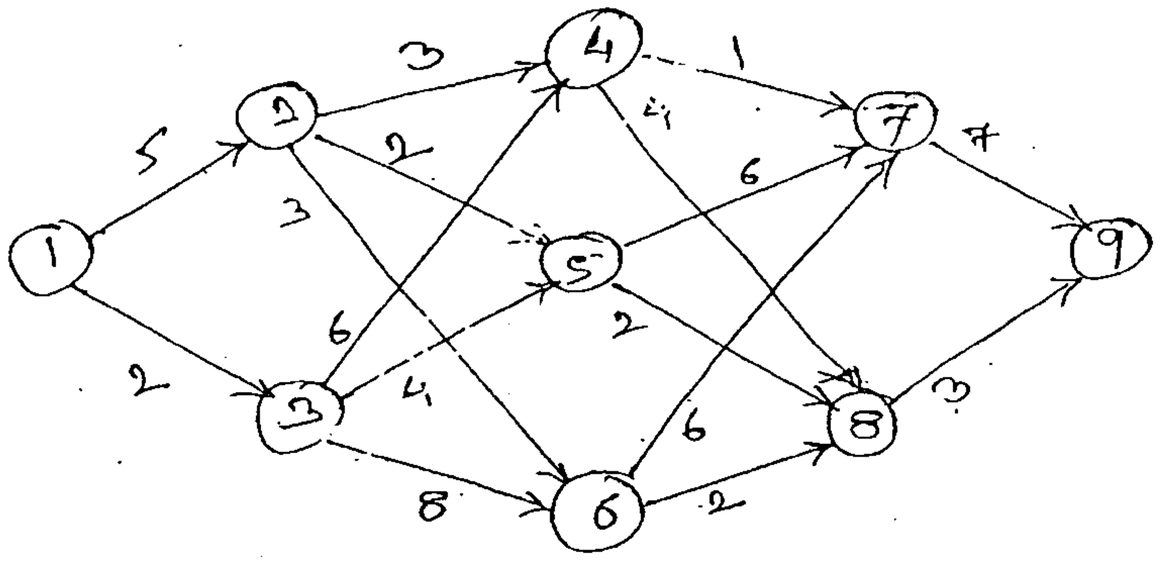
(3 Hours) **Total Marks : 80**

N. B. : (1) Attempt any **four** questions out of **six** question
(2) Assume suitable **data** if **necessary.**

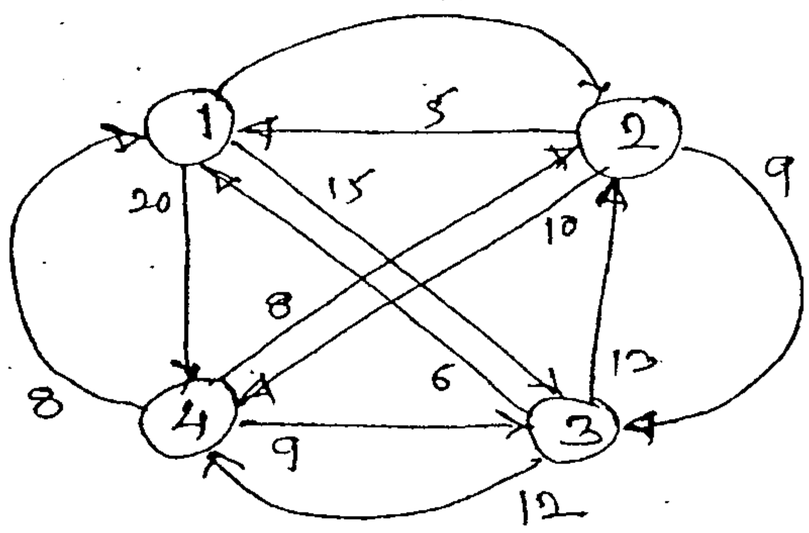
1. (a) Write an algorithm to find minimum and maximum value using divide and conquer and also drive it s complexity. **10**
(b) To sort the given set of number using insertion sort and also show the result of each pass. **10**
< 11, 7, 17, 3, 9, 29, 85, 9 >

2. (a) Find an optimal solution to the knapsack instance n = 7, m = 15. **10**
Profit = {10, 5, 15, 7, 6, 18, 3}
Weight = {2, 3, 5, 7, 1, 4, 1}
(b) Explain optimal storage on tape with example. **10**

3. (a) Find a minimum cost path from 1 to 9 in the given graph using dynamic programming. **10**



(b) Find the path of travelling sales person problem of given graph. **10**



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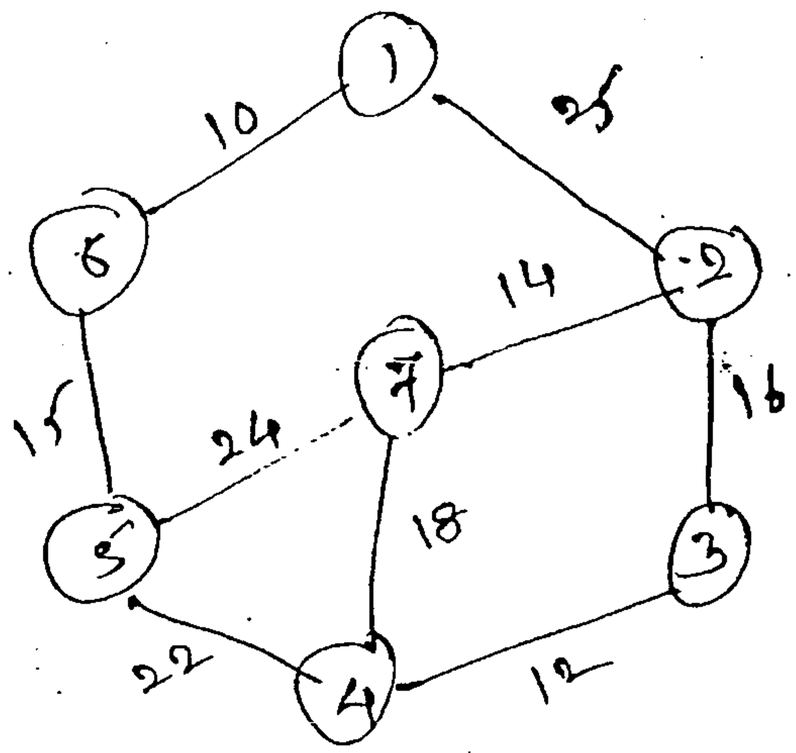
GN-Con.:8575-14.

4. (a) To generate the Huffman code for given set of frequencies. 10
1, 1, 2, 3, 4, 8, 13, 21

(b) To implement the knuth - Morris-Pratt, string matching algorithm. 10

5. (a) To find MST of following graph using prim's and kruskal's Algorithm. 10



(b) Explain flow shop scheduling using suitable data. 10

6. Write note on (**Any two**) 20
(i) N-Queen Problem
(ii) Randomized Algorithm
(iii) Tries
(iv) The 15 - puzzle problem.

SE - SEM IV (CBGS) - Comp

Dec 2014

C. G.

QP Code : 12589

(3 Hours) **[Total Marks : 80]**

N.B. : (1) Questions 1 is **compulsory**.
(2) Solve any three of the remaining
(3) Assume suitable data if necessary

1. (a) Explain 8 connected flood fill algorithm in detail. **5**
   (b) Differentiate between random scan and raster Scan techniques. **5**
   (c) Explain Liang Barsky line clipping algorithm in detail **10**

2. (a) Derive Bressenham's line drawing algorithm for lines with slope <1 **10**
   (b) Explain parallel and perspective projections. Also derive the matrix for perspective projection. **10**

3. (a) Derive the matrix for 2 D rotation about an arbitrary point. **10**
   (b) Explain Gouraud and Phong shading techniques with their advantages and disadvantages. **10**

4. (a) Explain midpoint circle algorithm. Use the same to plot the circle, whose radius is 10 units. **10**
   (b) Explain any one polygon clipping method in detail. **10**

5. (a) Define window, view port and hence derive window to view port transformation. **10**
   (b) Explain what is meant by Bezier curve. State its properties and hence explain how a Bezier surface can be generated from Bazier curve. **10**

6. Write short notes on **any two** following :- **20**
   (i) Halftoning and dithering techniques
   (ii) Open GL basic primitives
   (iii) Sweep representation

GN-Con: 12096-14.

S.E. Comps & I.T
AM - IV (K.T.)
(CBGS)

21/11/14

QP Code : 12413

(3 Hours) **[Total Marks : 80**

N.B. (1) Question No. **1** is **compulsory**.
(2) Answer any **three** questions from Question Nos. **2** to 6.

1. (a) Evaluate $\int_C (z - z^2)$ where Cis the upper half of the circle $|z| = 1$. What is the value of the integral for the lower half of the same circle ? **5**

(b) If $A = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$. Find the eigen values of $A^3 + 5A + 8I$. **5**

(c) The regression lines of a sample are $x + 6y = 6$ and $3x + 2y = 10$. Find (1) mean of x and y and (2) coefficient of correlation between x and y. **5**

(d) A machine is claimed to produce nails of mean length 5 cm. and standard deviation of 0·45 cm. A random sample of 100 nails gave 5·1 cm. as average length. Does the performance of the machine justify the claim ? Mention the level of significance you apply. **5**

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

(b) Evaluate $\int \frac{z+3}{z^2+2z+5} dz$, where Cis the circle (i) $|z| = 1$. (ii) $|z + 1 - i| = 2$. **6**

(c) The mean inside diameter of a sample of 200 washers produced by a machine is 0·502 cm and the standard deviation is 0·005 cm. The purpose for which these washers are intended allows a maximum tolerance in the diameter of 0·496 to 0·508 cm, otherwise the washers are considered defective. Determine the percentage of defective washers produced by the machine, assuming the diameters are normally distributed. **8**

3. (a) A continuous random variable X has the following probability law $f(x) = kx^2e^{-x}$, $x \geq 0$. Find k, mean and variance. **6**

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

Max $z = x_1 + 4x_2$
Subject to $2x_1 + x_2 \leq 3$
$3x_1 + 5x_2 \leq 9$
$x_1 + 3x_2 \leq 5$
$x_1, x_2 \geq 0$

(c) Find Laurent's series which represents the function $f(z) = \frac{2}{(z-1)(z-2)}$ when **8**

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

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4. (a) The means of two random samples of size 9 and 7 are 196·42 and 198·82 respectively. The sums of the squares of the deviation from the means are 26·94 and 18·73 respectively. Can the samples be considered to have been drawn from the same population ? **6**

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

X :	23	27	28	29	30	31	33	35	36	39
Y :	18	22	23	24	25	26	28	29	30	32

(c) Show that the following matrix is Diagonalizable. Find the transforming matrix and the Diagonal matrix. **8**

$$\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$$

5. (a) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls. **6**

(b) Evaluate the following integral by contour integration **6**

$$\int_{-\infty}^{\infty} \frac{x^2\,dx}{(x^2+1)(x^2+4)}.$$

(c) Use Kuhn Tucker method to solve the NLPP :— **8**

$$\text{Max } Z = -x_1^2 - x_2^2 - x_3^2 + 4x_1 + 6x_2$$

$$\text{St} \quad x_1 + x_2 \leq 2$$
$$2x_1 + 3x_2 \leq 12$$
$$x_1, x_2 \geq 0.$$

6. (a) For special security in a certain protected area, it was decided to put three lighting bulbs on each pole. If each bulb has a probability p of burning out in the first 100 hours of service, calculate the probability that at least one of them is still good after 100 hours. **6**

If p = 0·3, how many bulbs would be needed on each pole to ensure 99% safety that atleast one is good after 100 hours ?

(b) Use Duality to solve the following LPP : **6**

$$\text{Max } Z = 2x_1 + x_2$$
$$\text{Subject to} \quad 2x_1 - x_2 \leq 2$$
$$x_1 + x_2 \leq 4$$
$$x_1 \leq 3$$
$$x_1, x_2 \geq 0$$

(c) The number of car accidents in a metropolitan city was found to be 20, 17,12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use χ^2 test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during 10 months period. Test at 5% level of Significance. **8**
