(98) SE-Sem-IV- Computers-CBSGS-Apr-17 15/5/17

QP Code : 541301

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

N.B. : (1) Questions no. **1** is compulsory.
(2) Attempt any **three** questions from Q. 2 to Q. 6
(3) Use of statistical table permitted.
(4) Figures to the **right** indicate **full** marks.

1. (a) Evaluate $\int_C (z-z^2)\,dz$, where C is the upper half of the circle $|z|=1$. **5**

(b) If $A=\begin{bmatrix}2 & 4\\ 0 & 3\end{bmatrix}$, then find the eigen values of $6A^{-1}+A^3+2I$ **5**

(c) State whether the following statement is true or false with reasoning : " The regression coefficients between 2x and 2y are the same as those between x and y." **5**

(d) Construct the dual of the following L.P.P. **5**

Maximise $Z=3x_1+17x_2+9x_3$

Subject to $x_1-x_2+x_3\geq 3$

$-3x_1+2x_3\leq 1$

$2x_1+x_2-5x_3=1$

$x_1, x_2, x_3\geq 0$

2. (a) Evaluate , $\int_c \frac{e^{2z}}{(z+1)^4}\,dz$, where C is the circle $|Z-1|=3$ **6**

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

(c) A manufacturer knows from his experience that the resistance of resistors he produces is normal with $\mu=100$ ohms and standard deviation $\sigma=2$ ohms. What percentage of resistors will have resistance between 98 ohms and 102 ohms? **8**

3. (a) A discrete random variable has the probability distribution given below: **6**

x	−2	−1	0	1	2	3
p(x)	0.2	k	0.1	2k	0.1	2k

Find k, the mean and variance

[TURN OVER]

(b) Solve the following L.P.P. by simplex method 6

Maximise $Z = 3x_1 + 2x_2$

Subject to $x_1 + x_2 \leq 4$

$x_1 - x_2 \leq 2$

$x_1, x_2 \geq 0$

(c) Expand $f(z) = \dfrac{z^2 - 1}{z^2 + 5z + 6}$ around $z = 0$, indicating region of convergence. 8

4. (a) Find the first two moments about the origin of Poisson distribution and hence find mean and variance. 6

(b) Calculate R and r from the following data : 6

x	12	17	22	27	32
y	113	119	117	115	121

(R - the rank correlation coefficient, r - correlation coefficient)

(c) Show that the matrix $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ is diagonalisable. 8

Find the transforming matrix and the diagonal matrix.

5. (a) A tyre company claims that the lives of tyres have mean 42,000 kms with S.D of 4000 kms. A change in the production process is believed to result in better product. A test sample of 81 new tyres has a mean life of 42,500 kms. Test at 5% level of significance that the new product is significantly better than the old one. 6

(b) Evaluate $\int_0^{2\pi} \dfrac{d\theta}{5 + 3\sin\theta}$ using Cauchy's residue theorem. 6

(c) Using the Kuhn-Tucker conditions solve the following N.L.P.

Minimise $Z = 7x_1^2 + 5x_2^2 - 6x_1$ 8

Subject to $x_1 + 2x_2 \leq 10$

$x_1 + 3x_2 \leq 9$

$x_1, x_2 \geq 0$

6. (a) 300 digits were chosen at random from a table of random numbers. The frequency of digits was as follows. **6**

Digit	0	1	2	3	4	5	6	7	8	9	Total
Frequency	28	29	33	31	26	35	32	30	31	25	300

Using χ^2-test examine the hypothesis that the digits were distributed in equal numbers in the table.

(b) Use the dual simple method to solve the following L.P.P. **6**

Minimise $Z = 6x_1 + x_2$

Subject to $2x_1 + x_2 \geq 3$

$x_1 - x_2 \geq 0$

$x_1, x_2 \geq 0$

(c) (i) Ten individuals are chosen at random from a population and their heights are found 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. **4**

(ii) A random variable X has the following probability distribution **4**

x	0	1	2	3
p(x)	$1/6$	$1/3$	$1/3$	$1/6$

Find M.G.F about the origin and hence first four raw moments.

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SE – Sem-IV – CBSGS – Comps – AOA

19/5/17

Q.P. Code :13174

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: Subject AOA CSC 402 CBSGS R-12 SE comp SEM IV CBSGS

1. Q.1 is compulsory.
2. Solve any three from Remaining

Q. 1 Answer **any four** **20**

a) Write an algorithm for finding maximum and minimum number from given set.

b) Write the algorithm and derived the complexity of Binary Search algorithm.

c) Explain masters method with example

d) Write a note on flow shop scheduling

e) Compare divide and conquer, dynamic programming and Backtracking approache used for algorithm design.

Q. 2 a) Write and explain string matching with finite automata with an example **10**

b) Explain how branch and bound strategy can be used in 15 puzzle problem. **10**

Q. 3 a) What is 0/1 knapsack and fractional knapsack problem. **10**

Solve following using 0/1 knapsack method

Item (i)	Value (vi)	Weight(wi)
1	18	3
2	25	5
3	27	4
4	10	3
5	15	6

Knapsack capacity=12.

b) Explain insertion sort and derive its complexity **10**

Q. 4 a) What is a binary search tree? How to generate optimal binary search tree **10**

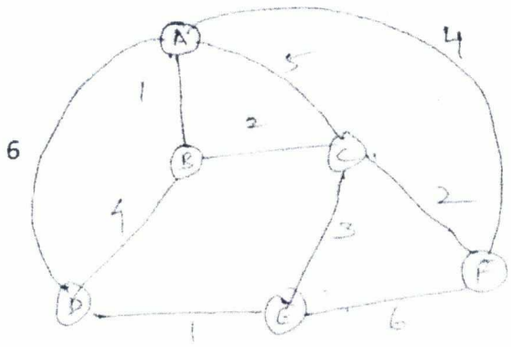
b) What is a longest common subsequence problem? Find LCS for following string X = ACB AED Y = ABC ABE **10**

Q. 5 a) Explain Job Sequencing with deadlines. **10**

Let n=4, $(P_1\ P_2\ P_3\ P_4) = (100,10,15,27)$ and $(d_1\ d_2\ d_3\ d_4)$ (2,1,2,1) find feasible solution.

b) Explain prims algorithm and find minimum spanning tree for the following graph. **10**

(P.T.O)



Q.6 Write short notes (**any three**):- 20

a) Problem of multiplying Long Integers
b) Strassen's matrix multiplication
c) Knuth Morris Pratt's Pattern matching
d) Multi stage Graphs

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SE - sem - IV - CBSGS - COMPS

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25/5/17

T1124 / T1044 COMPUTER ORGANIZATION AND ARCHIECTURE

Q.P. Code :13085

[Time: Three Hours] [Marks:80]

Please check whether you have got the right question paper.

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.

Q.1 Solve any four out of five. 20

A. Explain Virtual Memory.

B. What is IO buffering?

C. Write a note on scanner.

D. What is Segmentation?

E. What is TLB?

Q.2 A. I) Draw the flow chart for Restore Division Algorithm. 04

II) Divide using restore division method 7/3. 06

B. Describe hard-wire control unit and specify its advantages. 10

Q.3 A. Multiply (-5) and (2) using Booth's Algorithm. 10

B. A block set associative cache consists of 64 blocks divided in 4 block sets. The main memory contains 4096 blocks, each 128 words of 16bit length. 10

1) How many bits are there in main memory address?

2) How many bits are there in cache memory address (tag, set, and word fields)?

Q.4 A. Differentiate between I. RISC and CISC processor. 10

B. Explain Flynn's classification. 10

Q.5 A. Discuss the functions of 8089 I/O processor. 10

B. Show IEEE 754 standards for Binary Floating Point Representation for 32 bit single format and 64 bit double format. 10

Q.6 A. Explain different pipelining hazards. 10

B. Discuss the functions of 8089 I/O processor 10

Q. P. Code: 18323

Time: 3 Hours Marks: 80

N.B. : (1) Question Number 1 is compulsory

(2) Solve any three question from the remaining questions

(3) Make suitable assumptions if needed

1. (a) Construct an ER diagram for a hospital with a set of patients and a set of medical doctors. Associated with each patient a log of various tests and examination conducted. 10

   (b) Explain lossless join decomposition and dependency preserving decomposition 5

   (c) List four significant differences between file processing system and database management system 5

2. (a) What is a deadlock? How is it detected? Discuss different types of deadlock prevention scheme. 10

   (b) Write SQL queries for the given database 10

   Employee(eid,ename,street,city)

   Works(eid,cid,salary)

   Company(cid,cname,city)

   (i) Modify the database so that Jack now lives in 'Mumbai'

   (ii) Give all employees of 'ANZ Corporation' a 10% raise in salary

   (iii) Find all employee id who live in same cities as the company for which they work

   (iv) Give total number of employees

   (v) Find the highest paid employee

3. (a) What is an attribute? Explain different types of attributes with examples. 10

   (b) Companies manufacture ranges of products which are purchased by customers. The relation schema for this operation is given as :- 10

   Company(company_code,company_name,director#,director_name,{product name, cost, {cust#, customer_name, address}}) where { } represents a repeating groups and company_code, dirctor# and cust# contains unique values. Normalize this relation to third normal form.

TURN OVER

Q. P. Code: 18323

4. (a) Explain following relational algebra operations with examples 10

   (i) set intersection

   (ii) Generalized projection

   (iii) Natural Join

   (iv) Aggregation operator

4 (b) Explain nested loop join and block nested loop join algorithm in query processing. 10

5 (a) Explain Timestamp ordering protocol and Thomas write rule 10

(b) Describe the three level schema architecture of DBMS. State different level of dependencies in this architecture. 10

6 (a) Explain log based recovery 10

(b) Explain Hash join algorithm in query processing 10

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SE - SEM-IV - CBSGS - Computers

7/6/17

T1124 / T1046 THEORETICAL COMPUTER SCIENCE

Q.P. Code :09887

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

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

Q. 1
a) Differentiate between NFA and DFA 5
b) Explain Chomsky Hierarchy 5
c) Explain Rice's Theorem 5
d) Explain Pumping Lemma for CFG 5

Q. 2
a) Design FA to check divisibility by 3 to binary number. 10
b) Using Pumping Lemma prove that following language is not regular: $L = \{ 0^m 1^{m+1} \mid m>0 \}$ 10

Q. 3
a) Design Moore Machine to generate output A if string is ending with abb, B if string ending with aba and C otherwise over alphabet (a,b).And Convert it to Mealy machine. 10
b) Simplify the given grammar. $S \rightarrow aAa/bBb/BB$ $A \rightarrow C$ $B \rightarrow A/S$ $C \rightarrow S/\varepsilon$. 10

Q. 4
a) Construct NFA for Given Regular expressions: 10
i) (a+b)*ab,
ii) aa(a+b)*b,
iii) aba(a+b)*,
iv) (ab/ba)*/(aa/bb)*
b) Construct PDA accepting the language $L= \{a^{2n}b^n \mid n>0\}$. 10

Q.5
a) Design minimized DFA for accepting strings ending with 100 over alphabet (0,1). 10
b) Design Turing machine to recognize wellformedness of parenthesis. 10

Q. 6 Write short note on (any four) 20
a) Greibach Normal form
b) Deterministic PDA and Multistack PDA
c) Variants of Turing Machine
d) Halting Problem
e) Church-Turing Thesis

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Q.P. Code: 16435

Duration: 3 Hours **Total Marks assigned: 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 justify the same.

1. (a) Compare Raster and Random Scan Techniques [05]
   (b) What are the disadvantages of DDA algorithm? [05]
   (c) Derive the matrix for 2D rotation about an arbitrary point. [05]
   (d) Write a boundary fill procedure to fill 8-connected region. [05]

2. (a) Explain Bresenham's Circle drawing algorithm in detail. [10]
   (b) Derive the transformation matrix to magnify the triangle with vertices A(0,0), B(1,2),C(3,2) to twice its size so that the point C(3,2) remain fixed. [10]

3. (a) Explain Cohen-Sutherland clipping algorithm for line with suitable example. [10]
   (b) Explain Weiler-Atherton algorithm for polygon clipping. What are the advantages over the other polygon clipping algorithm. Explain its working with an example. [10]

4. (a) Define window, viewport and derive window to viewport transformation. [10]
   (b) Differentiate between parallel and perspective projection. Explain with the help of examples. [10]

5. (a) Explain Back Surface Detection method in detail with an example. [10]
   (b) Discuss Halftoning and Dithering techniques. [10]

6. Write a short note on any **two** of the following [20]
   (a) B-Spline curves.
   (b) 3-D rotation.
   (c) Fractals.

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