S.E-Sem IV (Comp & I.T.). 23/11/15
AM-IV

Q.P. Code : 5316

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

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

(2) Answer any three questions from Q.2 to Q.6

(3) Use of stastical Tables permitted.

(4) Figures to the right indicate full marks

1. (a) Evaluate the line integral $\int_0^{1+i}(x^2 - iy)dz$ along the path $y = x$ 5

(b) State Cayley-Hamilton theorem & verify the same for $A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ 5

(c) The probability density function of a random variable x is

x	−2	−1	0	1	2	3
$P(x)$	0.1	k	0.2	2k	0.3	K

Find i) k ii) mean iii) variance 5

(d) Find all the basic solutions to the following problem

Maximize $z = x_1 + 3x_2 + 3x_3$

Subject to $x_1 + 2x_2 + 3x_3 = 4$

$2x_1 + 3x_2 + 5x_3 = 7$

and $x_1, x_2, x_3 \geq 0$ 5

2. (a) Find the Eigen values and the Eigen vectors of the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ 6

(b) Evaluate $\oint_C \frac{dz}{z^3(z+4)}$ where c is the circle $|z| = 2$ 6

(c) If the heights of 500 students is normally distributed with mean 68 inches and standard deviation of 4 inches, estimate the number of students having heights i) less than 62 inches, ii) between 65 and 71 inches. 8

[TURN OVER

3. (a) Calculate the coefficient of correlation from the following data

x	30	33	25	10	33	75	40	85	90	95	65	55
y	68	65	80	85	70	30	55	18	15	10	35	45

6

(b) In sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 100 such samples, how many would you expect to contain 3 defectives i) using the Binomial distribution, ii) Poisson distribution. 6

(c) Show that the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalizable. Find the transforming matrix and the diagonal matrix. 8

4. (a) Fit a Poisson distribution to the following data

x	0	1	2	3	4	5	6	7	8
f	56	156	132	92	37	22	4	0	1

6

(b) Solve the following LPP using Simplex method

Maximize $z = 6x_1 - 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + 2x_3 \leq 2$

$x_1 + 4x_3 \leq 4$

$x_1, x_2, x_3 \geq 0$ 6

(c) Expand $f(z) = \frac{2}{(z-2)(z-1)}$ in the regions

$i)\ |z| < 1,\ ii)\ 1 < |z| < 2,\ iii)\ |z| > 2$ 8

5. (a) Evaluate using Cauchy's Residue theorem $\oint_c \frac{1-2z}{z(z-1)(z-2)} dz$ where c is

$|z| = 1.5$ 6

[TURN OVER

(b) 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

(c) Solve the following LPP using the Dual Simplex method

Minimize $z = 2x_1 + 2x_2 + 4x_3$

Subject to $2x_1 + 3x_2 + 5x_3 \geq 2$

$3x_1 + x_2 + 7x_3 \leq 3$

$x_1 + 4x_2 + 6x_3 \leq 5$

$x_1, x_2, x_3 \geq 0$. 8

6. (a) Solve the following NLPP using Kuhn-Tucker conditions

Maximize $z = 10x_1 + 4x_2 - 2x_1^2 - x_2^2$

Subject to $2x_1 + x_2 \leq 5$; and $x_1, x_2 \geq 0$ 6

(b) In an experiment on immunization of cattle from Tuberculosis the following results were obtained

	Affected	Not Affected	Total
Inoculated	267	27	294
Not Inoculated	757	155	912
Total	1024	182	1206

Use χ^2 Test to determine the efficacy of vaccine in preventing tuberculosis. 6

(c) i) The regression lines of a sample are $x + 6y = 6$ and $3x + 2y = 10$

find a) sample means $\bar{x}$ and $\bar{y}$ b) coefficient of correlation between x and y 4

ii) If two independent random samples of sizes 15 & 8 have respectively the means and population standard deviations as

$\bar{x}_1 = 980, \bar{x}_2 = 1012 : \sigma_1 = 75, \sigma_2 = 80$

Test the hypothesis that $\mu_1 = \mu_2$ at 5% level of significance. 4

SE (SEM IV) (Rev-2012) (Regular) Comp Dec. 2015

T.C.S.

5485

Q.P. Code :

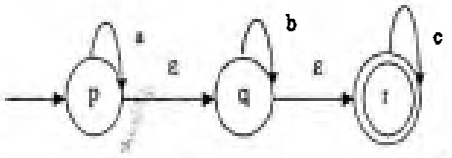
(3 Hours) **[Total Marks : 100**

N.B. : (1) Question Number **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** whenever **required** but **justify** the same.

1. (a) Consider the following grammar G = (V, T, P, S), V = {S, X}, T {0, 1} and productions P are **5**
$S \rightarrow 0 \mid 0X1 \mid 01S1$
$X \rightarrow 0XX1 \mid 1S$
S is start symbol. Show that above grammar is ambiguous.

(b) State and prove the halting problem. **5**

(c) Convert following ε-NFA to NFA without ε. **5**



(d) Prove that Language $L = \{0^n 1 0^n$ for n = 0, 1, 2, ... } is not regular. **5**

2. (a) Consider the following grammar G = (V, T, P, S), V = {S, X, Y}, T {a, b}and productions P are **10**
$S \rightarrow XYX$
$X \rightarrow aX \mid \varepsilon$
$Y \rightarrow bY \mid \varepsilon$
Convert this grammar in Chomsky Normal Form (CNF).

(b) Design DPDA to accept language $L=\{ x \in \{a, b\}^* \mid N_a(x) > N_b(x) \}$, **10**
$N_a(x) > N_b(x)$ means number of a's are greater than number of b's in string x.

3. (a) Design Turing machine to accept the language L = set of strings with equal number of a's and b's. **10**

(b) Design the DFA to accept the language containing all the strings over Σ = {a, b, c} that starts and ends with different symbols. **10**

[TURN OVER

4. (a) Design Moore Machine for the input from (0+ 1 +2) * which print the residue modulo 5 of the input treated as ternary number. 10

(b) State and prove pumping lemma for context free languages. 10

5. (a) Convert the following grammar into finite automata. 5

$S \rightarrow aX \mid bY \mid a \mid b$

$X \rightarrow aS \mid bY \mid b$

$Y \rightarrow aX \mid bS$

(b) Compare recursive and recursively enumerable languages. 5

(c) State and prove Rice's theorem 10

6. (a) Write regular expression for the following languages. 5

(i) language containing all the strings in which every pair of adjacent a's appears before any pair of adjacent b's, over the alphabet $\Sigma = \{a, b\}$.

(ii) language containing all the strings in which all possible combination of a's and b's is present but strings does not have two consecutive a's , over the alphabet Σ {a, b}

(b) Write short note on "Universal Turing Machine". 5

(c) Explain variations and equivalences of Turing machine. 10

S.E. Compute. (IV) (CBGS). 10/12/15

DBMS

QP Code : 5443

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

N.B. : (1) Question number one is compulsory
(2) Attempt any three from remaining five questions
(3) Make suitable assumptions if needed

Q 1 (a) Draw E-R diagram for Hospital management System.

Convert E-R diagram into tables. 10

(b) Explain authorization in sql. 5

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

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

(b) Explain following terms with suitable example 10

(I) Weak entity set (ii) Data manipulation language

(iii) Foreign key (iv) Super key

Q. 3 (a) When a transaction is rolled back under timestamp ordering, it is assigned a new timestamp, Why can it not simply keep its old timestamp? 10

(b) What is normalization? Explain 1NF, 2NF, 3NF and BCNF with examples 10

TURN OVER ...

Q. 4 (a) For the following given database, write SQL queries - 10

employee(eid, employee_name, street, city)

works(eid, cid, salary)

company(cid, company_name, city)

Manager(eid, manager_name)

(i)Find the names, street and city of all employees who work for "AZT" and earn more than Rs. 30,000

(ii) Find the names of all employees having "K" as the first letter in their names

(iii) Display the annual salary of all employees.

(b) Describe overall architecture of DBMS with diagram 10

Q. 5 (a) Discuss the different security and authorization mechanisms in database management system. 10

(b) Explain lock based and validation based protocol with example 10

Q. 6 (a) Write short notes on any four 20

(i) Specialization and Aggregation

(ii) Referential integrity

(iii) Assignment

(iv) Log based recovery

(v) Cost based query optimization

SE/sem IV/CBGS/comp/COA

09/12/15

QP Code : 5401

(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 each question carries 5 marks

a) Explain role of different registers like IR, PC,SP,AC,MAR and MDR used in Von Neumann model. [5]

b) Differentiate between Computer Organization and Computer Architecture. [5]

c) List different memory organization characteristics [5]

d) What is virtual memory? [5]

e) Show IEEE 754 standards for Binary Floating Point Representation for 32 bit single format and 64 bit double format. [5]

2. (a) I) Draw the flow chart for Booth's Algorithm for twos complement multiplication. [4]

II) Using Booth's algorithm show the multiplication of -3 * -7. [6]

(b) What are differences between RISC and CISC processor? [10]

3. (a)Describe hardwire control unit and specify its advantages. [10]

(b) Explain six stage instruction pipeline with suitable diagram. [10]

4. (a) Calculate the hit and miss using various page replacement policies LRU,OPT,FIFO for following sequence (page frame size 3) 4,7,3,0,1,7,3,8,5,4,5,3,4,7 . State which one is best for above example? [10]

(b) What is TLB? Explain working of TLB [10]

5. (a) compare interrupt driven I/O and DMA [10]

(b) Explain Flynn's classification [10]

6. (a) explain set associative and associative cache mapping techniques [10]

(b) What is bus arbitration? Explain any two techniques of bus arbitration. [10]

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MD-Con. 9925-15.

S. E. SEM - IV CBGS
(Comp) Analysis of Algorithm 30/11/15

QP Code : **5359**

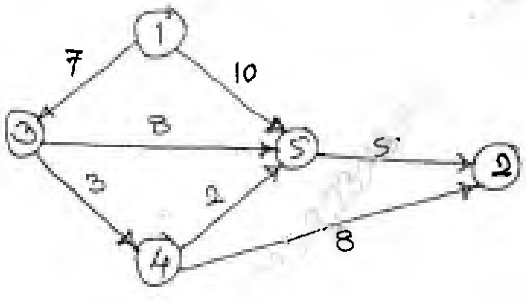
(3 Hours) [Total Marks :80

N.B. : (1) Attempt any **four** questions out of six.
(2) **Assume** suitable **data** wherever **required.**

1. (a) Define 0, Ω, and θ notations. To find the complexity of given recurrence relation. 10
   (i) $T(n) = 4T(n/2) + n^2$
   (ii) $T(n) = 2T(n/2) + n^3$
   (b) Implement the binary search, and derive its complexity. 10

2. (a) Explain 0/1 knapsack problem using dynamic programming 10
   (b) Explain optimal storage on tapes and find the optimal order for given instance. 10
   $n = 3$, and $(l_1, l_2, l_3) = (5, 10, 3)$.

3. (a) Let $n = 4$, $(p_1, p_2, p_3, p_4) = (100, 10, 15, 27)$ and
   (d1, d2, d3, d4) = (2, 1, 2, 1). Find feasible solutions, using job sequencing with deadlines. 10
   (b) Find a minimum cost path from 3 to 2 in the given graph using dynamic programming. 10



4. (a) Explain 8 Queen problem. 10
   (b) Explain sum of subset problem, Find all possible subsets of weight that sum to m, let n =6, m = 30, and w[1:6] = {5, 10, 12, 13, 15, 18} 10

5. (a) Write an algorithm for Kunth-Morrie-Pratt (KMP). 10
   (b) Explain the strassen's Matrix multiplication. 10

6. Write note on (any two):- 20
   (i) Randomized Algorithms.
   (ii) Branch and bound strategy
   (iii) Huffman coding
   (iv) Rabin karp algorithm

SE Sem IV CBGS
Comp: Engg.
CG.

QP Code : 5526

(3 Hours)

[Total Marks : 60

N. B (1) Question No. 1 is compulsory.
(2) Solve any three questions from the remaining
(3) Assume suitable data wherever necessary.

1.	(a)	State what is meant by clipping. Explain any one clipping algorithm	05
	(b)	Explain flood fill algorithm in detail	05
	(c)	Differentiate between random scan and raster scan technique	05
	(d)	Explain the various color models in detail	05
2	(a)	Define window and viewport. Derive window to viewport transformation	10
	(b)	Explain what is meant by Bezier curve. Also explain how a Bezier surface can be generated from Bezier curve	10
3	(a)	What is meant by parallel and perspective projections? Derive the matrix for perspective projections	10
	(b)	Explain the steps used in rotation of 2 D object about an arbitrary axis and hence derive the matrix for the same	10
4	(a)	Explain midpoint circle algorithm. Explain the same to plot a circle whose radius is 10 units	10
	(b)	Explain half toning and dithering techniques in detail	10
5	(a)	Derive Bressenhams line drawing algorithm for lines with slope < 1	10
	(b)	Explain Gourand and Phong shading techniques in detail	10
6		Write short notes on:- (any two)	20
	(a)	Polygon clipping method.	
	(b)	OpenGL	
	(c)	Sweep representations	

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