Time Duration: 03Hrs **Marks: 80**

Note: Question 1 is compulsory.

Attempt any three out of remaining five questions.

Make suitable assumptions whenever necessary.

Q.1 [a] Explain the Strassen's matrix multiplication concept with an example. Derive it's time complexity. [10]

[b] Apply the quick sort algorithm to sort the list. E,X,A,M,P,L,E in alphabetical order. Analyze the best case, worst case and average case complexities of quick sort. [10]

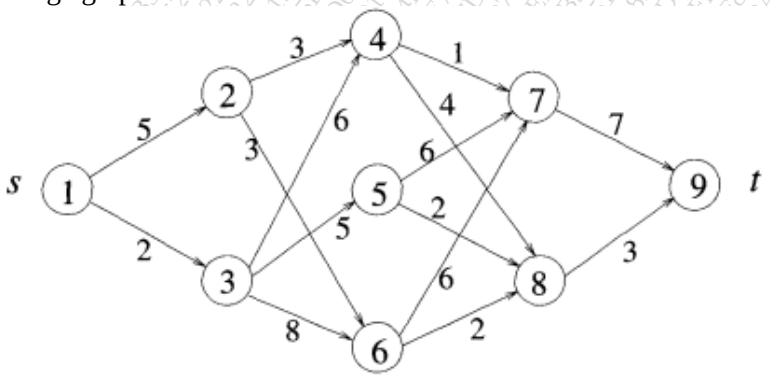
Q.2 [a] Solve following problem of sum of subset and draw portion of state space tree.
w= (5,7,10,12,15,18,20) and m=35.
Find all possible subsets of w that sum to m. [10]

[b] What is single source shortest path algorithm. Write an algorithm to find single source shortest path using greedy methods [10]

Q.3 [a] Prove that vertex cover problem is NP complete. [10]

[b] Explain various string matching algorithms. [10]

Q.4 [a] Find the minimum cost path from s to t in the following figure using multistage graph. [10]



[b] Describe the Travelling sales person problem and discuss how to solve it using dynamic programming with example. [10]

Q.5 [a] What is longest common subsequence problem? Find the LCS for the following problem. [10]

[b] Write a short note on 8 queen problem, Write an algorithm for the same. [10]

Q.6 Write a short note on(Any two)

1.Branch and Bound Strategy. [10]

2.Algorithms to find minimum spanning tree. [10]

3.Recurrenses.

(3 hours) **Max. Marks: 80**

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

Q.1 **(a)** Find all the basic solutions to the following problem: **05**

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

$$x_1 + 2x_2 + 3x_3 = 9$$
$$3x_1 + 2x_2 + 2x_3 = 15$$
$$x_1, x_2, x_3 \geq 0$$

(b) Evaluate $\oint z\,dz \; from \; z = 0 \; to \; z = 1 + i \; along \; the \; curve \; z = t^2 + it.$ **05**

(c) A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that in the population, the mean height is 165 cm, and the standard deviation is 10 cm? **05**

(d) The sum of the Eigen values of a 3 × 3 matrix is 6 and the product of the Eigen values is also 6. If one of the Eigen value is one, find the other two Eigen values. **05**

Q.2 **(a)** Evaluate $\oint \frac{sin^6 z}{(z-\pi/6)^n} dz$ where c is the circle $|z| = 1$ for n = 1, n =3 **06**

(b) The following data is collected on two characters. Based on this, can you say that there is no relation between smoking and literacy? Use Chi-square test at 5% Level of significance. **06**

	Smokers	Non-smokers
Literates	83	57
Illiterates	45	68

(c) Solve the following LPP using Simplex Method **08**

Maximize $z = 3x_1 + 5x_2$

subject to

$$3x_1 + 2x_2 \leq 18,$$
$$x_1 \leq 4,$$
$$x_2 \leq 6,$$
$$x_1, x_2 \geq 0$$

Q.3 **(a)** Find the Eigen values and Eigen vectors of the following matrix. **06**

$$A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$$

(b) The incomes of a group of 10,000 persons were found to be normally distributed with mean of Rs. 750 and Standard deviation of Rs. 50. What is the lowest income of richest 250 ? **06**

(c) Expand $\frac{z^2-1}{z^2+5z+6}$ around z = 0. **08**

[Turn over

Q.4 **(a)** The mean breaking strength of cables supplied by a manufacturer is 1800 with S.D 100. By a new technique in the manufacturing process it is claimed that the breaking strength of the cable has increased. In order to test the claim a sample of 50 cables are tested. It is found that the mean breaking strength is 1850. Can we support the claim at 1% LOS. **06**

(b) Using the Residue theorem, Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$ **06**

(c) (i) Out of 1000 families with 4 children each, how many would you expect to have (I) at least one boy, (II) at most 2 girls.
(ii) Find the Moment Generating Function of Poisson distribution and hence find its mean. **04+04**

Q.5 **(a)** Check whether the following matrix is Derogatory or Non-Derogatory:

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & -3 & 3 \end{bmatrix}$$ **06**

(b) The means of two random samples of sizes 9 and 7 are 196 and 199 respectively. The sum of the squares of the deviations from the mean is 27 and 19 respectively. Can the samples be regarded to have been drawn from the same normal population? **06**

(c) Use the dual simplex method to solve the following L.P.P.
Minimise $z = 6x_1 + 3x_2 + 4x_3$
subject to

$$x_1 + 6x_2 + x_3 = 10$$
$$2x_1 + 3x_2 + x_3 = 15$$
$$x_1, x_2, x_3 \geq 0$$ **08**

Q.6 **(a)** Show that the matrix A satisfies Cayley-Hamilton theorem and hence find A^{-1} .
Where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{bmatrix}$ **06**

(b) The Probability Distribution of a random variable X is given by

X :	-2	-1	0	1	2	3
P(X = x):	0.1	k	0.2	2k	0.3	k

Find k, mean and variance. **06**

(c) Using Kuhn-Tucker conditions, solve the following NLPP
Maximize $z = x_1^2 + x_2^2$
subject to

$$x_1 + x_2 - 4 \leq 0$$
$$2x_1 + x_2 - 5 \leq 0$$
$$x_1, x_2 \geq 0$$ **08**

(12)

Paper / Subject Code: 40504 / Computer Graphics

10/12/18

Sem IV CMPN, CBCNS, Dec 18

LC

Duration: 3 Hrs **Total Marks : 80**

N.B.: 1) Question No. 1 is Compulsory.
2) Attempt any three questions, from remaining five questions.
3) Figure to the right indicates full marks

Q.1.	A)	Compare Raster and Random Scan Techniques .	**5**
	B)	What are the disadvantages of DDA algorithm?	**5**
	C)	Explain inside outside test used in filling algorithm.	**5**
	D)	What are Aliasing & Antialiasing? Explain any one Antialiasing method.	**5**
Q.2.	A)	Explain Liang Barsky line clipping algorithm. Apply this algorithm to the line with coordinates (35,60) and (80,25) against the window (Xmin, Ymin) = (10,10) and (Xmax ,Ymax) =(50,50)	**10**
	B)	Derive the matrix for 2D rotation about an arbitrary point.	**10**
Q.3.	A)	Explain the Cohen-Sutherland line clipping algorithm with suitable example.	**10**
	B)	What is meant by Parallel and Perspective Projections? Derive matrix for Perspective projection.	**10**
Q.4.	A)	Specify midpoint circle algorithm. using the same ,plot the circle whose radius is 8 units and center is at (10,10)	**10**
	B)	Explain any one Polygon clipping algorithm	**10**
Q.5.	A)	Explain Bezier curve with its properties and construct	**10**
	B)	Explain Gouraud and Phong Shading along with their advantages and disadvantages.	**10**
Q.6.		Write Short Note on **(Any four)**	**20**
		(a) Depth Buffer method	
		(b) Halftone and Dithering techniques	
		(c) Fractals	
		(d) Koch Curve	
		(e) Area Subdivision method	

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(3Hrs)

Max Marks: 80

NB: 1. Question No.1 Compulsory.
2. Solve any THREE from Q.2 to Q.6
3. Assume suitable data whenever necessary with justification.

Q1. Answer any four questions

	(A)	Explain Instruction and Instruction Cycle.	(05)
	(B)	Explain Booths algorithm with an example	(05)
	(C)	Give different instruction formats.	(05)
	(D)	Describe the memory hierarchy in the computer system	(05)
	(E)	Explain Superscalar Architecture.	(05)
Q2.	(A)	Explain Branch Predication Logic and delayed branch.	(10)
	(B)	List and explain various data dependencies, data and branch hazards that occur in the computer system.	(10)
Q3.	(A)	A program having 10 instructions (without Branch and Call instructions) is executed on non-pipeline and pipeline processors. All instructions are of same length and having 4 pipeline stages and time required to each stage is 1nsec. i) Calculate time required to execute the program on Non-pipeline and Pipeline processor. ii) Calculate Speedup	(10)
	(B)	What is Microprogram? Write microprogram for following operations. i) ADD R1, M, Register R1 and Memory location M are added and result store at Register R1. ii) MUL R1, R2 Register R1 and Register R2 are multiplied and result store at Register R1.	(10)
Q4.	(A)	Explain Bus Contention and different method to resolve it.	(10)
	(B)	Describe memory segmentation in detail. Explain how address translation is performed in virtual memory.	(10)
Q5.	(A)	State the various types of data transfer techniques. Explain DMA in detail.	(10)
	(B)	Consider a cache memory of 16 words. Each block consists of 4 words. Size of the main memory is 256 bytes. Draw associative mapping and calculate TAG, and WORD size.	(10)
Q6.	(A)	Write short note on Performance measures	(10)
	(B)	Draw and explain floating point addition subtraction algorithm.	(10)

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