



WISDOM BETTER KNOWLEDGE

AIKTC KALSEKAR TECHNICAL CAMPUS

IMPROVING TEACHING ENRICHING LEARNING

School of Architecture

School of Engineering & Technology

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Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2018-19/

Date: _____

School: SoET-CBSGS

Branch: COMP. ENGG.

SEM: IV

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following [✓]Semester/[✓]Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Applied Mathematics- IV	CSC401		✓	02
2	Analysis Of Algorithms	CSC402		✓	02
3	Comp. Org. And Archi.	CSC403		✓	02
4	Data Base Management System	CSC404		✓	02
5	Theoretical Computer Science	CSC405		✓	02
6	Comp. Graphics	CSC406		✓	02

Note: SC – Softcopy, HC - Hardecopy

(Shaheen Ansari)
Librarian, AIKTC

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7/5/19

Paper / Subject Code: 38901 / APPLIED MATHEMATICS - IV

(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 statistical Tables permitted.

(4) Figures to the right indicate full marks

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

5

x	2	9	7	6	5	1
y	9	4	5	2	3	13

(b) Evaluate the line integral $\int_0^{1+i} 3z^2 dz$ along the path $y = x$

5

(c) Find the Eigen values of $2A^3 + 5A^2 - 3A$ where $A = \begin{bmatrix} 1 & 0 & 0 \\ 8 & 2 & 0 \\ 8 & 8 & -1 \end{bmatrix}$

5

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

x	-2	-1	0	1	2	3
P(x)	0.1	3k	0.2	2k	0.3	5k

Find i) k ii) mean iii) standard deviation of the distribution.

5

2. (a) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.

6

(b) The equations of the two regression lines are

$x + 6y = 6$ and $3x + 2y = 10$.

find the means of x and y and the coefficient of correlation between x and y .

6

(c) Is the matrix $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ diagonalizable? If so find the diagonal form and

the transforming matrix.

8

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

(b) Evaluate using Residue theorem $\oint_C \frac{z^4 dz}{(z+1)(z-2)}$ where c is the circle $|z| = 3$

6

(c) The weights of 1000 students were found to be normally distributed with mean 40 kgs and standard deviation 4 kgs. Find the expected number of students with weights i) less than 36 kgs, ii) more than 45 kgs.

8

4. (a) Evaluate $\oint_C \frac{(z+2)dz}{z^2(z-3)}$ where c is $|z| = 1$

6

(b) A sample of 900 members is found to have mean of 3.4 cm. Can it be regarded as a truly random sample from a large population with mean 3.25 cm and S.D. 1.61 cm?

6

(c) Solve the following LPP using Simplex method

$$\text{Minimize } z = x_1 - 3x_2 + 3x_3$$

$$\text{Subject to } 3x_1 - x_2 + 2x_3 \leq 7$$

$$2x_1 + 4x_2 \geq -12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

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

8

5. (a) Find the Laurent's series for $f(z) = \frac{1}{(z-1)(z-2)}$

about $z = 0$ in the regions i) $1 < |z| < 2$, ii) $|z| > 2$

6

(b) Fit a Binomial distribution to the following data and compare the theoretical frequencies with the actual ones

6

x	0	1	2	3	4	5
f	2	14	20	34	22	8

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

8

$$\text{Minimize } z = 2x_1 + 2x_2 + 4x_3$$

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

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

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

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

6. (a) Find 4^A where $A = \begin{bmatrix} 3/2 & 1/2 \\ 1/2 & 3/2 \end{bmatrix}$

6

(b) Solve the following NLPP using Kuhn-Tucker conditions

$$\text{Maximize } z = 8x_1 + 10x_2 - x_1^2 - x_2^2$$

$$\text{Subject to } 3x_1 + 2x_2 \leq 6; \text{ and } x_1, x_2 \geq 0$$

6

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

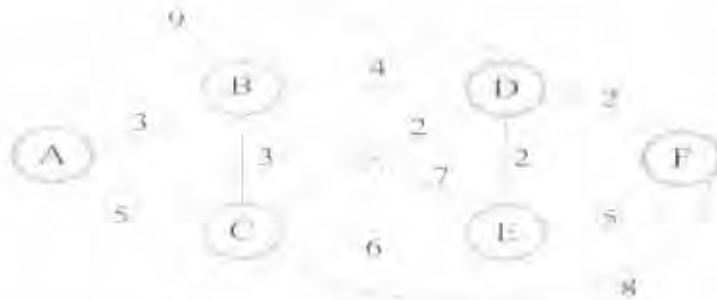
No. obtained	1	2	3	4	5	6	Total
Frequency	15	20	25	15	29	28	132

Test the hypothesis that the die is unbiased. Use χ^2 Test

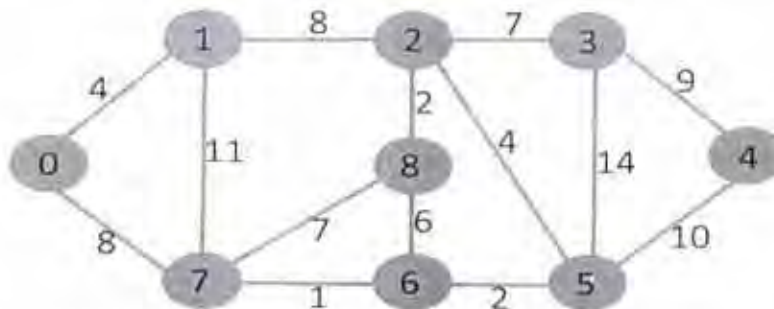
8

- N.B.: (1) Question No. 1 is compulsory.
 (2) Attempt any three questions out of remaining five questions.

- Q1. a) Sort the following numbers using Merge Sort. Also derive the time complexity of Merge Sort. (10)
 70, 20, 30, 40, 10, 50, 60
 b) Explain different string matching algorithms. (10)
- Q2. a) Write an algorithm to find minimum and maximum value using divide and conquer and also derive its complexity. (10)
 b) Find the shortest path from source vertex A using Dijkstra's algorithm



- Q3. a) Write an algorithm for sum of subsets. Solve the following problem. (10)
 $M=30$ $W=\{5, 10, 12, 13, 15, 18\}$
 b) Explain optimal storage on tape with example. (10)
- Q4. a) Find an optimal solution to the knapsack instance $n=5$, $m=60$ (10)
 $profit=\{30, 20, 100, 90, 160\}$
 $weight=\{5, 10, 20, 30, 40\}$
 b) Explain longest common subsequence with example. (10)
- Q5. a) Find the Minimum Spanning Tree of the following graph using prim's algorithm



- b) Explain flow shop scheduling with example. (10)
- Q7. Write note on (any two): (20)
 a) Strassen's matrix multiplication.
 b) 15-puzzle problem.
 c) Job sequencing with deadlines.
 d) N-Queen problem.

Paper / Subject Code: 38903 / COMPUTER ORGANIZATION AND ARCHITECTURE

Q.P. Code: 40879

(80 Marks)

(3 Hours)

- Question no. 1 is compulsory.
- Answer any three questions from question no. 2 – 6.
- Assume suitable data, if necessary.

Q.1. Answer following questions in brief.

- Convert the following number 256.325 into IEEE 32 bit Single Precision Format and IEEE 64 bit Double Precision Format (05)
- Discuss difference between RISC and CISC processors. (05)
- Explain function of 8089 I/O processor in brief. (05)
- Differentiate between SRAM and DRAM (05)

- Explain cache consistency and coherency with suitable examples. Also, give methods to maintain cache consistency. (10)
 - Explain DMA based data transfer techniques. (10)

- Explain how Virtual Address is translated to Physical address with suitable example. (10)
 - Compare between Cache Look Aside Architecture and Cache Look through Architecture (10)

- Explain the Bus Arbitration Techniques (08)
 - Explain hardwired Control Unit with help of neat diagram. Compare it with microprogrammed control unit. (12)

- What is TLB? Explain working of TLB. (10)
 - Describe register organization within CPU. (10)

Q.6. Write short note on

- Hazards In Pipelining (05)
- Interrupt driven I/O (05)
- Interleaved memory (05)
- Modes of DMA (05)

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23/5/19

(3 Hours)

Total Marks: 80

NOTE:

1. Question no 1 is compulsory question
2. Attempt any three questions from the remaining
3. Assume suitable data if necessary.
4. Figures to the right indicate full marks.

1. (a) Define the following terms. (10)

Trigger, Deadlock, Weak Entity, Access Path, Transaction, Metadata, Assertion, Functional Dependency, Concurrency Control, Constraints

1. (b) Explain Referential Integrity and Authorization in SQL. (10)

2. (a) Explain Cost Based Query Optimization (10)

2. (b) Explain implementation of atomicity and durability. (10)

3. (a) Explain lock based, timestamp based, validation based protocols. (10)

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

4. Consider a AIRLINE Reservation System.

(a) Draw E-R Diagram. Assume suitable data (10)

(b) Convert the E-R diagram into Relational Model (10)

OR

4. (a) Draw E-R Diagram for HOTEL Management System. Assume suitable data (10)

(b) Convert the E-R diagram Que 4(a) into Relational Model (10)

5. (a) Explain Relational algebra queries and Relational calculus with examples (10)

5. (b) Explain aggregate functions and set operations in SQL with examples (10)

6. (a) Explain data control commands in SQL with examples. (10)

6. (b) Explain sort-merge join algorithm in query processing. (10)

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Duration : 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 should be clearly stated
- Q. 1 a) Differentiate between NFA and DFA 5
b) Give regular expression for 5
i) Set of all strings over $\{0, 1\}$ that end with 1 has no substring 00
ii) Set of all strings over $\{0, 1\}$ with even number of 1's followed by odd number of 0's
c) Construct an NFA with epsilon transition for $(00 + 11)^* (10)^*$ 5
d) Give applications of regular expression and finite automata 5
- Q. 2 a) Construct PDA accepting the language $L = \{a^n b^n \mid n \geq 1\}$ 10
b) Design minimized DFA for accepting strings ending with 100 over alphabet $\{0, 1\}$ 10
- Q. 3 a) Convert following CFG to CNF 10
$$S \rightarrow ASA \mid aB$$
$$A \rightarrow B \mid S$$
$$B \rightarrow b \in$$

b) Convert Moore and Mealy machine to find out 2's complement of a binary number 10
- Q. 4 a) Convert following ϵ -NFA to NFA without ϵ 10

b) Using pumping lemma prove that language 10
 $L = \{0^n 1^n 2^n \mid n \geq 1\}$ is regular language or not
- Q. 5 a) Design Turing machine that recognizes palindrome strings over $\Sigma = \{0, 1\}$ 10
b) Define context free grammar. 10
Obtain the CFG for the regular expression $(110 + 11)^* (10)^*$
- Q. 6 Write short note on (any four) 20
a) Halting problem
b) Universal Problem
c) Post correspondence problem
d) Chomsky Hierarchy
e) Differentiate between FSM and TM

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4/6/19

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

N.B: 1. Question number one is compulsory.

2. Attempt any three from remaining five questions.

3. Assume any suitable data if necessary and justify the same.

- Q.1**
- a) State the various applications of computer graphics. Explain anyone in detail **05**
 - b) List the various 2 D transformations used in graphics systems. Explain anyone in detail **05**
 - c) Specify the mechanism of converting window to viewport coordinate transformation **05**
 - d) Explain the various polygon rendering models used in computer graphics. **05**
- Q.2**
- a) Rasterize a line segment using Bresenham's line drawing algorithm where starting coordinates of line segment are $P_1(5,5)$ and ending coordinates are $P_2(13,9)$. Further differentiate between DDA and Bresenham's line drawing algorithm. **10**
 - b) Define Boundary and Flood fill mechanism. Explain 8-connected flood fill mechanism in detail. **10**
- Q.3**
- a) State the how the visible surface detection algorithms are classified. Explain Back Surface detection method in detail with an example **10**
 - b) Explain mid-point circle drawing algorithm. Using mid-point circle algorithm plot the circle whose radius = 10 units. **10**
- Q.4**
- a) Explain Cohen Sutherland line clipping algorithm. Apply the algorithm to line with coordinates $p_1(x_1, y_1) = (2, 2)$ and $p_2(x_2, y_2) = (12, 9)$ against the window $(x_{wmin}, y_{wmin}) = (4, 4)$ and $(x_{wmax}, y_{wmax}) = (9, 8)$. **10**
 - b) Define what is meant by Bezier curve. Explain its properties and further differentiate between Bezier and B spline curve. **10**
- Q.5**
- a) Explain Parallel and Perspective "projection"? Derive the matrix for perspective projection **10**
 - b) Explain Sutherland Hodgman polygon clipping algorithm with example. Also clearly state its drawback **10**

Q.6 Write short notes on (Any Two)

20

- a) Illumination models
- b) Half tone and Dithering techniques
- c) Fractals
