Q.P. Code :23709

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

Please check whether you have got the right question paper.

N.B:
1. Question.No.1 is compulsory.
2. Solve any **three** questions out of remaining five questions.
3. Assume suitable data if necessary
4. Figures to right indicate marks

Q. 1 Solve **any four** out of five.

a) Write a note on Computer evolution. **(05)**
b) Draw and explain 6 stage instruction pipeline. **(05)**
c) What are the various functions performed by I/O module? **(05)**
d) Differentiate between SRAM & DRAM. **(05)**
e) Represent $(5.125)_{10}$ in IEEE 754 single precision floating point standard. **(05)**

Q. 2 a) Multiply (- 5) and (2) using Booth's Algorithm. **(10)**
b) Discuss various pipeline hazards with example **(10)**

Q. 3 a) Explain the register organization of a CPU **(10)**
b) Consider the string 8,3,9,4,9,8,5,8,3,9,6,7,5,4,3,9,4,9,3 Find the page faults for 3 frames using FIFO, Optimal, & LRU page replacement policies **(10)**

Q. 4 a) Divide 4 by 2 using non restoring division algorithm. **(10)**
b) Explain Flynn's classification in detail. **(10)**

Q. 5 a) Discuss the various characteristics of Memory. **(10)**
b) Explain design of control unit w.r.t. microprogrammed and hardwired approach. **(10)**

Q. 6 a) Explain different addressing modes with example **(10)**
b) What is the need of DMA? Explain its various techniques of data transfer. **(10)**

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Duration: 3 Hours **Total Marks: 80**

N.B.

1. Question number **ONE is compulsory**
2. Attempt any **THREE** questions from question 2 to 6
3. Figures to the right indicae full marks
4. Assume suitable data if necessary

Q1. Answer any **FOUR** from the following **(20)**

(a) What are the different types of the classes of IP address?
(b) Compare TCP/IP vs OSI Model
(c) Explain the use of SSH
(d) Explain traditional Ethernet with neat diagram
(e) What parameters can be used to assess the performance of the network?

Q2. (a) Explain the functions of each layer of the OSI reference model **(10)**
(b) Explain subnetting with example **(10)**

Q3. (a) Discuss congestion and flow control in the network **(10)**
(b) Explain sliding window protocol with neat diagram **(10)**

Q4. (a) Explain working of the DNS server with neat diagram **(10)**
(b) Explain TCP connection establishment and termination using three-way handshaking **(10)**

Q5. (a) Explain the working of the CSMA/CD with neat diagram and flow chart **(10)**
(b) Explain IPv4 header format **(10)**

Q6. Write short note on the following **(Any four)** **(20)**

(a) Networking and Internetworking Devices
(b) Timers in TCP protocol
(c) HDLC
(d) Slotted ALOHA
(e) Guided and unguided transmission media

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(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)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 alarge 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

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

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

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

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

$x_1, x_2, x_3 \geq 0$.

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

Maximize $z = 8x_1 + 10x_2 - x_1^2 - x_2^2$

Subject to $3x_1 + 2x_2 \leq 6$; 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

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

Note :

1. Question No.1 is compulsory.
2. Attempt any three question form reaming question.
3. Draw suitable diagram whenever necessary.

Q.1:

a) Construct NFA for accepting binary string in which the first part of each string contain at least four 0's and second part contains at least three 1's (05)

b) State and explain limitations and power of Finite Automata. (05)

c) Design a Moore machine for binary number divisible by 3 (05)

d) Construct a FA to search the keyword 101 for String over {0,1}. (05)

Q2. a) Convert the following grammar to CNF (10)

S→ Ba / aB

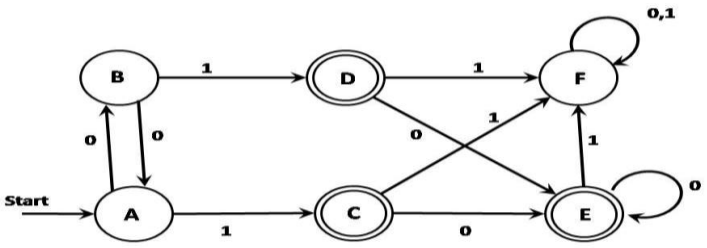
A→bAA / aS / a

B→aBB / bS / b

b) Design a Moore machine that will read sequences made up of letters A,E,I ,O ,U and will give an output having the same sequences. Except that in those cases where and 'I' directly follows and 'E', it will be changed to 'U'. (10)

Q.3:

a) Minimize the following DFA .



b) Convert the following NFA to DFA(final state is marked with *) (10)

∂	0	1
p	p,q	p
q	r	r
r	s	---
*s	s	s

Q.4:

a) Design PDA for recognizing L= **{ $a^n b^m a^n$ | m, n >=1 }** (10)

b) Using pumping lemma prove that the languages of all even palindromes over an alphabet {a,b} is non regular (10)

Q.6: Write a Short Note on **(any four)** (20)

a) Chomsky Hierarchy.
b) Applications of Automata theory
c) Pumping Lemma for regular languages.
d) Simplification of CFG.
e) Variation of Tuning Machine.

Duration: 3Hrs **Marks: 80**

Instructions:
(1) Question no 1 is Compulsory
(2) Write any Three from Remaining
(3) Assume suitable data if necessary

1. a) Write a note on convolution code. [4]
   b) State Fermat's little theorem and its applications. [4]
   c) Define Source entropy and destination entropy. [4]
   d) Explain cyclic and Hamming codes. [4]
   e) Describe properties of prefix coding with example. [4]

2. a) Name the source coding technique used in the following types of files and Classify them as lossy or lossless. [10]
   i).Zip ii).jpg iii).mpg iv).bmp v).gif
   b) For (7,4) cyclic code, find out the generator matrix if $G(D)=1+D+D^3$ [10]

3. a) Explain Diffie-Hellman algorithm. Which attack is it vulnerable to? [10]
   b) Construct Huffman code for the given symbols{x1,x2..x8} with probabilities P(x)= {0.1,0.05,0.04,0.01,0.04,0.06,0.3,0.4}Find coding efficiency. [10]

4. a) Explain LZW compression algorithm with example. [10]
   b) State Chinese Remainder theorem. Using it solve for X.
   X=1 MOD 2
   X=2 MOD 3
   X= 2 MOD 5 [10]

5. a) What do you mean by symmetric key cryptography? Explain DES in detail. [10]
   b) The generator polynomial for a (7, 4) cyclic code is given by $G(D)= 1+D+D^3$.
   Compute all systematic codewords. [10]

6. Write short notes on [20]
   a) RSA
   b) RLE
   c) Security Goals
   d) Digital signature.

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