(3 Hours) [Total Marks: 80

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

(2) Solve any **three** questions out of remaining **five.**

(3) Figures to **right** indicate **full** marks.

(4) Assume suitable **data** where **necessary.**

1. Solve any four out of five sub questions. [04 x 05=20]

   a) Explain Von-Neumann Architecture.

   b) Draw and explain 6 stage instruction pipeline.

   c) What are the various functions performed by I/O module?

   d) Differentiate between RICS & CISC.

   e) Represent $(15.125)_{10}$ in IEEE 754 single precision floating point standard.

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 **10**

   Find the page faults for 3 frames using FIFO, Optimal, & LRU page replacement policies.

Q. 4. a) Divide 18 by 5 using restoring division algorithms. **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. micro-programmed 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**


Duration: 3 hours **Total marks: 80**

N.B. (1) Question No. 1 is compulsory.
  (2) Solve any three questions from remaining questions.
  (3) Draw suitable diagrams wherever necessary.
  (4) Assume suitable data, if necessary.

Q.1 Attempt any four sub-questions.
  a) State and explain closure properties of regular language. 5
  b) Design a Moore machine to convert each occurrence of 100 to 101. 5
  c) Give formal definition of a Push Down Automata. 5
  d) Let G be the grammar. Find the leftmost derivation, rightmost derivation and parse 5
  tree for the string 001222.
    G: $S \rightarrow 0S \mid 1A \mid 2B \mid \varepsilon$
      $A \rightarrow 1A \mid 2B \mid \varepsilon$
      $B \rightarrow 2B \mid \varepsilon$
  e) Give a regular expression for a language over the alphabet $\Sigma = \{a, b\}$ containing 5
  at most two a's

Q2. a) Design a DFA for the regular expression (a+b)*aba 10
  b) Design a Mealy machine over the alphabet {0, 1} which outputs EVEN, ODD 10
  according to the number of 1's encountered as even or odd.

Q3.a) Find a regular expression RE corresponding to the following FA 10
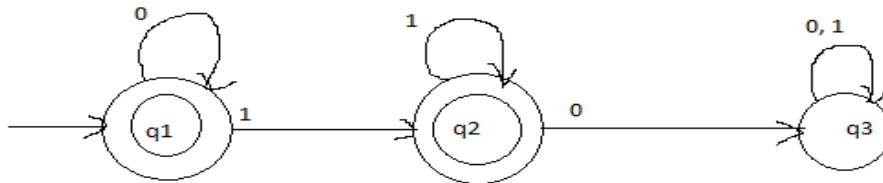
  b) Using pumping lemma prove that the following language is not regular 10

  L= { ww | w $\in$ {O, 1}* }

Q4.a) Design a PDA for recognizing the L= {$a^m b^n c^{m+n}$ | m,n>=1}. 10

  b) Construct a TM accepting palindromes over Σ= {a,b}. 10

Q5. a) What is a Greibach Normal Form (GNF)? Convert the following CFG to GNF 10

  S→Sab | Sba | ε

Turn Over

b) Design a NFA for accepting input strings that contain either the keyword 000   10

     or the keyword 010 and convert it into an equivalent DFA.

Q6. Write short notes on (any two)   20

     a) Variants of Turing Machines
     b) Recursive and Recursively enumerable language
     c) Chomsky Hierarchy
     d) Halting Problem
     e) Simplification of CFG.

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Time Duration: 3Hr   Total Marks: 80

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

Maximum Marks

Q1. a) Evaluate $\int_C |z|\, dz$, where C is the left half of unit circle $|z| = 1$ from z= -i to z= i. **[5]**

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

c) If the tangent of the angle made by the line of regression of y on x is 0.6 and $\sigma_y = 2\,\sigma_x$,find the correlation coefficient between x and y. **[5]**

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

Minimise $z = x_2 + 3x_3$
Subject to $\qquad 2x_1 + x_2 \le 3$
$\qquad\qquad x_1 + 2x_2 + 6x_3 \ge 5$
$\qquad\qquad -x_1 + x_2 + 2x_3 = 2$
$\qquad\qquad x_1, x_2, x_3 \ge 0$

Q2. a) Evaluate $\int_C \frac{e^{zz}}{(z+1)^4}\, dz$, where c is the circle $|z - 1|$=3. **[6]**

b) Show that the matrix $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$ is derogatory. **[6]**

c) For a normal variate with mean 2.5 and standard deviation 3.5, find the probability that (i) $2 \le X \le 4.5$, (ii) $-1.5 \le X \le 5.3$. **[8]**

Q3. a) The daily consumption of electric power is a random variable X with probability distribution function $f(x) = \begin{cases} kxe^{-\frac{x}{3}} & ,x > 0 \\ 0 & ,x \le 0 \end{cases}$ **[6]**

Find the value of k, the expectation of k and the probability that on a given day the electric consumption is more than expected value.

b) Solve the following L.P.P. by simplex method **[6]**
Maximise $z = 4x_1 + 10x_2$
Subject to $2x_1 + x_2 \le 10$
$\qquad\qquad 2x_1 + 5x_2 \le 20$
$\qquad\qquad 2x_1 + 3x_2 \le 18$
$\qquad\qquad x_1, x_2 \ge 0$

c) Expand $f(z) = \frac{2}{(z-1)(z-2)}$ in the regions (i) $|z| < 1$ $(ii) 1 < |z| < 2$ $(iii)\, |z| > 2$. **[8]**

Q4. a) The incidence of an occupational disease in an industry is such that the workers have 20% chance of suffering from it. What is the probability that out of 6 workers chosen at random 4 or more will be suffering from the disease? **[6]**

b) Calculate the coefficient of correlation between X and Y from the following data. **[6]**

X	3	5	4	6	2
Y	3	4	5	2	6

c) Show that the matrix $A = \begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalizable. Find the transforming matrix M and the diagonal form D. **[8]**

Page 1 of 2

Q5.a) Can it be concluded that the average life- span of an Indian is more than 70 years, if a random sample of 100 Indians has an average life span of 71.8 years with standard deviation 8.9 years? **[6]**

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{3+2\cos\theta}$, using Cauchy's residue theorem. **[6]**

c) Using the Kuhn – Tucker conditions, solve the following N.L.P.P. **[8]**

Maximise $z = x_1^2 + x_2^2$
Subject to $x_1 + x_2 - 4 \le 0$
$2x_1 + x_2 - 5 \le 0$
$x_1, x_2 \ge 0$

Q6.a) A die was thrown 132 times and the following frequencies were observed. **[6]**

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.

b) Two independent samples of sizes 8 and 7 gave the following results. **[6]**

Sample 1	19	17	15	21	16	18	16	14
Sample 2	15	14	15	19	15	18	16	

Is the difference between sample means significant?

b) Using Penalty (Big-M) method solve the following L.P.P. **[8]**

Maximise $z = 3x_1 - x_2$
Subject to $2x_1 + x_2 \le 2$
$x_1 + 3x_2 \ge 3$
$x_2 \le 4$
$x_1, x_2 \ge 0$

ALL THE BEST!

[Time: Three 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** questions from question 2 to 6
3. Figures to the right indicate full marks.

Q. 1. Answer any **FOUR** from the following   20
   a) Define Hub, Switch, Router, Bridge and Gateway
   b) What is ALOHA? Explain different types of ALOHA
   c) Why do HTTP and FTP run on top of TCP rather than on UDP?
   d) What is classful addressing? Explain difference classes of IP address.
   e) Examine problems in Application Layer.

Q. 2 a) Compare OSI and TCP network models   10
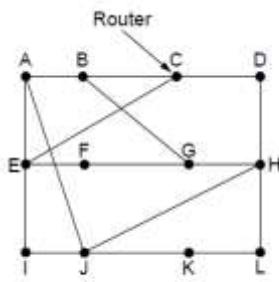Q. 2 b) Explain Peer-to-Peer Communication architecture.   10

Q. 3 a) Create new routing table for node J using DVR   10

Q. 3 b) List various sliding window protocols. Explain any one in detail.   10

Q. 4 a) Justify that the Go-Back-N protocol is good for network communications.   10
Q. 4 b) Examine 2D Parity Code for error detection and correction   10

Q. 5 a) What is congestion? How it can be avoided? Explain   10
Q. 5 b) List different protocols used at the boundary of AS. Explain any one of them in detail. 10

Q. 6. Answer any **FOUR** from the following   20
   a) Explain token bucket algorithm
   b) What is carrier sense? Hence, Differentiate between CSMA/CA & CSMA/CD.
   c) List and explain any two framing methods
   d) Explain subnetting. Hence, explain how subnet mask is calculated?
   e) Examine the advantages of LAN, WAN and MAN.

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Max. Marks: 80   **Duration: 3 Hours**

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

Q 1 (a)	Explain Lossy and Lossless compression techniques with example	04
Q 1 (b)	State Source coding theorem and write equation.	04
Q 1 (c)	Define following terms 1.Code Efficiency 2.Hamming Distance 3.Minium Distance (d_{min}) 4.Hamming Weight	04
Q 1 (d)	What is coding efficiency and coding redundancy	04
Q 1 (e)	State and explain Fermat's Little theorem with suitable example.	04
Q2 (a)	Describe broad level DES and Triple- DES in detail	10
Q2 (b)	Explain JPEG Encoder and Decoder in detail. Compare JPEG with GIF	10
Q3 (a)	Define information and Information rate. Find Information rate of the source given below An analog signal is band limited to B Hz sampled at the nyquist rate and samples are quantized into 4 levels, these quantization levels assumed independent and occur with probability $P_1=P_4 =1/8$, $P_2=P_3=3/8$.	10
Q3 (b)	Explain Symmetric and Asymmetric Algorithms in detail Differentiate between block cipher and stream cipher	10
Q4(a)	Explain in detail Convolution code by taking example. Draw code tree, code trellis, state diagram	10
Q4 (b)	Explain Chinese Remainder Theorem and Digital Signature	10
Q5 (a)	Encode the string using LZW Technique abracadaba	10
Q5 (b)	Explain Diffie –Hellman key agreement protocol. It is vulnerable to which attack?	10
	Write short notes	
Q6 (a)	Security Attacks	05
Q6 (b)	cyclic codes and BCH codes	05
Q6 (c)	Explain RLE in detail	05
Q6 (d)	Speech Compression	05

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[Time: 3 Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Question **1** is compulsory.
2. Attempt any three out of remaining questions.
3. Figure to right indicates full marks.

1. a) List and explain common cross browser compatibility issues. **(05)**
    b) Differentiate between GET and POST. **(05)**
    c) Explain different stages of an ASP.NET web page. **(05)**
    d) How is type casting done in PHP? **(05)**

2. a) Write HTML code to draw the following table: **(10)**

Table I : Cricket Analysis

Country	Matches			Net RR
	Played	Won	Lose	
INDIA	30	28	2	+0.394
PAKISTAN	30	03	27	-1.09
AUSTRALIA	36	10	16	+0.12
SRILANKA	25	5	20	-0.80

    b) What is JQUERY? Write a program to validate a form using JQUERY. **(10)**

3. a) Explain servlet lifecycle in detail. **(10)**
    b) Give details about JDBC connectivity through an example. **(10)**

4. a) Explain any 5 string manipulation functions in PHP with examples. **(10)**
    b) Discuss various web system architectures. **(10)**

5. a) Explain cookies, its attributes and uses in detail. **(10)**
    b) Write an ASP.NET program to insert a new record in Student database. **(10)**

6. Write short notes on(any **four**): **(20)**
    (i) Session tracking
    (ii) Commonly used ADO.NET objects
    (iii) Use of RSS web feeds
    (iv) Different CSS text properties
    (v) Different types of XSL elements

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