Sem-IV
IT (CBGS)
Applied maths-4   QP Code : 541304

24/11/2016

(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
        (5) Assume suitable data wherever applicable.

1. (a) Find the Eigenvalues and eigenvectors of the matrix.   5

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$$

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

    (c) Find k and then E (x) for the p.d.f.   5

$$f(x) = \begin{cases} k(x\text{-}x^2) & ,0 \le x \le 1, k > 0 \\ 0 & , \text{otherwise} \end{cases}$$

    (d) Calculate Karl pearson's coefficient of correlation from the following   5
         data.

x	100	200	300	400	500
y	30	40	50	60	70

2. (a) Show that the matrix $A = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ is non- derogatory.   6

    (b) Evaluate $\int \dfrac{e^{2z}}{(z+1)^4}$ dz where C is the circle $|z\text{-}1|=3$ 6

    (c) If x is a normal variate with mean 10 and standard deviation 4 find   8
         (i)   P(|x-14|<1)   (ii)   P ($5 \le x \le 18$)   (ii)   P (x$\le$ 12)

2

3. (a) Find the relative maximum or minimum (if any) of the function
   $Z = x_1^2 + x_2^2 + x_3^2 - 4x_1 - 8x_2 - 12x_3 + 100$ 6

   (b) If x is Binomial distributed with $E(x) = 2$ and $V(x) = 4/3$, find the probability distribution of x.   6

   (c) If $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$, find A^{50}.   8

4. (a) Solve the following L.P.P. by simplex method   6
   Minimize $z = 3x_1 + 2x_2$
   Subject to $3x_1 + 2x_2 \leq 18$
   $0 \leq x_1 \leq 4$
   $0 \leq x_2 \leq 6$
   $x_1, x_2 \geq 0.$

   (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) Find Laurent's series which represents the function $f(z) = \dfrac{2}{(z-1)(z-2)}$ 8

   When   (i) $|z| < 1$,   (ii) $1 < |z| < 2$ (iii) $|z| > 2$

5. (a) Evaluate $\displaystyle\int_c \dfrac{z^2}{(z-1)^2(z+1)} \, dz$ where C is $|z| = 2$ using residue theorem   6

   (b) The regression lines of a sample are $x + 6y = 6$ and $3x + 2y = 10$ Find   6
      (i)   Sample means $\bar{x}$ and $\bar{y}$
      (ii)   Correlation coefficient between x and y. Also estimate y When $x = 12$

   (c) A die was thrown 132 times and the following frequencies were observed   8

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

   Using χ^2-test examine the hypothesis that the die is unbiased.

6. (a) Evaluate $\int_{-\infty}^{\infty} \dfrac{x^2 + x + 2}{x^4 + 10x^2 + 9}\, dx$ using contour integration. **6**

(b) If a random variable x follows Poisson distribution such that $P(x=1) = 2\,P(x=2)$ Find the mean and the variance of the distribution. Also find $P(x=3)$. **6**

(c) Use Penalty method to solve the following L.P.P. **8**
Minimize $\quad z = 2x_1 + 3x_2$
Subject to $\quad x_1 + x_2 \geq 5$
$\qquad\qquad\; x_1 + 2x_2 \geq 6$
$\qquad\qquad\; x_1, x_2 \geq 0.$

Q. P. Code : 549603

(3 Hours) [Total Marks: 80]

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

1. Answer any four   20
   (a) Discuss and compare various types of Networks.
   (b) Explain PSTN.
   (c) Compare Circuit switched and Packet switched networks.
   (d) Differentiate between TCP and UDP.
   (e) Explain Framing in Data link layer.

2. (a) Describe about the different Guided Transmission Medias .   10
   (b) What are three main function of Network layer? What is Routing. Explain   10
       Distance vector Routing.

3. (a) Explain the Connection Establishment and Termination in TCP with neat   10
       diagram.
   (b) Explain the functions of data link layer   10

4. (a) Explain TCP Sliding Window protocol with neat diagram in detail.   10
   (b) Explain HDLC protocol with suitable diagram.   10

5. (a) Explain the following with example :-   10
       (i) Repeaters (ii) Switches (iii) Hubs (iv) Routers (v) Bridges
   (b) What are the elements of Transport Layer   10

6. Write short notes on (Any Four)   20
       (i) GSM operation subsystem
       (ii) Networking using Windows and LINUX operating system
       (iii) Internet Control Protocol
       (iv) Mobile Telephone System
       (v) BGP.

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QP Code :549803

MAX MARKS:80   TIME:03 HRS

N.B.   1. Question No 1 is compulsory.

        2. Solve any three questions out of remaining five questions.

        3. Assume suitable data if necessary.

Q. 1. Solve any four out of five.   (4*5=20)

        a. What are the major requirements of I/O module?

        b. Draw the flowchart of non-restoring division algorithm and explain the same.

        c. With the help of diagram, explain Von-Neumann architecture.

        d. Compare SRAM & DRAM.

        e. Note on pipeline hazards.

Q. 2. a) Explain Flynn's classification in detail.   (10)

        b) Discuss the various characteristics of Memory.   (10)

Q. 3. a) Multiply (-4) and (2) using Booth's algorithm.   (10)

        b) Explain Instruction cycle with Interrupt execution with example.   (10)

Q. 4. a) Express $(4.50)_{10}$ in IEEE 754 single & double precision standard of floating
        point number representation.   (10)
        b) Explain design of control unit wrt softwired and hardwired approach.   (10)

Q. 5. a) Divide 13 by 3 using restoring division algorithm.   (10)

        b) Explain different addressing modes with example.   (10)

Q. 6. Write a note on any two.   (2*10=20)

        a. Comparison of RISC & CISC

        b. Programmed I/O

        c. Mapping techniques of Cache memory

Q. P. Code : 549702

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

N.B. : (1) Attempt any **Four** questions.
(2) Draw suitable **diagram** whenever **necessary**.
(3) Assume suitable **data**, if **necessary**.

1. Attempt **four** sub questions.
   (a) State applications where Automata Theory is used. 5
   (b) What are limitations of finite automata. 5
   (c) Develop an NF A to accept strings ending with 'aba' over {a , b} 5
   (d) Explain with example equivalence between NFA & DFA. 5

2. (a) Consider the grammar G = { (S, A), (0, 1), P, S }, where P consists of : 10
       (i)   S → 0AS | 0   (ii)   A → S1A | SS | 10
       Show the leftmost and rightmost derivation for the input string '001100'. Is
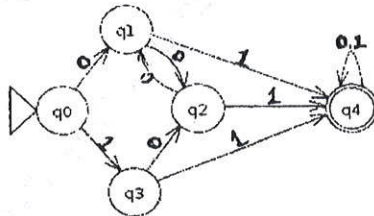   given G Ambiguous?
   (b) Construct deterministic PDA to recognize $a^n abb^n$, n > 0 over{ a,b} 10

3. (a) Define Normal form and its types and Convert given grammar to CNF: 10
       (i)   S → bA | aB   (ii)   A → bAA | aS | a   (iii)   B → aBB | bS | b
   (b) Define CFG and construct a CFG for $a^{2n} b^n$ 10

4. (a) Design mealy machine to accept all strings ending with aa or bb 10
   (b) Minimize given DFA- 10

5. (a) Develope ε -NFA to accept $0^n 1^n 2^n$, where n >= 0 over { 0,1 ,2} 5
   (b) Define Halting problem 5
   (c) Give Regular Expressions for- 6
       (i)   Binary strings containing atleast one 11 & atleast one 00
       (ii) Strings with even number of a's
       (iii) Strings in which third symbol from end is 'c' over { a,b,c}
   (d) Describe Regular Language for given Regular Expressions 4
       (i)   (ab+ba)*,
       (ii) 1(0+1)(0+1) (0+1) (0+1)* 0

6. (a) Write short note on - Chomsky Hierarchy 7
   (b) Explain Post correspondence problem 7
   (c) Explain Pumping Lemma for Regular Language 6

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(3 Hours)   [Total Marks : 80]

Note: 1) Question No.1 is **compulsory**.
       2) Solve **any three** questions out of remaining questions .
       3) Assume suitable data if required.

1. Give **any four** :-
   (a) Explain the functions of webserver.   5
   (b) Difference between static and dynamic web pages.   5
   (c) What is the purpose of the XML DTD.   5
   (d) Explain features of PHP framework.   5

2. (a) What are the major components of a web browser? Draw a neat diagram to   10
       explain them.
   (b) Write the HTML code for the following table: 10

TEMPERATURE				
CITIES	DELHI	MUMBAI	KOLKATTA	CHENNAI
MAXIMUM	21	35	43	50
MINIMUM	5	14	28	32

3. (a) Write a simple JavaScript example program for Fibonacci sequence.   5
   (b) Write a program to find the current date and time using JSP.   5
   (c) Discuss life cycle of a JSP.   10

4. (a) Compare Client-Side vs Server-Side Programming Languages.   10
   (b) What is JQUERY? Illustrate the use of is JQUERY for form validation.   10

5. (a) How to connect to MySQL database using PHP.   10
   (b) Describe the life cycle of ASP.Net   10

6. Write short note on **(any two)**   20
       (i) Important Classes in ADO.NET.
       (ii) Types of CSS.
       (iii) ASP.NET Web server control.
       (iv) Cookies and sessions.

Q. P. Code : 550000

(3 Hours) [Total Marks -80

N.B.- 1. Question No. 1 is compulsory
2. Attempt any three Questions out of remaining five Questions
3. Figures to right indicate marks.
4 all questions carry equal marks.

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1. a) What is Entropy? What are its types? [4]
   b) Compare Lossy and Lossless compression. [4]
   c) Write a note on convolution code. [4]
   d) State Fermat's little theorem and its applications. [4]
   e) Explain cyclic codes. [4]

2. 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]

3 a) Explain LZW compression algorithm with example. [10]
   b) State Chinese Remainder theorem. Using it solve for X. [10]

      X=1 MOD 2
      X=2 MOD 3
      X= 2 MOD 5

4. (a) Consider the symbols {1,1,1,1,1,1,1,2,2,2,2,2,2,3,3,3,3,3,4,4,4,4,5,5,5,6,6,7} [10]
      i. Find efficient fixed length code.
      ii. Find Huffman code.
      iii. Compare 2 codes.
   (b) Explain Modular arithmetic with example [5]
   (c) Compare MD5 and SHA-1 [5]

5. (a) Explain Diffie- Hellman algorithm. Which attack, is it vulnerable to? [10]
   (b) Explain the idea of Message Digest 5 (MD 5) [5]
   (c) Explain Speech compression. [5]

6. Write short notes on any **two**: [20]
      a) RSA
      b) RLE
      c) Channel Capacity
      d) Data Encryption Standard (DES)