S.E. Sem IV (CBSGS) IT
App. Maths. - IV
Dt: 23/11/15

Q.P. Code : 5316

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

(b) State Cayley-Hamilton theorem & verify the same for $A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ 5

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

x	−2	−1	0	1	2	3
$P(x)$	0.1	k	0.2	2k	0.3	K

Find i) k ii) mean iii) variance 5

(d) Find all the basic solutions to the following problem

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

Subject to $x_1 + 2x_2 + 3x_3 = 4$

$2x_1 + 3x_2 + 5x_3 = 7$

and $x_1, x_2, x_3 \geq 0$ 5

2. (a) Find the Eigen values and the Eigen vectors of the matrix $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{bmatrix}$ 6

(b) Evaluate $\oint_C \frac{dz}{z^3(z+4)}$ where c is the circle $|z| = 2$ 6

(c) If the heights of 500 students is normally distributed with mean 68 inches and

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

x	30	33	25	10	33	75	40	85	90	95	65	55
y	68	65	80	85	70	30	55	18	15	10	35	45

6

(b) In sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 100 such samples, how many would you expect to contain 3 defectives i) using the Binomial distribution, ii) Poisson distribution. 6

(c) Show that the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalizable. Find the transforming matrix and the diagonal matrix. 8

4. (a) Fit a Poisson distribution to the following data

x	0	1	2	3	4	5	6	7	8
f	56	156	132	92	37	22	4	0	1

6

(b) Solve the following LPP using Simplex method

Maximize $z = 6x_1 - 2x_2 + 3x_3$

Subject to $2x_1 - x_2 + 2x_3 \leq 2$

$x_1 + 4x_3 \leq 4$

$x_1, x_2, x_3 \geq 0$ 6

(c) Expand $f(z) = \frac{2}{(z-2)(z-1)}$ in the regions

$i)\ |z| < 1, ii)\ 1 < |z| < 2, iii)\ |z| > 2$ 8

5. (a) Evaluate using Cauchy's Residue theorem $\oint_c \frac{1-2z}{z(z-1)(z-2)} dz$ where c is

$|z| = 1.5$ 6

(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) Solve the following LPP using the Dual Simplex method

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) Solve the following NLPP using Kuhn-Tucker conditions 8

Maximize $z = 10x_1 + 4x_2 - 2x_1^2 - x_2^2$

Subject to $2x_1 + x_2 \leq 5$; *and* $x_1, x_2 \geq 0$

(b) In an experiment on immunization of cattle from Tuberculosis the following results were obtained 6

	Affected	Not Affected	Total
Inoculated	267	27	294
Not Inoculated	757	155	912
Total	1024	182	1206

Use χ^2 Test to determine the efficacy of vaccine in preventing tuberculosis.

(c) i) The regression lines of a sample are $x + 6y = 6$ *and* $3x + 2y = 10$ 6

find a) sample means $\bar{x}$ *and* $\bar{y}$ b) coefficient of correlation between x *and* y 4

ii) If two independent random samples of sizes 15 & 8 have respectively the means and population standard deviations as

$\bar{x}_1 = 980, \bar{x}_2 = 1012 : \sigma_1 = 75, \sigma_2 = 80$

Test the hypothesis that $\mu_1 = \mu_2$ at 5% level of significance. 4

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Web Programming

Dt:-17/12/15

QP Code : 5503

Duration: 3Hrs. Total Marks : 80

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

1	(a)	Explain three tier architecture of web application.	5
	(b)	What is XSLT? Explain with example.	5
	(c)	Explain web services.	5
	(d)	Differentiate between GET and POST.	5
2	(a)	Explain JavaScript objects Window and Document.	10
	(b)	What is session? What are the ways to do session tracking? Explain session handling using cookies.	10
3	(a)	What is valid XML document? Design DTD for address book XML document.	10
	(b)	What is JQUERY? Illustrate the use of JQUERY for form validation.	10
4	(a)	Explain AJAX – PHP framework.	10
	(b)	Write JavaScript program to validate a form which accepts Name, Date of Birth, email and Phone Number of a student.	10
5	(a)	Write the HTML code to display class timetable.	10
	(b)	Write an ASP.NET program to insert a new record (Name, Date of Birth, email and Phone Number of a student) in the database using C#.	10
6	(a)	What is CSS? Explain the ways by which CSS is included in the web page.	10
	(b)	Write JavaScript code to display today's day (eg. Sunday, Monday, . . .).	10

S.E. Sem. IV (CBGS) IT

COA

DT: 10/12/15

Q.P. Code : **5461**

(3 Hours) [Total Marks :80

N.B. : (1) Question **No.1** is **compulsory**
(2) Solve any **three** questions out of remaining **five** questions.
(3) Assume suitable data if necessary.

1. Solve any **four** out of **five.** 20
   (a) Differentiate between RISC and CISC
   (b) What are the functions of following registers?
      (i) PC (ii) SP (iii) MAR (iv) MDR (v) IR
   (c) Write a note on interrupt execution.
   (d) Define Stored Program Concept and draw Von-Neumann's architecture.
   (e) What is meant by nanoprogramming?

2. (a) Multiply (-3) and (4) using Booth's Algorithm. 10
   (b) Explain 6 stage instruction pipeline with suitable diagram. 10

3. (a) Compare SRAM & DRAM.
   (b) Consider the string 1,3,2,4,2,1,5,1,3,2,6,7,5,4,3,2,4,2,3,1,4 10
   Find the page faults for 3 frames using FIFO and LRU page replacement algorithms. 10

4. (a) Divide 11 by 2 using restoring division algorithm. 10
   (b) What is meant by Fetch cycle, Instruction cycle, Machine cycle and interrupt cycle? Explain in brief. 10

5. (a) Explain different mapping techniques of Cache memory. 10
   (b) What is virtual memory? Explain the role of paging and segmentation in virtual memory. 10

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

S.E. Sem: IV (CBGS) + 1

Information Theory & Coding

QP Code : 5541

Dt: 22/12/15

(3 Hours) [Total Marks : 80

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

(2) Attempt any **three** questions from remaining **five** questions.

(3) Make **suitable assumption** if **necessary** and **state it clearly**.

1. (a) Derive expression for entropy ? 5
   (b) What is lossless compresion ? 5
   (c) List attacks threatening security goals. 5
   (d) Explain the role of digital signature. 5

2. (a) Explain LZW compression algorithm with example. 10
   (b) For DES symmetric algorithm, explain main steps involved showing block size, cipher key size and round key size. 10

3. (a) For (7, 4) cyclic code, find out the generator matrix if $G(D) = 1 + D + D^3$. 10
   (b) Describe Huffman decoding procedure with example. 10

4. (a) Explain Diffie-Hellman algorithm. Which attack is it valnerable to ? 10
   (b) Describe convolution code in brief. 10

5. (a) State Fermat's Little Theorem with example and its applications. 10
   (b) Describe lossy compression methods. Where we use lossy compression methods ? How do we are it ? 10

6. (a) Describe Chinese-Remainder Theorem and its applications. 10
   (b) Define : (i) Hamming distance 10
   (ii) Hamming Weight
   (iii) Syndrome
   (iv) Linear properties of code
   (v) Code rate

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S.E. Sem. IV (CBSGS) IT

Automata Theory

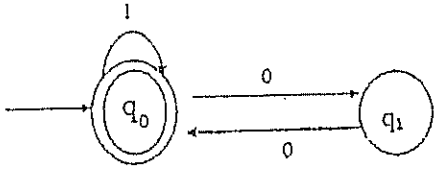
DF. 4/12/15

QP Code : 5419

(3 Hours) [Total Marks : 80

N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions from the entire paper.
(3) Draw diagrams wherever necessary.

1. (a) (2) Explain if the following machine M is a DFA? Is it NFA? Write formally a definition for this M. 4



(b) Design moore machine to convert each occurrence of 1 00 to 101 3
(c) Write a CFG to generate strings Starting and ending with different letter over the $\Sigma = \{a,b\}$ 3
(d) What is Multi-Tape Turing Machine 3
(e) Difference between FA and PDA 4
(f) Give a regular expression for the language over the alphabet $\Sigma = \{a,b\}$ containing at most two a's. 3

2. (a) Construct a minimal DFA which accepts $L=\{a^n b^m c^l \mid n,m,l>=0\}$ 5
(b) State and explain Turing Machine Formalism. 5 5
(c) If L(r)= { aaa,aab,aba,abb,baa,bab,bba,bbb} ,find the regular expression r which represents L(r). 5
(d) Explain Chomsky Hierarchy. 5

3. (a) Construct a TM for accepting palindromes. 10
(b) Design PDA For recognizing $L= \{a^m b^n c^{m+n} \mid m,n>= 1\}$ 10

4. (a) Convert the following grammar to Chomsky Normal Form. Show all the relevant Steps briefly. 10

$S \rightarrow bA \mid aB$
$A \rightarrow bAA \mid aS \mid a$
$B \rightarrow aBB \mid bS \mid b$

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(b) Convert the following Grammar G to GNF. 10

$G=\{(A_1, A_2, A_3), (a,b), P, A_1\}$

Where , P consist of the Following Productions:

$A_1 \rightarrow A_2A_3$

$A_2 \rightarrow A_3A_1 \mid b$

$A_3 \rightarrow A_1A_2 \mid a$

5. (a) State and Prove pumping lemma for regular languages and prove that following language is regular or not 10

$L=\{a^nb^n \mid n>=1\}$

(b) Construct NFA,DFA for the regular Expression R=ab(a+b)+abb.Obtain minimized DFA 10

7. Write short notes on:- (any two) 20

(a) Simplification OfCFG

(b) Recursive and Recursively enumerable languages.

(c) Universal TM

(d) Halting Problem

S.E. Sem. IV (CBGS) [?] Computer Networks Dt: 30/11/15

QP Code : 5377

(3 Hours) [Total Marks : 80

N.B. : (1) Question No. 1 is are **compulsory**.
(2) Attempt any **three** questions out of **remaining** questions.
(3) Total 4 questions **need** to be **solved**.

1. (a) Compare circuit switched and packet switched networks. 5
(b) Waht is a network ? What are its goals and applications ? 5
(c) Differentiate between TCP and UDP. 5
(d) Explain framing in Data link Layer. 5

2. (a) What is OSI modes ? Give the function and services of each layer. 10
(b) Explain HDLC protocol along with its different frame structure. 10

3. (a) Explain CSMA/CD protocol. 10
(b) Describe about the different Guided transmission Medias. 10

4. (a) Explain the following with example :— 10
(i) Repeater
(ii) Hubs
(iii) Bridges
(iv) Swithces
(v) Router.
(b) What is Ip addressiing ? Explain IpV_4 datagram format ? 10

5. (a) What is Congestion and what are the causes of congestion ? Explain Token bucket algorithm of Congestion Control ? 10
(b) Explain TCP segment header format. 10

6. Explain any **four** :— 20
(a) Compare LAN, WAN, MAN.
(b) Network Topologies.
(c) PSTN.
(d) Berkely sockets.
(e) Sliding window protocol.

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