DECEMBER-2019

EXAMINATION TIME TABLE
PROGRAMME - S.E. (Information Technology)
(REV. -2012)(CBSGS)
SEMESTER – IV

Days and Dates	Time	Paper Code	Paper
Wednesday, December 04, 2019	**02:30 p.m. to 05:30 p.m.**	**39401**	**APPLIED MATHEMATICS - IV**
Monday, December 09, 2019	**02:30 p.m. to 05:30 p.m.**	**39402**	**COMPUTER NETWORKS**
Wednesday, December 11, 2019	**02:30 p.m. to 05:30 p.m.**	**39403**	**AUTOMATA THEORY**
Friday, December 13, 2019	**02:30 p.m. to 05:30 p.m.**	**39404**	**COMPUTER ORGANIZATION AND ARCHITECTURE**
Tuesday, December 17, 2019	**02:30 p.m. to 05:30 p.m.**	**39405**	**WEB PROGRAMMING**
Thursday, December 19, 2019	**02:30 p.m. to 05:30 p.m.**	**39406**	**INFORMATION THEORY AND CODING**

(Dr. Vinod Patil

Time Duration: 3Hr   **Total Marks: 80**

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

Q1. a)   Evaluate $\int_C (z - z^2)dz$, where C is the upper half of circle $|z| = 1$.   **[5]**

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

c) State whether the following statement is true or false with reasoning: "The line of regression between x and y are parallel to the line of regression between 2x and 2y."   **[5]**

d) Find the dual of the following L.P.P.   **[5]**
Maximize $z = 3x_1 + 17x_2 + 9x_3$
Subject to $x_1 - x_2 + x_3 \geq 3$
            $-3x_1 + 2x_3 \leq 1$
            $2x_1 + x_2 - 5x_3 = 1$
            $x_1, x_2, x_3 \geq 0$

Q2. a)   Evaluate $\int_C \frac{1}{z^3(z+4)} dz$, where c is the circle $|z|$=2.   **[6]**

b) Show that the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{bmatrix}$ is non-derogatory.   **[6]**

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

Q3. a)   Find the expectation of number of failures preceding the first success in an infinite series of independent trials with constant probabilities p and q of success and failure respectively.   **[6]**

b) Solve the following L.P.P. by simplex method   **[6]**
Maximize $z = 3x_1 + 2x_2$
Subject to $x_1 + x_2 \leq 4$
            $x_1 - x_2 \leq 2$
            $x_1, x_2 \geq 0$

c) Expand $f(z) = \frac{2-z^2}{z(1-z)(2-z)}$ about $Z = 0$ indicating the region of convergence in each case.   **[8]**

Q4. a)   A biased coin is tossed n times. Prove that the probability of getting even number of heads is $0.5[1 + (q - p)^n]$.   **[6]**

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

X	100	200	300	400	500
Y	30	40	50	60	60

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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]**

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 of 8.9 years? **[6]**

b) Evaluate $\int_0^\infty \frac{1}{x^4+1} \, dx$, using Cauchy's residue theorem. **[6]**

c) Using the Kuhn – Tucker conditions, solve the following N.L.P.P. **[8]**
Minimize $z = 7x_1{}^2 + 5x_2{}^2 - 6x_1$
Subject to $x_1 + 2x_2 \leq 10$
$x_1 + 3x_2 \leq 9$
$x_1, x_2 \geq 0$

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) If two independent random samples of sizes 15 and 8 have respectively the following means and population standard deviations, **[6]**
$\overline{X_1} = 980 \quad \overline{X_2} = 1012$
$\sigma_1 = 75 \qquad \sigma_2 = 80$
Test the hypothesis that $\mu_1 = \mu_2$ at 5% level of significance.

b) Using Penalty (Big-M) method solve the following L.P.P. **[8]**
Maximise $z = 3x_1 - x_2$
Subject to $2x_1 + x_2 \leq 2$
$x_1 + 3x_2 \geq 3$
$x_2 \leq 4$
$x_1, x_2 \geq 0$

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

Note:
(1) Questions No. 1 is compulsory.
(2) Solve any three questions from remaining questions.
(3) Draw suitable diagram whenever necessary.
(4) Assume suitable data if necessary.

Q1	**Answer Any four**		**(20)**
	(a)	Explain PSTN.	
	(b)	Explain selective repeat protocol.	
	(c)	Explain CRC with example.	
	(d)	Compare Circuit switched and packet switched network.	
	(e)	What is IP address, MAC Address and port address.	
Q2.	(a)	Explain the Taxonomy of multiple access protocols.	**(10)**
	(b)	What is Slotted ALOHA and Pure ALOHA? What is the efficiency? Justify your answer.	**(10)**
Q3.	(a)	Explain TCP Congestion Control.	**(10)**
	(b)	Explain IEEE 802.3, 802.4 and 802.5 standard.	**(10)**
Q4.	(a)	Explain TCP sliding window protocol with neat diagram.	**(10)**
	(b)	What is subnet mask? Explain subnetting and supernetting with example.	**(10)**
Q5.	(a)	Compare OSI and TCP network models.	**(10)**
	(b)	Explain HDLC protocol with suitable diagram.	**(10)**

Q6.   Write short note on (**Any Four)**   **(20)**
      (a)   Satellite Communication
      (b)   Examine the advantages of LAN, MAN and WAN.
      (c)   Differentiate between connectionless and connection oriented services.
      (d)   Mobile Telephone System.
      (e)   Link State Routing.

(3 Hours)   **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 the set of all strings over the input $\sum = \{0,1\}$, whose
   second last symbol is 1   **(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) Give formal definition of a Push Down automata (PDA)   **(05)**

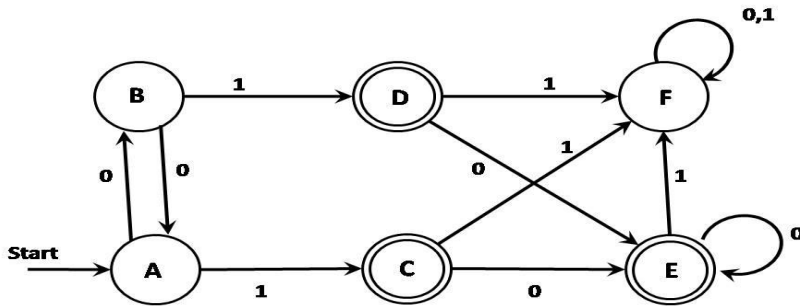Q2. a) Convert the following grammar to CNF   **(10)**

$S \rightarrow Ba \ / \ aB$

$A \rightarrow bAA \ / \ aS \ / \ a$

$B \rightarrow aBB \ / \ bS \ / \ b$

b) Design DFA to accept

i. Binary Strings in which every 0 is followed by 11   **(05)**
ii. String over the binary alphabet that do not contain the substring 010   **(05)**

Q.3:

a) Minimize the following DFA.   **(10)**

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) Design a Turing Machine to recognize the language L = {$a^n b^n a^n$ | n >=1} **(10)**

Q.5:

a) Using the pumping Lemma prove that the following language is not regular

L= { ww | w= {0 , 1}* } **(10)**

b) Design Melay machine to accept all the strings ending with 00 or 11 **(10)**

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

a) Chomsky Hierarchy.
b) Applications of Automata theory
c) Universal Turing Machine
d) Post correspondence Problem
e) Halting Problem

(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.
4. Figures to right indicate marks.

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

a. Draw and explain instruction execution cycle.

b. Explain memory hierarchy with the help of diagram.

c. What are the various means of I/O communication?

d. With the help of diagram, explain Von-Neumann's architecture.

e. Explain the IEEE 754 double precision standard of floating point representation.

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

Q. 3. a) Compare RISC & CISC.   (10)
b) Consider the string   8,3,9,4,9,8,5,8,3,9,6,7,5,4,3   (10)
    Find the page faults for 3 frames using FIFO, Optimal, & LRU page replacement policies.

Q. 4. a) Divide 7 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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Paper / Subject Code: 39405 / WEB PROGRAMMING

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

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

1. (a) Discuss any five CSS text properties. **5**
   (b) Explain the *for* loop used in PHP. **5**
   (c) Explain the functions of a web server. **5**
   (d) List and explain common cross browser compatibility issues. **5**

2. (a) Write a program that shows a message as Good Morning, Good Afternoon or **10**
      Good Night according to the current time by using the *if* statement in JavaScript.

   (b) Write HTML code to draw the following table: **10**

<table>
<tr><th colspan="6">Time Table</th></tr>
<tr><td rowspan="7">Hours</td><th>Mon</th><th>Tue</th><th>Wed</th><th>Thu</th><th>Fri</th></tr>
<tr><td>Science</td><td>Maths</td><td>Science</td><td>Maths</td><td>Arts</td></tr>
<tr><td>Social</td><td>History</td><td>English</td><td>Social</td><td>Sports</td></tr>
<tr><th colspan="5">Lunch</th></tr>
<tr><td>Science</td><td>Maths</td><td>Science</td><td>Maths</td><td rowspan="2">Project</td></tr>
<tr><td>Social</td><td>History</td><td>English</td><td>Social</td></tr>
</table>

3. (a) Explain ASP.NET application lifecycle. **10**
   (b) Describe string manipulation and date and time built-in functions in PHP **10**

4. (a) How a database can be connected using ADO.Net? Explain with a suitable example. **10**
   (b) Explain different types of XSL elements. **10**

5. (a) What is JQUERY? Illustrate the use of JQUERY for form validation. **10**
   (b) Explain servlet life cycle in detail. **10**

6. Write short notes on **(any four)**: **20**
   (i) Three-tier architecture of web application
   (ii) Website design issues
   (iii) PHP and MySQL database connectivity
   (iv) Session tracking
   (v) Use of RSS web feeds

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(3 Hours) [Total Marks : 80]

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

Question No.		Max. Marks
Q 1 (a)	Differentiate Lossy and Lossless Compression	04
Q 1 (b)	Define Cyclic and BCH codes	04
Q 1 (c)	List four properties of Information	04
Q 1 (d)	Explain three Security Goals of Cryptography.	04
Q 1 (e)	State and explain Fermat's Little theorem with example	04
Q2 (a)	With example explain Convolution codes and Cyclic codes	10
Q2 (b)	Describe AES in relation with cryptography	05
Q2 (c)	Explain Digital Signature	05

Q3 (a) For (7,4) linear block code 10

$$H = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 1 & 0 & 0 \end{bmatrix}$$

Find
   1. Generator matrix
   2. All code vectors
   3. Number of error that can be detected and corrected

Q3 (b) Define different types of Entropy 05

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Q3 (c)	Define different Security attacks that is threat to Integrity	05
Q4 (a)	Consider a Telegraph source having two symbols Dot and Dash .The Dot duration is 0.2 sec and dash duration is 3 times Dot duration .The probability of dot occurring is twice that of Dash and time between symbols is 0.2 sec. Calculate the information rate of Telegraph source	10
Q4 (b)		10
	With block diagram explain JPEG Encoder and Decoder in detail	
Q5 (a)	Encode the string using LZW Technique	10
	bananana	
Q5 (b)	Compare Symmetric and Asymmetric key cryptography.	05
Q5 (c)	Use the Euclidean,s algorithm to find gcd (1819,3587).	05
	Write short notes	
Q6 (a)	RSA algorithm	05
Q6 (b)	Dictionary based compression	05
Q6 (c)	Code efficiency and redundancy	05
Q6 (d)	Shannon's Limit	05