

S.E (SEM IV) (CBCGS)  
INFORMATION TECHNOLOGY  
INFORMATION THEORY AND CODING  
DT 12/06/17

Q.P. Code : 3660

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No. 1 is compulsory.  
(2) Solve **Any Three** questions out of the remaining questions.  
(3) Figures to the right indicate **Full Marks**.

1. (a) State the properties of Information? Also derive the expression for entropy. 5  
(b) What is Compression? List different Compression algorithm. Why adaptive Huffman coding is used? 4  
(c) Explain Asymmetric key cryptography. 5  
(d) What are the security goals? Define Cryptography 3  
(e) Describe Fermat's Little Theorem. 3
2. (a) Given  $x_i = \{x_1, x_2, x_3, x_4, x_5, x_6\}$  with probabilities as below: 10  
 $P(x_i) = \{0.3, 0.25, 0.2, 0.06, 0.04, 0.05, 0.06, 0.04\}$   
(i) Determine the efficient fixed length code for the source.  
(ii) Determine the Huffman code for this source.  
(iii) Compare the two codes and comment.
- (b) Explain convolution code in brief. 10
3. (a) A (7,4) cyclic code has a generator polynomial:  $g(x) = X^3 + X + 1$ . 10  
(i) Draw the block diagram of encoder.  
(ii) Find generator and parity check matrices in systematic form.
- (b) Explain Chinese Remainder theorem and also Explain the properties of Modular Arithmetic and Congruences. 10
4. (a) Describe about Discrete probability and logarithms. 10  
(b) For a (6,3) linear block code, the coefficient matrix [p] is as follows: 10

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

The received code words at the receiver are :

1) 0 0 1 1 1 0      2) 1 1 1 0 1 1

Check whether they are correct or contains some errors.

**Q.P. Code : 3660**

2

5. (a) Explain Diffie-Hellman algorithm. Which attack is it vulnerable to? 10
- (b) Explain convolution code in brief. 10
6. (a) What do you mean by Symmetric key cryptography? Explain DES in detail. 10
- (b) Write a short note on: Types of Entropy and LZW compression. 10
-

QP Code : 3647

(3 Hours)

[ Total Marks : 80

- N.B. :**
- 1) Question No. 1 is Compulsory
  - 2) Attempt any 3 questions out of the remaining questions
  - 3) Total 4 questions need to be solved.
1. (a) "A datagram cannot be larger than the MTU of network over which it is sent. Is the statement true or false? Explain with the help of suitable example. 5
  - (b) Suppose you have to develop an error recovery protocol for a link that is unreliable and delay sensitive, which of the following protocol would you to choose? Justify your answer. 5
    - (i) Stop and wait
    - (ii) Selective repeat
    - (iii) Go back
  - (c) How congestion is controlled in TCP? 5
  - (d) The size of option field of an IP datagram is 20 bytes. What is the value of HLEN ? What is the value in binary? 5
  - 2 (a) What is OSI model ? Give the function and services of each layer. 10
  - (b) What is routing in network? Explain shortest path routing protocol. 10
  - 3 (a) Explain the different classes of IP addresses and need of subnetting with the help of example. 10
  - (b) Differentiate between message switching, circuit switching and packet switching. 10
  - 4 (a) What is pure ALOHA and Slotted ALOHA? What is the efficiency. Justify your answer. 10
  - (b) Draw and explain TCP Segment Header. 10
  5. (a) Differentiate between TCP and UDP . 10
  - (b) Explain the different transmission media in networking. 10
  6. Write short notes on the following (any four) : 20
    - (a) BGP
    - (b) HDLC
    - (c) TCP Timers
    - (d) Hubs, Switches and Bridges
    - (e) CRC and checksum.

**QP Code : 3654**

Duration : 3 hours

Total marks : 80

Note.(1) Question No. 1 is compulsory

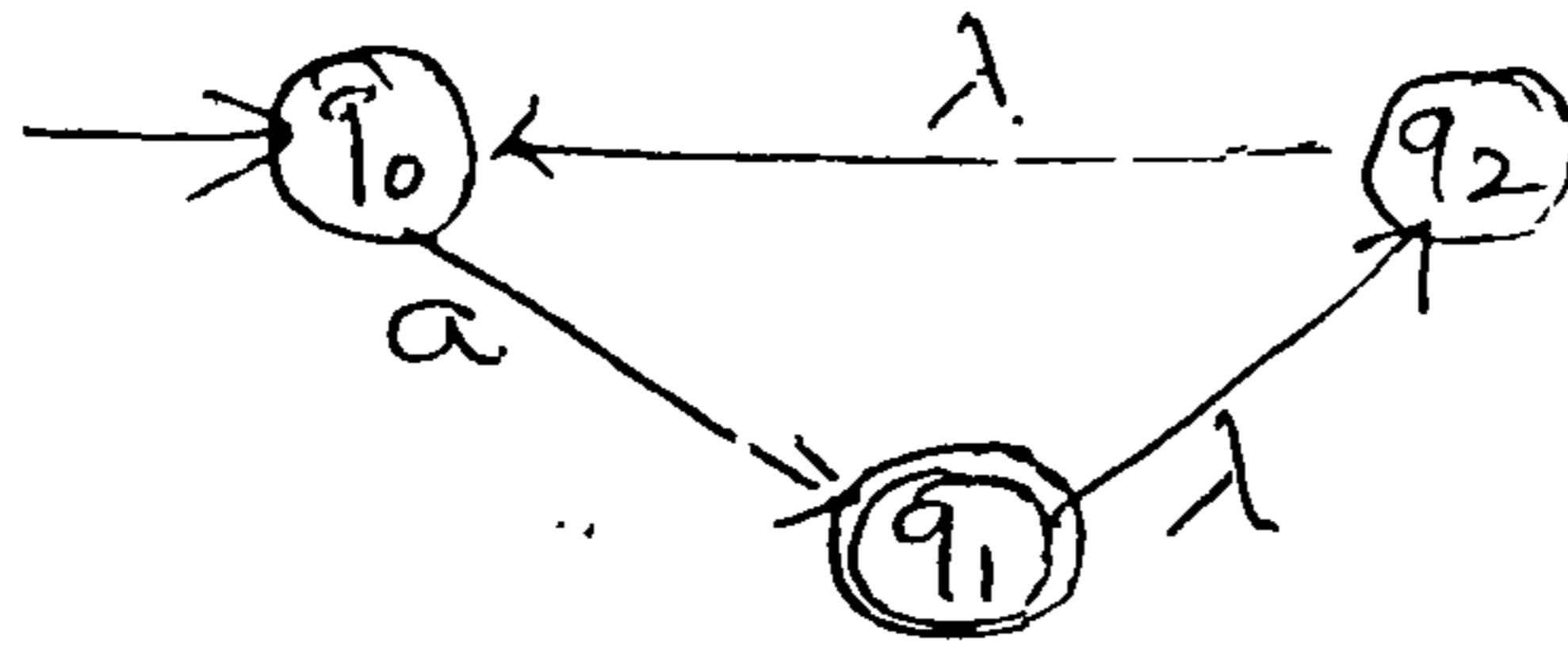
- (2) Attempt any three questions from remaining questions
- (3) Draw suitable diagrams wherever necessary
- (4) Assume suitable data, if necessary.

Q1. Attempt any four sub-questions.

- (a) Design a DFA to accept only those strings containing a substring 'aa'. (05)
- (b) Design a Moore machine for a binary adder. (05)
- (c) Give formal definition of a Push Down Automata. (05)
- (d) Construct a Context Free Grammar for the language with equal number of a's and b's. (05)
- (e) Give a regular expression for a language over the alphabet  $\Sigma = \{ a, b \}$  containing at most two a's. (05)

Q2. (a) Design a DFA that accepts the strings over a binary alphabet that do not contain the substring 010. (10)

(b) Convert the following NFA to a reduced DFA. (10)

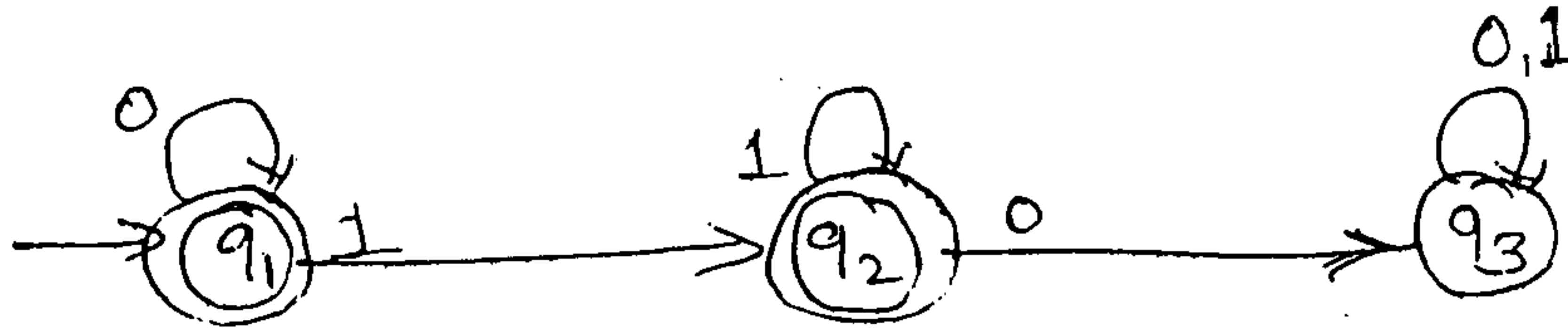


Q3. (a) What is a Mealy machine? Design a mealy machine to determine the residue mod 5 of a binary number. (10)

(b) Using pumping lemma prove that the following language is not regular (10)

$$L = \{ a^n b^n c^n \mid n \geq 0 \}$$

Q4. (a) Find a regular expression RE corresponding to the following FA (10)



(b) Design a Turing machine to recognize the language (10)

$$L = \{ 1^n 2^n 3^n \mid n \geq 1 \}$$

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

$$S \rightarrow Sab \mid Sba \mid \epsilon$$

(b) Design a PDA for the language  $L = \{ ww^R \mid w \in \{a, b\}^* \}$  (10)

Q6. Write short notes on ( any two) (20)

- (a) Variants of Turing Machines
- (b) Recursive and Recursively enumerable languages
- (c) Chomsky Hierarchy
- (d) Halting Problem

S. E. IV IT (CBSEGS)  
S. E. - ~~IV~~ IT (CBSEGS)

7/6/2015

Web Programming 08/06/15

QP Code : 3657

(3 Hours)

[ Total Marks : 80

- N. B. : (1) Question No. 1 is compulsory.  
(2) Write any three questions.  
(3) Assume suitable data if required.

1. (a) Explain 3-tier architecture and its applications. 5  
(b) Differentiate between cookies and sessions. 5  
(c) Differentiate between JSP and servlets. 5  
(d) Differentiate between HTML4 & HTML5 features. 5
2. (a) Explain ADO NET object model with suitable diagram. 10  
(b) Explain Javascript objects windows and documents. 10
3. (a) Write a Java script to write out the multiplication table for the no. 5 from 1 to 20 using while loop. 10  
(b) What is JQUERY? Illustrate the use of JQUERY for form validation. 10
4. (a) What is CSS? Explain the ways by which CSS is included in HTML. 10  
(b) What is session tracking what are the ways to do session tracking - How is it done in PHP. 10
5. (a) Explain life cycle of servlets. 10  
(b) Explain the need of web server. How is it administered. 10
6. Explain any two :- 20
  - (a) Life cycle of ASP.NET application
  - (b) JDBC with example
  - (c) AJAX - PHP framework

Q.P. Code : 3541

(3 Hours)

[ Total Marks : 80

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

1. (a) Show that  $\int_C \log z \, dz = 2\pi i$ , where C is the unit circle in the z - plane. 5
- (b) If  $A = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$  then find the eigen values of  $4A^{-1} + 3A + 2I$ . 5
- (c) It is given that the means of x and y are 5 and 10. If the line of regression of y on x is parallel to the line  $20y = 9x + 40$ , estimate the value of y for  $x = 30$ . 5
- (d) Find the dual of the following L.P.P. 5
- Maximise  $Z = 2x_1 - x_2 + 3x_3$   
 Subject to  $x_1 - 2x_2 + x_3 \geq 4$   
 $2x_1 + x_3 \leq 10$   
 $x_1 + x_2 + 3x_3 = 20$   
 $x_1, x_3 \leq 0$ ,  $x_2$  unrestricted.
2. (a) Evaluate  $\int_C \frac{z+2}{z^3-2z^2} \, dz$ , where C is the circle  $|Z - 2 - i| = 2$  6
- (b) Show that  $A = \begin{bmatrix} 7 & 4 & -1 \\ 4 & 7 & -1 \\ -4 & -4 & 4 \end{bmatrix}$  is derogatory. 6
- (c) In a distribution exactly normal 7% of items are under 35 and 89% of the items are under 63. Find the probability that an item selected at random lies between 45 & 56. 8
3. (a) A continuous random variable has probability density function  $f(x) = 6(x-x)^2$ ,  $0 \leq x \leq 1$ . Find (i) mean (ii) variance. 6
- (b) Solve the following L.P.P. by simplex method 6
- Maximise  $Z = 4x_1 + 3x_2 + 6x_3$   
 Subject to  $2x_1 + 3x_2 + 2x_3 \leq 440$   
 $4x_1 + 3x_3 \leq 470$   
 $2x_1 + 5x_2 \leq 430$   
 $x_1, x_2, x_3 \leq 0$

3. (c) Find all possible Laurent's expansions of the function 8

$$f(z) = \frac{7z - 2}{z(z-2)(z+1)} \quad \text{about } z = -1$$

4. (a) Find the moment generating function of Binomial distribution & hence find mean and variance. 6

- (b) Calculate the correlation coefficient from the following data : 6

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

- (c) Show that the matrix  $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$  8

is diagonalisable. Find the transforming matrix and the diagonal matrix.

5. (a) Ten individuals are chosen at random from a population and their heights are found to be 63, 63, 64, 65, 66, 69, 69, 70, 70, 71 inches. Discuss the suggestion that the mean height of the universe is 65 inches. 6

- (b) Evaluate  $\int_0^{\infty} \frac{dx}{(x^2 + a^2)^3}$ ,  $a > 0$  using contour integration. 6

- (c) Use Kuhn - Tucker conditions to solve the following N.L.P.P. 8

Maximise  $Z = 8x_1 + 10x_2 - x_1^2 - x_2^2$   
 subject to  $3x_1 + 2x_2 \leq 6$   
 $x_1, x_2 \geq 0$

6. (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



(b) Using duality solve the following L. P. P. 6

$$\begin{aligned} \text{Maximise } Z &= 5x_1 - 2x_2 + 3x_3 \\ \text{Subject to } &2x_1 + 2x_2 - x_3 \geq 2 \\ &3x_1 - 4x_2 \leq 3 \\ &x_1 + 3x_3 \leq 5 \\ &x_1, x_2, x_3 \geq 0 \end{aligned}$$

(c) (i) A random sample of 50 items gives the mean 6.2 and standard deviation 10.24, can it be regarded as drawn from a normal population with mean 5.4 at 5% level of significance? 4

(ii) Find the M.G.F. of the following distribution. 4

X :	-2	3	1
P (X = x)	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

Hence find first four central moments.

---

S.E. Sem IV (CBCS).  
(Computer & I.T.)  
COA

27/5/15

QP Code : 3546

(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. (a) What are applications of Microprogramming? 3  
(b) What is stored program concept in digital computer? 3  
(c) List the Flynn's Classification of Parallel Processing Systems. 3  
(d) Draw flowchart for Booth's Algorithm for Twos Complement Multiplication. 3  
(e) What is Associative memory? 4  
(f) Explain in brief Programmed I/O. 4
  2. (a) Explain with diagram functioning of Hardwired Control Unit. 8  
(b) Using Unsigned Binary Division method, divide 7 by 3. 6  
(c) Explain IEEE 754 standards for Floating Point number representation. 6
  3. (a) Describe what are the features of cache design? 8  
(b) What are the differences between RISC and CISC processors? 6  
(c) Explain concepts of Nano programming. 6
  4. (a) What are major requirements for an I/O module? 6  
(b) Explain in details Virtual Memory, Segmentation and Paging. 7  
(c) Explain in details Cache Coherency. 7
  5. (a) What is instruction pipelining? what are advantages of pipelining? 6  
(b) Explain DMA based data transfer technique for I/O devices. 7  
(c) Explain Microinstruction sequencing and execution. 7
  6. Write short note on:  
(a) Pipeline Hazards. 7  
(b) Scanner. 7  
(c) Interrupt driven I/O. 6
-