



Bachelor Level / Third Year/ Fifth Semester/ Science  
Computer Science and Information Technology (CSC314)  
(Design and Analysis of Algorithms)  
(NEW COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable.  
The questions are of equal marks.

### Section A

Attempt any TWO questions.

(2×10=20)

1. Explain the divide and conquer strategy for problem solving. Describe the worst-case linear time selection algorithm and analyze its complexity. (2+8)
2. Write the dynamic programming algorithm for matrix chain multiplication. Find the optimal parenthesization for the matrix chain product ABCD with size of each is given as  $A_{5 \times 10}$ ,  $B_{10 \times 15}$ ,  $C_{15 \times 20}$ ,  $D_{20 \times 30}$ . (3+7)
3. What do you mean by Backtracking? Explain the backtracking algorithm for solving 0-1 knapsack problem and find the solution for the problem given below:

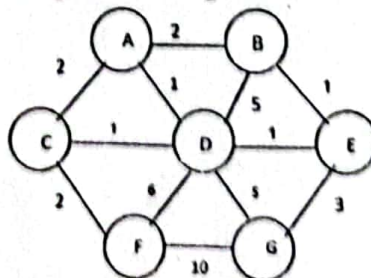
Items →	1	2	3	4	
Weight (wi) →	2	3	4	5	
Profit (Pi) →	3	5	6	10	and capacity of knapsack = 10 kg (1+4+5)

### Section B

Attempt any EIGHT questions

(8×5=40)

4. Explain the iterative algorithm to find the GCD of given two numbers and analyze its complexity (5)
5. Trace the quick sort algorithm for sorting the array  $A[] = \{15, 7, 6, 23, 18, 34, 25\}$  and write its best and worst complexity (4+1)
6. Generate the prefix code for the string "CYBER CRIME" using Huffman algorithm and find the total number of bits required. (5)
7. Solve the following recurrence relations using masters method (2.5+2.5)
  - a)  $T(n) = 2T(n/4) + kn^2$ ,  $n > 1$   
 $= 1$ ,  $n = 1$ .
  - b)  $T(n) = 5T(n/4) + kn$ ,  $n > 1$   
 $= 1$ ,  $n = 1$ .
8. Find the edit distance between the string "ARTIFICIAL" and "NATURAL" Using dynamic programming (5)
9. Find the MST from following graph using Kruskal's algorithm. (5)



10. Solve the following linear congruences using Chinese Remainder Theorem. (5)

$$x \equiv 1 \pmod{2}$$

$$x \equiv 3 \pmod{5}$$

$$x \equiv 6 \pmod{7}$$

11. Define tractable and intractable problem. Illustrate vertex cover problem with an example.

(2+3)

12. Write short notes on:

(2.5+2.5)

a) Best, Worst and average case complexity

b) Greedy Strategy

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Bachelor Level / Third Year /Fifth Semester/Science  
Computer Science and Information Technology (CSC315)  
System Analysis and Design  
(OLD COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

**Section A**

Attempt any TWO questions. (2×10=20)

1. Differentiate between black box and white box testing. Explain different stages of testing. (3+7)
2. Why do we use DFD? Draw context diagram and data flow diagrams of a retail clothing store in a mall that sells different cloths to its customers. (2 + 8)
3. Compare structured development with object-oriented development. Explain use case diagram and class diagram with suitable example. (3+3+4)

**Section B**

Attempt any EIGHT questions. (8×5=40)

4. Explain common skills of a project manager. Which skill do you think is most important? (4 + 1)
5. Describe the project identification and selection process. (5)
6. List and describe the steps in the project initiation and planning process. (5)
7. Explain Joint Application Design in brief. How is it better than traditional information gathering techniques? (3 + 2)
8. What is conceptual data modeling? Explain conceptual data modeling process. (1.5+3.5)
9. Why do we need normalization? Explain 2NF and 3NF with example. (2 + 3)
10. Compare form with report. Explain the process of designing forms and reports. (1.5+3.5)
11. Define system maintenance. Explain the process of maintaining information systems in brief. (1 + 4)
12. Write short notes on: (2×2.5=5)
  - a. CASE Tool
  - b. Baseline Project Plan



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Bachelor Level / Third Year /Fifth Semester/Science  
Computer Science and Information Technology (CSC318)  
(Web Technology)  
**(NEW COURSE)**

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

**Section A**

Attempt Any TWO questions.

[2×10=20]

1. What is the use of XML? Create a XML file with simple type and complex type elements. Write its equivalent DTD. [2+4+4]
2. Create an HTML file containing form elements textbox for username, password field and a checkbox for hobbies. Now write javascript function for the form validation. You should validate for username to be empty, password should be of length at least 5, and the check box should be checked. [10]
3. How database connection is created in PHP? Write a PHP program to create a form and insert values in to the database table. The form should contain at least two input fields. [10]

**Section B**

Attempt Any EIGHT questions.

[8×5=40]

4. Differentiate Web 1.0 from Web 2.0. [5]
5. Write a HTML script to generate following list of items; [5]
  1. Coffee
    - I. Black coffee
    - II. Green coffee
  2. Tea
    - A. Black tea
    - B. Green tea
6. Create a HTML page containing a div having id "dv1". The div should contain a canvas element. The id of canvas should be "mycanvas". The height and width of canvas should be 200 and 300. [5]
7. What are the usages of class and id selectors in CSS? Illustrate with example. [5]
8. What is word-wrap property in CSS? Write an HTML script to illustrate the word-wrap property. [1+4]
9. Describe the jQuery Animate() method. Write an html script to create a div with id "mydiv". The position of div should be set to absolute. Now show the use of animate method to the div element to right by 300px. [1+4]
10. What is XML Namespace? How it is used to avoid element name conflict in XML? Justify with an example. [1+1+3]
11. How can you define class and objects in PHP? Write a PHP script to create class and its object. [2.5+2.5]
12. How can you define array in PHP? Write a PHP function to create an array of type integer and print its elements. [2+3]

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Bachelor Level / Third Year / Fifth Semester / Science  
Computer Science and Information Technology (CSC316)  
(Cryptography)  
(NEW COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

Section A

Attempt Any TWO questions.

(2×10= 20)

1. Illustrate the concept of security policy and mechanism with an example. Differentiate between block cipher and stream cipher. Explain the process of key expansion in AES. (3+2+5)
2. Describe the properties of hash functions. Discuss how hash value is generated using SHA-1 algorithm. (4+6)
3. Show that  $Z_5$  is a field. John publishes the ElGamal public key  $(q, \alpha, Y_A) = (101, 2, 14)$ . Jane desired to send the secret message "CSIT" to John. Using the equivalence  $A=0, B=1, \dots, Z=25$ , encrypt the message using John's public key. Use a random number  $k=4$ . (5+5)

Section B

Attempt Any EIGHT questions.

(8×5 = 40)

4. Differentiate between Trojan horse and virus. Describe any two types of intruders. (2+3)
5. The message "IMOGUN" was encrypted with a Playfair cipher using keyword "GALOIS". Decrypt the message. (5)
6. How encryption is done using IDEA algorithm. (5)
7. Describe the services provided by Pretty Good Privacy protocol to secure email. (5)
8. What is the condition of for two integers,  $x$  and  $y$ , to be relatively prime? Find whether 61 is prime or not using Miller-Rabin algorithm. (1+4)
9. Define challenge response system. Why do we need Kerberos? (2+3)
10. How direct digital signature is different from arbitrated digital signature? How digital signature generation and verification is done using RSA. (2+3)
11. Which one is more secure, monoalphabetic cipher or poly alphabetic cipher? Justify. Using Rail fence cipher, encrypt the text "LEARNING AND TEACHING ARE DIFFERENT", using 3 as rails. (1+4)
12. Why do we need discrete logarithm over normal logarithm? Find out whether 3 is primitive root of 7 or not. (2+3)

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Bachelor Level / Third Year /Fifth Semester/Science  
Computer Science and Information Technology (CSC317)  
(Simulation and Modelling)  
(NEW COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

**Section A**

Attempt any TWO questions.

(2×10 = 20)

1. What is transaction in GPSS? Explain about facility in GPSS. Customers arrive at Joey's Barbershop one every  $15 \pm 3$  minutes and it takes Joey  $18 \pm 2$  minutes to cut hair of a customer. Create a GPSS model with block diagram for the Barbershop using the concept of facility and run the simulation for 9 hours.  
(2+2+6)
2. Why accuracy of analog computer is low? Explain analog computer with suitable example. Differentiate between analog and digital computer.  
(2+5+3)
3. Define and develop a Poker test for four-digit random numbers. A sequence of 1,000 random numbers, each of four digits has been generated. The analysis of the numbers reveals that in 525 numbers all four digits are different, 419 contain exactly one pair of like digits, 47 contain two pairs, 9 have three digits of a kind and 7 contain all like digits. Use Poker test to determine whether these numbers are independent. (Critical value of chi-square for  $\alpha = 0.05$  and  $N = 4$  is 9.49).  
(10)

**Section B**

Attempt any EIGHT questions.

(8×5 = 40)

4. Why Confidence interval is needed in the analysis of simulation output. How can we establish a confidence interval?  
(2+3)
5. Describe dynamic physical model in detail with the help of suitable example.  
(5)
6. Explain the Monte Carlo simulation method with example.  
(5)
7. Generate ten 3 digit random integers and corresponding random variables using Multiplicative Congruential method where  $a = 7$ , and  $X_0 = 22$ .  
(5)
8. "Building a model right" and "Building a right model". Are both statement same? Discuss the importance of V&V.  
(2+3)
9. Differentiate between discrete and continuous system.  
(5)
10. What is markov chain? Explain with example.  
(5)
11. Explain basic characteristics of Queueing System.  
(5)
12. Write short notes:  
a. Hypothesis testing  
b. Stationary Poisson Process  
(2×2.5 = 5)

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**Elective-I subjects**



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Bachelor Level / Third Year /Fifth Semester/Science  
**Computer Science and Information Technology (CSC323)**  
(Society and Ethics in Information Technology )  
**NEW COURSE**

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

**Section A**

**Attempt any TWO questions.**

(2 × 10 = 20)

1. What does code of ethics reflect? What are the causes of software failure? Explain the factors that that justify the risks in software issues. (2+4+4)
2. Explain the role of media and communication in social and cultural change. What are the reasons for resisting social change? (6 + 4)
3. Explain cyberspace in brief. Explain different techniques that can be used to secure cyberspace users. (3 + 7)

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**Section B**

**Attempt any EIGHT questions.**

(8 × 5 = 40)

4. Why are education and licensing essential to become an ethical professional? (5)
5. Define development planning. Why do we need development planning? (2 + 3)
6. What is e-governance? How can we achieve good governance through e-governance? (1.5 + 3.5)
7. What is ethical decision making? Explain framework for ethical decision making. (1.5 + 3.5)
8. Why are most copyright violations found in developing, usually; poor countries? (5)
9. Explain different health related issues of using computer technology in brief. (5)
10. Compare security with safety. Why is software safety so difficult to attain? Can it be guaranteed? (2 + 2 + 1)
11. Discuss the future of AI and its ethical implications. (5)
12. Write short notes on: (2 × 2.5 = 5)
  - a. Functional definition of ethics
  - b. Employee monitoring



Bachelor Level / Third Year / Fifth Semester / Science  
Computer Science and Information Technology (CSC319)  
(Multimedia Computing)  
(NEW COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

Candidates are required to give their answers in their own words as far as practicable.  
The figures in the margin indicate full marks.

### Section A

Attempt any TWO questions

(2 × 10 = 20)

1. What is animation? Explain the methods of controlling animation. Consider a SVGA video controller standard with resolution 1024 × 768 and color formats of 24 bits/pixel, determine the storage capacity per pixel. (1+6+3)
2. Describe the major steps of data compression. Discuss how Huffman Code tree is generated in Huffman encoding? Consider characters A, B, C, and D having probabilities 0.4, 0.3, 0.2, 0.1 respectively, now construct Huffman code tree and determine Huffman code. (4+3+3)
3. Differentiate time dependent sound concatenation from frequency dependent sound concatenation. Discuss how speech analysis is done? Consider you are performing speech analysis where incorrect recognition of individual word has 15% of probability, determine the probability of recognizing a four word sentence correctly. (4+4+2)

### Section B

Attempt any EIGHT questions

(8 × 5 = 40)

4. Describe multimedia system with properties. (5)
5. List the requirements on the networks when images are transmitted. Consider transmission of an image with resolution 600 × 800 pixels and pixel quantization of 16 bits/pixel, determine the transmission bytes through the network. (2+3)
6. Discuss about stored image formats. (5)
7. How can you define media as type, media as file and media as process in higher programming languages? (5)
8. What are Basic Multimedia Objects (BMO) and Compound Multimedia Objects (CMO)? How can you define BMO and CMO using object oriented approach? (2+3)
9. Describe tracking and motion based devices used for media preparation and composition. (5)
10. Multimedia had key role in e-learning during COVID19 period. Justify this statement with respect to application of multimedia in e-learning. (5)
11. Discuss the basic design issues in user interfaces of multimedia system. (5)
12. Why data compression is necessary in multimedia systems? How Run Length Encoding (RLE) compresses data? Given original data "AAAAACBBBBACCCCCZZZZU", what is its compressed data using RLE? (1+2+2)



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Bachelor Level / Third Year /Fifth Semester/Science  
**Computer Science and Information Technology (CSC321)**  
Image Processing  
(NEW COURSE)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours.

*Candidates are required to give their answers in their own words as far as practicable.*  
The figures in the margin indicate full marks.

### Section A

Attempt any **TWO** questions.

[2×10 = 20]

1. What is 8 – neighborhood? An image has the following histogram, stretch to the whole dynamic range using histogram equalization. [2 + 8]

Gray Level	0	1	2	3	4	5	6	7
Frequency	0	350	0	200	300	150	0	0

2. How do you detect edges using Gradient and Laplacian filters? Explain. [10]

3. Define dilation and erosion. From the following probability distribution construct the Huffman Code for each gray level. [2 + 8]

$r_k$	0	1	2	3	4	5
$P(r_k)$	0.50	0.1	0.25	0.15	0.3	0.15

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### Section B

Attempt any **EIGHT** questions.

[8 × 5 = 40]

4. What is image enhancement? Explain about Hadamard transformation with its properties. [1 + 4]
5. Using Hough Transform show that the points (1,1), (2,2) and (3,3) are collinear and find the equation of the line. [5]
6. Define chain code. How can you make chain code rotation and scaling invariant? [2 + 3]
7. Explain the different steps in digital image processing. [5]
8. Explain different types of frequency domain low pass filters with expressions. [5]
9. Describe the properties of DFT. [5]
10. Define pattern and pattern recognition system. Explain the issues with feature selection. [3 + 2]
11. What is image restoration? Discuss about any two noise models. [1 + 4]
12. How do you split and merge the region? Explain. [5]