

CBCS SCHEME

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15CS61

Sixth Semester B.E. Degree Examination, July/August 2021 Cryptography, Network Security and Cyber Law

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. What are the common cyber attacks? Explain different defense strategies to prevent cyber attacks. (06 Marks)
b. Write extended Euclidean algorithm. And find $77^{-1} \text{ Mod } 411$ using extended Euclidean algorithm. (08 Marks)
c. Distinguish between confusion and diffusion. (02 Marks)
- 2 a. Explain the construction of DES with Fiestal structure. (05 Marks)
b. Encrypt the plaintext "CRYPTOGRAPHY" using Hill cipher with key $K = \begin{bmatrix} 7 & 8 \\ 19 & 3 \end{bmatrix}$ (06 Marks)
c. Prove that $\langle \mathbb{Z}_7, +_7, *_7 \rangle$ is a field. (05 Marks)
- 3 a. Describe RSA algorithm. Perform encryption and decryption using the RSA algorithm for $p = 3, q = 11, e = 17$ and $m = 8$. (08 Marks)
b. What is a hash function? Explain the properties of hash function. (04 Marks)
c. Explain the computation of Hash based MAC (HMAC). (04 Marks)
- 4 a. Describe the computation of SHA-1 algorithm. (08 Marks)
b. Explain Diffie hellman key exchange protocol with an example. (08 Marks)
- 5 a. What is digital certificate? Explain general format of X.509 certificate. (06 Marks)
b. Explain Needham Schroeder protocol preliminary version 1. (10 Marks)
- 6 a. Describe the IP security protocols in transport mode. (08 Marks)
b. Explain SSL handshake protocol. (08 Marks)
- 7 a. What are the tasks performed by intrusion detection system? Briefly explain the different types of intrusion detection system. (08 Marks)
b. Explain 4 way handshake in 802.11i. (08 Marks)
- 8 a. What is a firewall? Explain the functions of firewall. (08 Marks)
b. Briefly explain the different technologies used for web services. (08 Marks)
- 9 a. What is Information Technology Act? Discuss its aims and objectives and scope. (08 Marks)
b. Who is a controller? Outline his functions and powers. (08 Marks)
- 10 a. Describe the duties of subscribers. (08 Marks)
b. Describe the following terms under the Information Technology Act, 2000:
i) Addressee ii) Certifying Authority iii) Secure system iv) Digital signature
v) Electronic record vi) Intermediary vii) Cyber applet tribunal viii) Information. (08 Marks)

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15CS62

Sixth Semester B.E. Degree Examination, July/August 2021 Computer Graphics & Visualization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Explain the application areas of computer graphics with examples. (09 Marks)
b. Write a note on Raster Scan Systems. (04 Marks)
c. Compare Raster Scan displays with Random Scan displays. (03 Marks)
- 2 a. Explain the importance of OpenGL libraries in terms of their functions. (03 Marks)
b. Write the DDA line drawing algorithm steps and mention list advantages and disadvantages. Use Bresenham's line drawing algorithm to draw line between points (20, 10) and (30, 18). (09 Marks)
c. Write and explain midpoint circle drawing algorithm. (04 Marks)
- 3 a. How will you classify polygons? Explain all possible methods for the classification. (10 Marks)
b. Explain scanline polygon fill algorithm with the help of a suitable example. (06 Marks)
- 4 a. Explain how it is advantageous to represent the vertices in homogeneous coordinate system? Write the composite 2D transformation matrix for computational efficiency and for rigid body transformation. (Write the 2D transformation matrix only). (06 Marks)
b. List and explain OpenGL functions for Raster methods of 2D transformations (any 4 functions). (04 Marks)
c. With a neat diagram, explain 2D viewing transformation pipeline. (06 Marks)
- 5 a. What is clipping? Why it is required? Explain Cohen-Sutherland line-clipping algorithm steps with example. (08 Marks)
b. Write a note on basic illumination models along with their corresponding OpenGL functions. (08 Marks)
- 6 a. Explain the composite transformation sequence for general 3D rotations of an object about an axis that is parallel to x-axis. Also give the specifications for the rotation axis and rotation angle. (08 Marks)
b. Explain Sutherland-Hodgman's polygon clipping algorithm with example. (06 Marks)
c. Write the expression for the transformation between CMY and RGB color space (matrix). (02 Marks)
- 7 a. List and explain different projections supported in computer graphics in detail with example. (10 Marks)
b. Explain two visible surface detection methods, back-face detection methods and Depth-Buffer method. (06 Marks)
- 8 a. Write a simple program to demonstrate 3D viewing of an object using OpenGL functions. (10 Marks)
b. Compare parallel projections and perspective projection. (06 Marks)

- 9 a. List and explain the steps involved for design of animation sequence involved in basic design approach. (08 Marks)
- b. Explain OpenGL quadric surfaces and cubic surface function. (06 Marks)
- c. Double buffer is a solution for drawing complex graphics. Justify. (02 Marks)
- 10 a. Explain two major characteristics of an input device to describe its logical behavior. Explain OpenGL functionalities provided for logical inputs. (08 Marks)
- b. Explain the major features of an interactive program. (05 Marks)
- c. Explain different input modes used in computer graphics for providing input interaction. (03 Marks)

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15CS63

Sixth Semester B.E. Degree Examination, July/August 2021 System Software and Compiler Design

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Explain SIC/XE machine architecture in detail. (10 Marks)
b. What are the various data structures used in the design of macro processor? (06 Marks)
- 2 a. Distinguish system software and application software. (04 Marks)
b. Construct the complete object code for the following assembly level program with the symbol table.
Assume: LDA = 00, TIX = 2C, LDX = 04, JLT = 38, STA = 0C, RSUB = 4C, ADD = 18.
Source program:
SUM START 4000
FIRST LDX ZERO
 LDA ZERO
LOOP ADD TABLE, X
 TIX COUNT
 JLT LOOP
 STA TOTAL
 RSUB
TABLE RESW 2000
COUNT RESW 1
ZERO WORD 0
TOTAL RESW 1
 END FIRST

c. What is ORG? (10 Marks)
(02 Marks)
- 3 a. Construct an algorithm for pass 1 of an linking loader. (10 Marks)
b. Explain dynamic linking with suitable example. (06 Marks)
- 4 a. With a neat diagram, explain how object program can be processed in linking loader and linkage editor. (10 Marks)
b. Explain MS-DOS linker in detail. (06 Marks)
- 5 a. Discuss the various phases of a compiler with neat diagram. (10 Marks)
b. Construct the transition diagram to recognize the tokens relational operators and unsigned numbers. (06 Marks)
- 6 a. Discuss the different software productivity tools. (06 Marks)
b. List the algebraic laws of regular expressions. (06 Marks)
c. Define token and lexeme with an example. (04 Marks)

- 7 a. Construct LL(1) parsing table for the grammar given below:
 $E \rightarrow E + T/T$
 $T \rightarrow id + T/id$ (10 Marks)
b. What are the advantages of LR parsers? (04 Marks)
c. Define operator grammar with an example. (02 Marks)
- 8 a. Outline an algorithm to find FIRST and FOLLOW. (06 Marks)
b. Show that the following grammar $S \rightarrow AaAb/BbBa$, $A \rightarrow \epsilon$, $B \rightarrow \epsilon$ is not SLR(1). Clearly mention the reasons. (10 Marks)
- 9 a. Construct annotated parse tree for $3 * 5 + 4n$ using top down approach. Write semantic rules for each step. (06 Marks)
b. Discuss the issues in the design of a code generator. (10 Marks)
- 10 a. Define inherited and synthesized attributes. (04 Marks)
b. What are three address codes? Explain different ways of representing three address code. (10 Marks)
c. Construct DAG for the following $a = a + 5$. (02 Marks)

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15CS64

Sixth Semester B.E. Degree Examination, July/August 2021 Operating Systems

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Explain the following:
(i) User and system view of OS
(ii) Dual mode operations of OS (08 Marks)
b. What are virtual machines? Explain virtual machines with neat diagram. Also point out its benefits. (08 Marks)
- 2 a. Explain process with state transition diagram and also explain PCB with neat diagram. (08 Marks)
b. List and explain two major models for Inter Process Communication (IPC). (08 Marks)
- 3 a. List and explain different type of multithreading models. Point out the advantages of Multithreaded Programming. (08 Marks)
b. Consider the following set of process with Burst time. Assume all the process arrive at time 0 ms.

Process	Burst time in (ms)
P1	21
P2	03
P3	06
P4	02

Draw Gantt chart and calculate the Average Waiting time and Average Turnaround time using FCFS and RR algorithm with time quantum 05 ms. (08 Marks)

- 4 a. Briefly explain about:
(i) Critical section problem
(ii) Peterson's solution (08 Marks)
b. What are semaphores? Explain Bounded Buffer Problem with semaphore. (08 Marks)
- 5 a. What is Deadlock? What are the necessary conditions that must satisfy for deadlock to occur? Explain Deadlock using RAG. (08 Marks)
b. For the following given snapshot, using Banker's algorithm. Find:
(i) Need matrix
(ii) Safe sequences of process

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

(08 Marks)

- 6 a. What is Paging? Explain Paging with neat diagram. (08 Marks)
b. Explain segmentation with neat diagram. (08 Marks)
- 7 a. Consider the following page reference string:
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
For a memory with Three (3) Frames. How many page faults will occur using LRU and FIFO page replacement algorithm? (08 Marks)
b. What is File? List and explain different attributes and operations of a File. (08 Marks)
- 8 a. List and explain different allocation methods used for a file. (08 Marks)
b. Explain different Free-space Management techniques related to disk. (08 Marks)
- 9 a. Briefly explain different disk scheduling techniques. (08 Marks)
b. What is protection? Distinguish between Mechanism and Policies. Briefly explain Access Matrix and its implementation. (08 Marks)
- 10 a. Explain the different IPC mechanism available in Linux. (08 Marks)
b. With a neat diagram, explain in detail about components of a Linux system. (08 Marks)

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15CS664

Sixth Semester B.E. Degree Examination, July/August 2021 Python Application Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1
 - a. Compare and contrast compiler and interpreter. (04 Marks)
 - b. Explain the hardware architecture of computer with a neat sketch. (06 Marks)
 - c. Write a python program to find arithmetic operations (+, -, *, / and %) of two numbers using functions by getting two numbers through key board. (06 Marks)
- 2
 - a. Explain conditional execution in python (if..., if.... else, if elifelse) with examples. (06 Marks)
 - b. Explain floor division (//), modulo division (%) and division (/) with examples. (04 Marks)
 - c. Find the greatest of three numbers (without using and operator) by getting 3 numbers through keyboards using function. (06 Marks)
- 3
 - a. Elucidate the role of secondary memory with a neat sketch. (04 Marks)
 - b. Explain the different exceptions in python and write syntaxes to handle them. (06 Marks)
 - c. Write a python program to count number of the occurrences of a word in a text file. (06 Marks)
- 4
 - a. Explain string data structure in Python for indexing the element of string (both positive and negative indexing) for the string "Hello" with different string slicing operations. (05 Marks)
 - b. Elucidate different file handling functions in python with examples. (05 Marks)
 - c. Write a Python program for handling divide by zero exception using try and except. (06 Marks)
- 5
 - a. Describe mutable and immutable objects with examples. (04 Marks)
 - b. How will you perform the following operations in the List - L = ['d', 'a', 'c', 'b']
 - To add the element 'e' in L
 - To delete the element 'c' from L
 - To join another List L1 = ['x', 'y', 'z'] with L. (06 Marks)
 - c. Discuss the lists handling functions in python with example. (06 Marks)
- 6
 - a. How to swap the values of two variables using a single statement in python. (02 Marks)
 - b. Explain search () and findall () in Regular expression with examples. (08 Marks)
 - c. Write a python program to read a list of words from a string and sort them and print in the order of longest to shortest words. (06 Marks)

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- 7 a. Define operator overloading. (02 Marks)
b. Elucidate the initialization of method with an example. (08 Marks)
c. Write an operator overloading program in python to set the values (3, 4) and (5, 7) into the point P_1 and P_2 respectively and perform $P_1 + P_2$ where + denotes addition of respective X and Y coordinates i.e $(x_1 + x_2, y_1 + y_2)$. (06 Marks)
- 8 a. Implement the concept of pure function with an example. (08 Marks)
b. Write a python program to create class Employee which has a parameterized constructor initializing name, salary and a method Display () for displaying name and salary of the employees. Invoke the constructor with the data of 'Zara' and 2000 and 'Sam' and 3000 and display them through Display () is main. (08 Marks)
- 9 a. Describe service oriented Architecture with a neat sketch. (08 Marks)
b. Write a python program to make SQLite connection with database called music.sqlite and insert two records of singer_Id and singer_name and display them on console. (08 Marks)
- 10 a. Write a python program to delete a particular record singer_Id = 100 from the database mentioned in Q9(b) and update the record singer_Id = 101 with singer_name = 'vijay'. (08 Marks)
b. Develop a world simplest web browser which makes a connection to a web server and follows rules of the HTTP protocol to request a document and display what the server sends back using python program. (08 Marks)

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15IS62

Sixth Semester B.E. Degree Examination, July/August 2021 File Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Define File Structures. Explain function seek with parameters. (05 Marks)
b. Explain sector loaded data organization in magnetic disk. (06 Marks)
c. Explain the organization of data on nine-track tape with a neat diagram. (05 Marks)
- 2 a. What is Field? Explain different methods for organizing fields of a Record with example. (10 Marks)
b. Explain the concept of inheritance using I/O buffer class hierarchy. (06 Marks)
- 3 a. What is data compression? Explain different techniques available for data compression. (12 Marks)
b. Explain how space can be reclaimed in files. Using record deletion and storage compaction technique. (04 Marks)
- 4 a. Explain operation required to maintain an indexed file. (08 Marks)
b. What are inverted lists? How does it improve the secondary index structure? (08 Marks)
- 5 a. What is consequential operation? Explain consequential match function based on a single loop. (08 Marks)
b. With example. Explain K-way merge and selection tree for merging larger number of lists. (08 Marks)
- 6 a. What is B-tree? Show the B-tree of order -4 that result from loading the following set of keys in order. Z J R O T U M W V L S K P Q N X. (10 Marks)
b. List out the properties of B-tree and explain worst case search. (06 Marks)
- 7 a. What is simple prefix B⁺ tree? Explain loading a prefix B⁺ tree. (10 Marks)
b. Explain internal structure of index set blocks a variable order B- Tree. (06 Marks)
- 8 a. Define Separator. Write a C++ function to find shortest separator. (08 Marks)
b. Explain block splitting and merging due to insertion and detection in sequence set. (08 Marks)
- 9 a. Define hashing. Explain simple hashing algorithm with example. (08 Marks)
b. Suppose that 10000 addresses are allocated to hold 8000 records in a randomly hashed file and that each address can hold one record. Compute the following values.
i) Packing density for the file
ii) Expected number of address with no record assigned to them by hash function.
iii) Expected number of address with one record assigned.
iv) Expected number of overflow records. (08 Marks)
- 10 a. Explain how extendible hashing works. (10 Marks)
b. Write a short note on Dynamic hashing. (06 Marks)

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