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15CS61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Cryptography, Network Security and Cyber Laws

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What do you mean by cyber attack? List and explain main motives of launching cyber attacks. (08 Marks)
- b. Using Extended Euclidean algorithm find the inverse of 12 modulo 79. (08 Marks)

OR

- 2 a. Design known plain text attack to obtain the key used in the Vigenere cipher. (08 Marks)
- b. Consider a Hill cipher $m = 3$ (block size = 3) with key k shown below:

$$k = \begin{pmatrix} 25 & 3 & 7 \\ 5 & 9 & 21 \\ 11 & 8 & 13 \end{pmatrix}$$

- (i) What is the cipher text corresponding to the plaintext = (VOW)?
- (ii) What is the plain text corresponding to the ciphertext = (TQX)? (08 Marks)

Module-2

- 3 a. List and explain RSA operations. (08 Marks)
- b. The modulus in a toy implementation of RSA is 143
 - (i) What is the smallest value of a valid encryption key and the corresponding decryption key?
 - (ii) For the computed encryption key and plaintext = 127, what is the corresponding ciphertext? (08 Marks)

OR

- 4 a. In what way are the properties of the cryptographic hash – the one way property and collision resistance relevant to the security provided by the MAC? Explain. (08 Marks)
- b. Consider the digital signature created using the Signer's private key operation but without the hash function i.e., $\text{sign}(m) = E_{A,pr}(m)$
Demonstrate how a forged signature may be created using this definition of a digital signature. (08 Marks)

Module-3

- 5 a. What do you mean key management? Explain the fields of an X.509 certificate. (06 Marks)
- b. List and explain PKI Architectures. (06 Marks)
- c. Define Dictionary Attacks. Explain Attack types. (04 Marks)

OR

- 6 a. Design the Needham – Schroeder protocol. (06 Marks)
- b. Define Kerberos. Explain Kerberos message sequence. (05 Marks)
- c. Explain SSL Record Layer Protocol. (05 Marks)

Module-4

- 7 a. Explain how each key in 802.11i was derived and where it is used. (06 Marks)
b. Define Firewall. List and explain main functions of a firewall. (06 Marks)
c. Classify Intrusion Detection Systems based on their functionality. (04 Marks)

OR

- 8 a. What is the role of a Bloom Filter in packet logging? (04 Marks)
b. Define SOAP. Explain SOAP messages in HTTP packets. (08 Marks)
c. Demonstrate WS-Trust relationship between entities involved in international trade. (04 Marks)

Module-5

- 9 a. List and explain IT act aim and objectives. (04 Marks)
b. Explain (i) Secure electronic record (ii) Secure digital signature (04 Marks)
c. List and explain Functions of a controller. (08 Marks)

OR

- 10 a. List and explain offences with reference to computer system. (06 Marks)
b. When network service providers not to be liable under IT Act? Explain. (04 Marks)
c. What are miscellaneous provisions of IT Act? Explain. (06 Marks)

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15CS62

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe various applications of computer graphics with appropriate examples. (08 Marks)
- b. With a neat diagram, explain the architecture of a raster display system with integrated display processor. (08 Marks)

OR

- 2 a. With necessary steps explain Bresenham's line drawing algorithm. Consider the line from (5, 5) to (13, 9), use the Bresenham's algorithm to rasterize the line. (08 Marks)
- b. Explain with diagram the different Cartesian reference frames are used in the process of constructing and displaying a scene. (08 Marks)

Module-2

- 3 a. Explain with example any two algorithms used for to identify the interior area of a polygon. (06 Marks)
- b. Explain with illustrations the basic 2-dimension geometric transformations used in computer graphics. (06 Marks)
- c. Explain the different Open GL routines used for manipulating display window. (04 Marks)

OR

- 4 a. Explain the scan line polygon filling algorithm. And also explain the use of sorted edge table and active edge list. (08 Marks)
- b. What is the need of homogeneous coordinates? Give 2-dimension homogeneous coordinate matrix for translation, rotation and scaling. (04 Marks)
- c. Obtain a matrix representation for rotation of a object about a specified pivot point in 2-dimension. (04 Marks)

Module-3

- 5 a. What is clipping? Explain with example the Sutherland-Hodgman polygon clipping algorithm. (08 Marks)
- b. Explain basic illumination models. (08 Marks)

OR

- 6 a. Explain RGB and CMY color models with examples. Explain the transformation between CMY and RGB color spaces. (08 Marks)
- b. Obtain the matrix representation for rotation of a object about an arbitrary axis. (08 Marks)

Module-4

- 7 a. Explain the 2 classifications of visible surface detection algorithm. (04 Marks)
b. Explain with example the depth buffer algorithm used for visible surface detection. And also list the advantages and disadvantages of depth buffer algorithm. (07 Marks)
c. Bring out the differences between perspective and parallel projections. (05 Marks)

OR

- 8 a. Explain the OpenGL 3-dimensional viewing functions. (06 Marks)
b. What is projection reference point? Obtain the general and special case perspective transformation equations. (06 Marks)
c. Explain Back-face detection method with example. (04 Marks)

Module-5

- 9 a. Explain the logical classifications of input devices with examples. (06 Marks)
b. Discuss request mode, sample mode and event mode with figures. (06 Marks)
c. List the various features that a good interactive program should include. (04 Marks)

OR

- 10 a. Explain how an event driven input can be performed for a keyboard and mouse device. (06 Marks)
b. List the properties of Bezier curve. And also explain Bazier techniques of generating curves. (10 Marks)

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15CS63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 System Software and Compiler Design

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the various instruction formats used in SIC/XE machine. (04 Marks)
- b. Write a SIC/XE program to copy the string "COMPUTER SCIENCE ENGINEERING" from STR1 to another string STR2. (06 Marks)
- c. List the functions of Pass-1 and Pass-2 of a two pass assembler. (06 Marks)

OR

- 2 a. Write an algorithm of the Pass-1 of a two pass assembler. (08 Marks)
- b. List the various machine independent assembler features. Explain the control-sections, how the assembler converter them into object code. (08 Marks)

Module-2

- 3 a. Define Macro. Explain how Macros are defined and expanded. (07 Marks)
- b. What are the basic functions of a loader? Explain two ways of program relocation in loaders. (09 Marks)

OR

- 4 a. Explain the functions of dynamic linking with a diagram. (08 Marks)
- b. Write a note on MS-DOS linker. (08 Marks)

Module-3

- 5 a. Explain the different phases of a compiler, with an example. (09 Marks)
- b. What is input buffering in lexical analysis? List the different methods of input buffering explain any one of them. (07 Marks)

OR

- 6 a. List and explain the reasons for separating the analysis portion of a compiler into lexical and syntax analysis phases. (06 Marks)
- b. Construct the transition diagram to recognize the tokens of
i) Identifier ii) Relational operators iii) Unsigned numbers. (06 Marks)
- c. Define Tokens, patterns, lexemes. (04 Marks)

Module-4

- 7 a. What is the role of parser? Explain the different error recovery strategies. (08 Marks)
- b. Construct the LL(1) parsing table for the following productions:
 $E \rightarrow E + T/T$; $T \rightarrow T * F/F$; $F \rightarrow (E)/id$ (08 Marks)

OR

- 8 a. Using operator-precedence parsing algorithm, construct the table and parse the input string $id + id * id$. (12 Marks)
b. Define Handle, viable prefixes. (04 Marks)

Module-5

- 9 a. Discuss S-attributed and L-attributed SDD. (06 Marks)
b. Write 3-address code syntax tree and DAG for the expression $a + a * (b - c) + (b - c) * d$. (10 Marks)

OR

- 10 a. Obtain the SDD and construct annotated parse tree for the input string $6 * 5 + 3$, for the grammar
 $S \rightarrow EN$
 $E \rightarrow E + T / T$
 $T \rightarrow T * F / F$
 $F \rightarrow (E) / \text{digit}$
 $N \rightarrow ;$ (10 Marks)
b. Discuss the issues in the design of code generator. (06 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Operating Systems

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- What is operating system? Explain multiprogramming and time sharing systems. (06 Marks)
 - Explain dual mode operating in operating system with a neat block diagram. (05 Marks)
 - What are system calls? Briefly point out its types. (05 Marks)

OR

- Explain process states with state transition diagram. Also explain PCB with a neat diagram. (06 Marks)
 - What is interprocess communication? Explain its types. (05 Marks)
 - With a neat diagram, explain the concept of virtual machines. (05 Marks)

Module-2

- For the process listed below, draw Gantt charts using pre-emptive and non-preemptive priority scheduling algorithm. A larger priority number has a higher priority. Calculate Average Weighing Time and Average turnaround time.

Jobs	Arrival Time	Burst Time	Priority
J ₁	0	6	4
J ₂	3	5	2
J ₃	3	3	6
J ₄	5	5	3

- Is CPU scheduling necessary? Discuss the five different scheduling criterias used in the computing scheduling mechanism. (06 Marks)
 - Explain multithreading models. (05 Marks)

OR

- Define semaphores. Explain its usage and implementation. (06 Marks)
 - Explain Reader-Write problem with semaphore in detail. (05 Marks)
 - What are monitors? Explain dining Philosopher's solution using monitor. (05 Marks)

Module-3

- System consists of five jobs (J₁, J₂, J₃, J₄, J₅) and three resources (R₁, R₂, R₃). Resource type R₁ has 10 instances, resource type R₂ has 5 instances and R₃ has 7 instances. The following snapshot of the system has been taken.

Jobs	Allocation			Maximum			Available		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
J ₁	0	1	0	7	5	3	3	3	2
J ₂	2	0	0	3	2	2			
J ₃	3	0	2	9	0	2			
J ₄	2	1	1	2	2	2			
J ₅	0	0	2	4	3	3			

Find need matrix and calculate the safe sequence by using Banker's algorithm. Mention the above system is safe or not safe. (06 Marks)

- b. What is dead lock? What are necessary conditions an operating system must satisfy for a dead lock to occur? (05 Marks)
- c. What is a Resource Allocation Graph (RAG)? Explain how RAG is very useful in describing deadlocks by considering your own example. (05 Marks)

OR

- 6 a. What are Translation Lookaside Buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. (06 Marks)
- b. Given the memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K apply first fit, best fit and worst fit algorithms to place 212K, 417K, 112K and 426K. (05 Marks)
- c. Describe both internal and external fragmentation problems encountered in a contiguous memory allocation scheme. (05 Marks)

Module-4

- 7 a. Consider the following page reference stream: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. How many page faults would occur for LRU and FIFO replacement algorithms assuming 3 frames? Which one of the above is most efficient? (06 Marks)
- b. Explain demand paging system. (05 Marks)
- c. What is thrashing? How can it be controlled? (05 Marks)

OR

- 8 a. Explain briefly the various operations performed on files. (06 Marks)
- b. Explain the various access methods of files. (05 Marks)
- c. Explain various allocation methods in implementing file systems. (05 Marks)

Module-5

- 9 a. Explain the various Disk Scheduling algorithms with example. (08 Marks)
- b. Explain access matrix method of system protection. (08 Marks)

OR

- 10 a. With a neat diagram explain in detail components of a Linux system. (06 Marks)
- b. Explain the different IPC mechanisms available in Linux. (05 Marks)
- c. Explain process scheduling in a Linux system. (05 Marks)

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15CS651

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Data Mining and Data Warehousing

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Data warehouse? Explain three tier architecture of data warehouse. (08 Marks)
b. Explain the schemas of multidimensional data models. (08 Marks)

OR

- 2 a. What is Data cube measure? Explain the categorization of measures. (08 Marks)
b. Explain data cube operations with examples. (08 Marks)

Module-2

- 3 a. Explain data cube computation and curse of dimensionality. (08 Marks)
b. Explain different methods of indexing OLAP data. (08 Marks)

OR

- 4 a. State and explain various data mining tasks. (08 Marks)
b. Define Similarity and dissimilarity between the objects. Find SMC and Jaccard's coefficient of two binary vectors.
 $X = (1, 0, 0, 0, 0, 0, 0, 0, 0, 0)$ $Y = (0, 0, 0, 0, 0, 0, 1, 0, 0, 1)$. (08 Marks)

Module-3

- 5 a. What is Association Analysis? Explain Association rule, Support and Confidence. (08 Marks)
b. State Apriori principle. Write apriori algorithm for frequent itemset. (08 Marks)

OR

- 6 a. Construct an FP tree for the following dataset.

TID	Items
1	{a, b}
2	{b, c, d}
3	{a, c, d, e}
4	{a, d, e}
5	{a, b, c}
6	{a, b, c, d}
7	{a}
8	{a, b, c}
9	{a, b, d}
10	{b, c, e}

- b. Explain the strategies used in frequent itemset generation. (08 Marks)

Module-4

- 7 a. Explain the general approach for solving classification problem. (08 Marks)
b. Write the algorithm for decision tree induction. (08 Marks)

OR

- 8 a. Explain the methods of comparing classifiers. (08 Marks)
b. Write the characteristics of nearest neighbor classifier. (08 Marks)

Module-5

- 9 a. Explain the requirements of cluster analysis. (08 Marks)
b. State and explain K – means algorithm. (08 Marks)

OR

- 10 a. Write DBSCAN clustering algorithm and estimate time and space complexity. (08 Marks)
b. State and explain the issues in cluster evaluation. (08 Marks)

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15CS653

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020

Operations Research

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define operations research. Explain the six major phases of operations research. (08 Marks)
b. Solve the Linear programming problem graphically.

$$Z_{\max} = 20x_1 + 24x_2$$

$$\text{Subject to : } 2x_1 + 3x_2 \leq 1500$$

$$3x_1 + 2x_2 \leq 1500$$

$$x_2 \leq 450 \text{ and}$$

$$x_1, x_2 \geq 0$$

(08 Marks)

- 2 a. Old hens can be bought at Rs.50 –each but young ones cost Rs.100 each. The old hens lay 3 eggs/week and young hens 5 eggs/week. Each egg costs Rs.2. A hen costs Rs. 5 per week to feed. If a person has only Rs. 2000 to spend for hens, formulate the problem to decide how many of each kind of hen should he buy? Assume that he cannot house more than 40 hens. (08 Marks)

- b. With reference to Linear Programming Problem (L.P) define the following :

i) Feasible solution ii) Unbounded solution iii) Optimal solution iv) Feasible region.

(08 Marks)

Module-2

- 3 a. Use simplex method to solve the following LPP (Linear Programming Problem).

$$\text{Max } z = 3x_1 + 9x_2$$

$$\text{Subject to } x_1 + 4x_2 \leq 8$$

$$x_1 + 2x_2 \leq 4 \text{ and}$$

$$x_1, x_2 \geq 0.$$

(08 Marks)

- b. Solve using penalty method (Big-M)

$$\text{Max } Z = 3x_1 - x_2$$

$$\text{Subject to : } 2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4 \text{ and}$$

$$x_1, x_2 \geq 0.$$

(08 Marks)

OR

- 4 a. Obtain all the basic solutions for the system of linear equations :

$$2x_1 + x_2 + 4x_3 = 11$$

$$3x_1 + x_2 + 5x_3 = 14.$$

(06 Marks)

- b. Use two phase simplex method to solve the following LPP.

$$\text{Max } z = 5x_1 - 4x_2 + 3x_3$$

$$\text{Subject to } 2x_1 + x_2 + 6x_3 = 20$$

$$6x_1 + 5x_2 + 10x_3 \leq 76$$

$$8x_1 - 3x_2 + 6x_3 \leq 50 \text{ and}$$

$$x_1, x_2, x_3 \geq 0.$$

(10 Marks)

Module-3

- 5 a. Write the dual of the following primal LPP.

$$\begin{aligned} \text{Max } z &= 3x_1 - x_2 + x_3 \\ \text{Subject to : } &4x_1 - x_2 \leq 8 \\ &8x_1 + x_2 + 3x_3 \geq 12 \\ &5x_1 - 6x_3 \leq 13 \\ &x_1, x_2, x_3 \geq 0. \end{aligned}$$

(08 Marks)

- b. Use dual Simplex method to solve the following LPP :

$$\begin{aligned} \text{Max } z &= -3x_1 - x_2 \\ \text{Subject to : } &x_1 + x_2 \geq 1 \\ &2x_1 + 3x_2 \geq 2 \\ &x_1, x_2 \geq 0. \end{aligned}$$

(08 Marks)

OR

- 6 a. List out the procedural steps used to solve a LPP using dual simplex method. (08 Marks)
- b. Explain briefly the essence of duality theory with an example. (08 Marks)

Module-4

- 7 a. Determine an initial basic feasible solution to the following transportation problem using North West Corner's rule. (05 Marks)

O/D	D ₁	D ₂	D ₃	D ₄	Supply
01	6	4	1	5	14
02	8	9	2	7	16
03	4	3	6	2	5
Required	6	10	15	4	35

- b. Four jobs are to be done on four different machines. The cost [in rupees] of producing
- i^{th}
- job on
- j^{th}
- machine is given below

		Machine			
		M ₁	M ₂	M ₃	M ₄
Jobs	J ₁	15	11	13	15
	J ₂	17	12	12	13
	J ₃	14	15	10	14
	J ₄	16	13	11	17

Assign the jobs to different machine so as to minimize the total cost. (06 Marks)

- c. Find an initial basic feasible solution for the following transportation problem using least cost or matrix minima method :

19	30	50	10	7
70	30	40	60	9
40	80	70	20	18
5	8	7	14	

(05 Marks)

OR

- 8 a. Determine the optimum basic feasible solution for the following transportation problem. Obtain initial basic feasible by vogels approximation method. (08 Marks)

O/D	D ₁	D ₂	D ₃	D ₄	Supply
01	2	2	2	1	3
02	10	8	5	4	7
03	7	6	6	8	5
Demand	04	3	4	4	

- b. Solve the following assignment problem. If it is treated as a salesman problem and the cell entries represent cost in rupees. Find the least cost route such that salesman does not visit any city twice.

	A	B	C	D	E
A	∞	2	5	7	1
B	6	∞	3	8	2
C	8	7	∞	4	7
D	12	4	6	∞	5
E	1	3	2	8	∞

(08 Marks)

Module-5

- 9 a. Solve the game using principle of dominance method whose payoff matrix to the player – A is given in the table. (08 Marks)

		Player – B		
		I	II	III
Player – A	I	1	7	2
	II	6	2	7
	III	5	2	6

- b. Give a note on basic simulated annealing algorithm and basic genetic algorithm. (08 Marks)

- 10 a. Solve the following game graphically. (08 Marks)

		Player-B		
		B ₁	B ₂	B ₃
Player-A	A ₁	2	6	22
	A ₂	16	10	4

- b. Explain briefly the nature of metaheuristics. (05 Marks)
 c. Find the value of the game.

		P ₂	
		I	II
P ₁	I	-4	6
	II	2	-3

(03 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Python Application Programming

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the salient features of python. (05 Marks)
- b. Write a python program to calculate the area of square, rectangle and circle. Print the results. Take input from user. (05 Marks)
- c. What are user defined functions? How can we pass parameters in user defined functions? Explain with suitable example. (06 Marks)

OR

- 2 a. Explain the concept of conditional execution alternate execution and chained conditions with suitable examples. (06 Marks)
- b. Write a python program to create a user defined function to find maximum and minimum letter in string. Also find the length the string without using inbuilt function. (05 Marks)
- c. Explain the concept of type conversion functions and math functions in python with examples. (05 Marks)

Module-2

- 3 a. Explain the working of while loop in python with suitable example. (05 Marks)
- b. Write a python program to demonstrate counting, summing and average of elements using loops. (05 Marks)
- c. What is a string? Write a python program to demonstrate traversal through a string with a loop. Also explain the concept of string slicing. (06 Marks)

OR

- 4 a. With syntax and example code, explain the working of definite loop in python. (05 Marks)
- b. Write a python program to concatenate and compare two strings. Read the strings from user. (05 Marks)
- c. Explain fileopen, fileclose, fileread and filewrite concepts in python with example. (06 Marks)

Module-3

- 5 a. What is a list? Explain the concept of list slicing and list traversing with example. (05 Marks)
- b. Explain the concept of comparing tuples. Describe the working of sort function with python code. (06 Marks)
- c. Write a python program to search for lines that start with 'F' followed by 2 characters, followed by 'm:'. (05 Marks)

OR

- 6 a. What is dictionary? How is it different from list? Write a python program to count occurrence of characters in a string and print the count. (06 Marks)
- b. With an example program, illustrate how to pass function arguments to list. (05 Marks)
- c. Write a python program to search lines that start with 'X' followed by any non whitespace characters, followed by ':' ending with number. Display the sum of all these number. (05 Marks)

Module-4

- 7 a. Define class and object? What are programmer defined types? Explain with example. (05 Marks)
- b. Illustrate the concept of pure function with python code. (05 Marks)
- c. What is the difference between method and function? Explain the working of init method with suitable code. (06 Marks)

OR

- 8 a. Define attribute? With the help of python code, explain how functions return instance values. (06 Marks)
- b. Explain the concept of modifier with python code. (05 Marks)
- c. What is type based dispatch? Illustrate with python example. (05 Marks)

Module-5

- 9 a. Define socket? Writ a python program that makes a connection to a webserver and follows the rules of HTTP protocol to request a plain test document and display what server sends back. (06 Marks)
- b. What is XML? How is it used is python? Explain parsing of XML with example. (05 Marks)
- c. Define cursor? Explain connect, execute and close command of databases with suitable example. (05 Marks)

OR

- 10 a. Write a python code to read the file from web using urelib and retrieve the data of the file. Also compute the frequency of each word in the file. (06 Marks)
- b. What is JSON? Illustrate the concept of parsing JSON python code. (05 Marks)
- c. Explain the concept of using JOIN to retrieve data in python. (05 Marks)
