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18CS61

Sixth Semester B.E. Degree Examination, July/August 2022
System Software and Compilers

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1   a. Explain in detail SIC/XE Machine Architecture. **(10 Marks)**
    b. List the various machine independent assembler features. Explain the control sections how the assembler convert them into object code. **(10 Marks)**

OR

2   a. Write an algorithm for One Pass Assembler and give sample object program from One Pass Assembler. **(10 Marks)**
    b. What are the basic functions of loader? Explain two ways of program relocation in loaders. **(10 Marks)**

Module-2

3   a. Explain various phases of Compiler. Show the translations for an Assignment statement.
       Position = Initial + rate * 60.
       Clearly indicate the output of each phase. **(12 Marks)**
    b. What are the applications of Compiler? Explain. **(08 Marks)**

OR

4   a. Write a brief note on Language Processing System. **(06 Marks)**
    b. Explain the concept of input buffering in the Lexical analysis with its implementation. **(10 Marks)**
    c. Define Token , Lexeme and Pattern with example. **(04 Marks)**

Module-3

5   a. Define Context Free Grammar. Obtain CFG to generate strings of a's and b's having substring "ab". **(10 Marks)**
    b. Consider grammar given below from which any arithmetic expressions can be obtained.
       $E \rightarrow E + E$ $E \rightarrow E - E$ $E \rightarrow E * E$ $E \rightarrow E | E$ $E \rightarrow id$
       Show that the grammar is ambigious for the sentence id + id * id. **(10 Marks)**

OR

6   a. Write an algorithm to eliminate left recursion from a grammar. Eliminate left recursion from the given grammar. $S \rightarrow Aa | b$ $A \rightarrow Ac | Sd | \varepsilon$. **(10 Marks)**
    b. Define Shift – Reduce Parser and Handle. What are conflicts in shift – reduce parse, explain with example. **(06 Marks)**
    c. List and explain different actions of shift – reducer parser **(04 Marks)**

Module-4

7   a. Explain the three basic section of LEX program with example. **(10 Marks)**
    b. Write LEX program to count word, character and line count in a given file. **(10 Marks)**

OR

8   a.   What is YACC? Explain the different sections used in writing the YACC specification. Explain with example program. **(10 Marks)**

   b.   Define Regular Expression. What is the use of following Meta characters :
       i) .   ii) *   iii) ∧   iv) $ v) { }   vi) ?   **(07 Marks)**

   c.   Discuss how Lexes and Parser communicate. **(03 Marks)**

Module-5

9   a.   Define S – Attribute and I – Attribute with respect to SDD and construct Syntax tree, Parse tree and annotated tree for string 5 *6 + 7 by using given grammar.

   S → En   T → T | F
   E → E + T | E – T | T   T → F
   T → T * F   F → (E) | digit |
                                   n → ;   **(10 Marks)**

   b.   What are the different three address code instructions? Translate the arithmetic expression a + b – (-c) into quadruples , triplets and indirect triples. **(10 Marks)**

OR

10 a.   Define SDD. Give SDD for simple type declaration. Construct a dependency graph for the declaration   int a, b ; **(10 Marks)**

   b.   Explain the issues in design of code generation. **(10 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **18CS62**

Sixth Semester B.E. Degree Examination, July/August 2022
Computer Graphics and Visualization

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Explain Refresh Cathode ray tube with neat diagram. (10 Marks)
    b. What is Computer Graphics? Explain the application of Computer Graphics. (10 Marks)

OR

2 a. With a neat diagram, explain the architecture of a raster display system with integrated display processor. (10 Marks)
    b. Explain Bresenham's Line drawing algorithm, with an example. (10 Marks)

Module-2

3 a. What is the need of Homogeneous Coordinate System? Explain Translation , Rotation and Scaling in 2D Homogeneous Coordinate System, with matrix representation. (10 Marks)
    b. Explain with example any two algorithms used to identify interior and exterior area of a polygon. (05 Marks)
    c. Explain two dimensional viewing transformation pipe line. (05 Marks)

OR

4 a. Explain Scan Line polygon fill algorithm. (10 Marks)
    b. Explain different OpenGL routines used for manipulating display window. (05 Marks)
    c. Explain OpenGL 2D – viewing function. (05 Marks)

Module-3

5 a. What is Clipping? Explain Cohen – Sutherland Line Clipping algorithm, with suitable example. (10 Marks)
    b. Explain Basic Illumination Model and explain Phong's Lighting model. (10 Marks)

OR

6 a. Explain Sutherland – Hodgman Polygon Clipping algorithm .Find the final clipping polygon for the following Fig. Q6(a). (10 Marks)
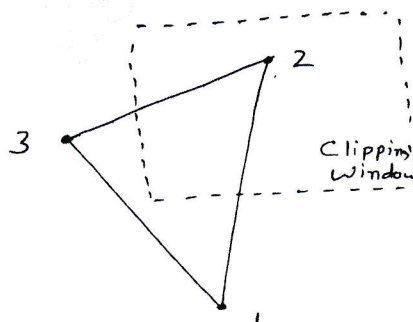
Fig. Q6(a)

    b. Write an OpenGL program to rotate a cube in all directions. (10 Marks)

Module-4

7 a. Explain with example, Depth buffer algorithm used for visible surface detection. Discuss the advantages and disadvantages. (10 Marks)

b. Explain 3D viewing pipeline with neat diagram and transformation from World to viewing coordinates. (10 Marks)

OR

8 a. Explain Orthogonal Projection in details. (10 Marks)

b. Explain Perspective Projection with reference point and vanishing point with neat diagram. (05 Marks)

c. Explain Symmetric Perspective – Projection Frustum. (05 Marks)

Module-5

9 a. What are the different Logical input devices and explain with an example. (10 Marks)

b. Discuss the various input modes with diagram. (05 Marks)

c. Explain the creation of display list with an example. (05 Marks)

OR

10 a. List the properties of Bezier curve and also explain Beizer techniques of generating curves. (10 Marks)

b. Describe the various features that a good interactive program should incorporate. (05 Marks)

c. Explain how menus in OpenGL are created. (05 Marks)

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18CS63

Sixth Semester B.E. Degree Examination, July/August 2022
Web Technology and its Applications

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. What is HTML? Explain the structure of HTML document with an example. **(08 Marks)**
   b. What are contextual selectors? Identify and explain 4 different contextual selectors. **(08 Marks)**
   c. Write the syntax of below mentioned HTML elements and briefly explain with examples.:
      (i)   `<a>`   (ii)   `<img>` **(04 Marks)**

OR

2 a. Illustrate the CSS box model. Be sure to label and briefly explain each component of the box. **(08 Marks)**
   b. List the HTML5 semantic elements and explain any three with suitable examples. **(08 Marks)**
   c. Describe the embedded style sheet with example. **(04 Marks)**

Module-2

3 a. Write HTML code for the following table with appropriate styling:

Year : 2021							
Month	Days		Dates				
	Name	Id					
March	Mon	1	1	8	15	22	29
	Tue	2	2	9	16	23	30
	Wed	3	3	10	17	24	31
	Thu	4	4	11	18	25	
	Fri	5	5	12	19	26	
	Sat	6	6	13	20	27	
	Sun	7	7	14	21	28	

(08 Marks)

   b. What is responsive design? Explain in brief the four key components that make a responsive design work. **(08 Marks)**
   c. Illustrate and briefly explain the use of number and range HTML5 controls. **(04 Marks)**

OR

4 a. Illustrate the construction of multi column layouts with example. **(08 Marks)**
   b. Explain the different types of buttons defined in HTML. **(08 Marks)**
   c. How the block level and inline elements are displayed in the normal flow? **(04 Marks)**

Module-3

5 a. Write Javascript code that uses function for the following problems:
      (i)   For the string input the output should be to display the position of left most vowel.
      (ii) For the numeric input output should be to display the reverse of a number. **(08 Marks)**
   b. Explain the two approaches to embed PHP script in HTML with suitable and compare the two approaches. **(08 Marks)**
   c. What is DOM? Briefly explain the different types of nodes. **(04 Marks)**

OR

6 a. Explain the PHP module in Apache and describe the difference between multi-threaded and multi-process setup. **(08 Marks)**

   b. Discuss the different ways the javascript can be included in HTML page and which is the most preferred way and why? **(08 Marks)**

   c. List the Web Server's responsibilities. **(04 Marks)**

Module-4

7 a. What are super globals? List the different super globals and briefly explain any two. **(08 Marks)**

   b. Explain the support of object oriented design in PHP. **(08 Marks)**

   c. Write a PHP code that checks for valid MIME types and file extensions. **(04 Marks)**

OR

8 a. Write a PHP program to create a class called "Artist" with suitable constructor. All it's data members are accessible only inside the class.
       Data members : first name, last name, birth city, birth date
       Data functions : getters and setters
       Using above class instantiate two objects and displays the artist details. **(08 Marks)**

   b. Explain the two techniques provided in PHP for reading/writing files and also list comparative advantages and disadvantages. **(08 Marks)**

   c. What is a visibility of a class member? Briefly explain the different levels of visibility. **(04 Marks)**

Module-5

9 a. What is session state? How does session state works with suitable example. **(08 Marks)**

   b. Demonstrate the manipulation of attributes, properties and styles of the element using jQuery with suitable examples. **(08 Marks)**

   c. What is JASON? Explain with the code example, how to convert string to JASON and vice versa. **(04 Marks)**

OR

10 a. What is AJAX? Using an UML diagram, explain how the asynchronous request is handled. **(08 Marks)**

    b. Explain the loading and processing of an XML document in javascript with suitable example. **(08 Marks)**

    c. Using functions, emulate a class with data members and member functions in javascript. **(04 Marks)**

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USN | | | | | | | | | | **18CS645**

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data may be suitably assumed.

Module-1

1 a. What is simulation? Explain with flowchart the steps involved in simulation study. **(08 Marks)**
   b. A grocery store has one checkout counter. Customers arrive at this checkout counter at random from 1 to 8 min apart and each interval time has the same probability of occurrence. The service times vary from 1 to 6 minutes with probability given below:

Service (minutes)	1	2	3	4	5	6
Probability	0.10	0.20	0.30	0.25	0.10	0.05

   Simulate the arrival of 6 customers and calculate:
   (i)   Average waiting time for a customer
   (ii) Probability that a customer has to wait
   (iii) Probability of a server being idle
   (iv) Average service time
   Use time between arrival and the following sequence of random numbers:

Random digits for arrival		913	727	015	948	309	922	753	235	302
Random digit for service time	84	10	74	53	17	79	91	67	89	38

   Assume that the first customer arrives at time 0. Depict the simulation in a tabular form.
   (12 Marks)

OR

2 a. Define: (i) Discrete system   (ii) Continuous system   (iii) Stochastic system
             (iv) Deterministic system   (v) Entity   **(10 Marks)**
   b. Consider the grocery store with one checkout counter. Prepare the simulation table for eight customers and find out average waiting time of customer in queue, idle time of server and average service time. The Inter Arrival Time (IAT) and Service Time (ST) are given in minutes.
   IAT   : 3, 2, 6, 4, 4, 5, 8
   ST (min) : 3, 5, 5, 8, 4, 6, 2, 3
   Assume first customer arrives at time t = 0.   **(10 Marks)**

Module-2

3 a. Explain any two discrete distributions and give equations for probability mass function. Also calculate mean and variables of same.   **(10 Marks)**
   b. Hurricane hitting east cost of India follows Poisson with a mean of 0.8 per year. Determine:
   (i)   The probability of more than two hurricanes in one year.
   (ii) The probability of exactly one hurricane in one year.
   (iii) The probability of hurricane not hitting in a year.   **(10 Marks)**

OR

4 a. Explain any two long run measures of performance of queuing systems.   **(08 Marks)**
   b. Explain Kendall's notation for parallel server queuing system A/B/C/N/K and also interpret meaning of M/M/2/∞/∞.   **(07 Marks)**
   c. List different queuing notations.   **(05 Marks)**

Module-3

5   a. What are the properties of random numbers? **(04 Marks)**
    b. Use linear congruential method to generate a sequence of 5 random numbers with $X_0 = 27$, $C = 43$, $a = 17$, $m = 100$. **(07 Marks)**
    c. Based on runs up and runs down, determine whether the following sequence of 40 numbers is such that the hypothesis of independence can be rejected where $a = 0.05$, $z_{0.025} = 1.96$.

0.41	0.68	0.89	0.94	0.74	0.91	0.55	0.62	0.36	0.27
0.19	0.72	0.75	0.08	0.54	0.02	0.01	0.36	0.16	0.28
0.18	0.01	0.95	0.69	0.18	0.47	0.23	0.32	0.82	0.53
0.31	0.42	0.73	0.04	0.83	0.45	0.13	0.57	0.63	0.29

(09 Marks)

OR

6   a. Explain the two different techniques used for generating random numbers with examples. **(07 Marks)**
    b. Using suitable frequency test find out whether the random numbers generated are uniformly distributed on the interval [0, 1] can be rejected. Assume $\alpha = 0.05$ and $D_\alpha = 0.565$. The random numbers are 0.54, 0.73, 0.98, 0.11, 0.68. **(07 Marks)**
    c. Develop a random variate generator for X with pdf given below:
    $F(X) = X$ $0 < X < 1$
         $= 2 - X$ $1 < X < 2$
         $= 0$ otherwise **(06 Marks)**

Module-4

7   a. List out the steps involved in the development of model of input data. **(04 Marks)**
    b. Explain with an example, importance of data distribution using histogram. **(08 Marks)**
    c. Records pertaining to the monthly number of job-related injuries at an underground coal mine were being studied by a federal agency. The values for the past 100 months were as follows:

Injuries/month	0	1	2	3	4	5	6
Frequency of occurrences	35	40	13	6	4	1	1

   (i) Apply Chi-square test to these data to test the hypothesis that the underlying distribution and Poisson. Use $\alpha = 0.05$.
   (ii) Apply Chi-square test for Poisson distribution, with mean = 1.0 and $\alpha = 0.05$. **(08 Marks)**

OR

8   a. Differentiate between terminating and steady state simulation with respect to output analysis with an example. **(06 Marks)**
    b. Explain output analysis for terminating simulation. **(07 Marks)**
    c. Explain the confidence interval simulation method. **(07 Marks)**

Module-5

9   a. What do you mean by a verification and validation of simulation models? **(05 Marks)**
    b. Explain with a neat diagram, model building, verification and validation process. **(10 Marks)**
    c. Write short notes on: (i) Optimization via simulation (ii) CPU simulation **(05 Marks)**

OR

10 a. Describe with a neat diagram, iterative process of calibrating a model. Which are the three steps that aid in the validation process? **(12 Marks)**
    b. Explain any two output analysis for steady state simulation. **(08 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **18CS652**

Sixth Semester B.E. Degree Examination, July/August 2022
Introduction to Data Structures and Algorithms

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a.   Explain the basic structure of a C program with example.   **(10 Marks)**
    b.   What are basic data types available in C? Write the significance of each data.   **(06 Marks)**
    c.   Write a C program that computes the size of int, float, double and char.   **(04 Marks)**

OR

2   a.   What are Arrays? Explain the declaration and initialization of one dimensional and two dimensional array with an example.   **(10 Marks)**
    b.   What are structures? Explain the C syntax of structure declaration with example.   **(06 Marks)**
    c.   What is a pointer? Explain how the pointer variable declared and initialized.   **(04 Marks)**

Module-2

3   a.   What is an algorithm? Write its criteria and characteristics.   **(10 Marks)**
    b.   What are the various basic asymptotic efficiency classes? Explain Big O, Ω omega and θ theta notation.   **(10 Marks)**

OR

4   a.   Write a non-recursive algorithm to find maximum of element in a set of values.   **(05 Marks)**
    b.   What are the general plans for analyzing the time efficiency of non recursive algorithm?
                                                                                             (05 Marks)
    c.   Explain the different types of data structure with example.   **(10 Marks)**

Module-3

5   a.   What is a Linked List? Explain the different types of Linked List with neat diagram.
                                                                                             (07 Marks)
    b.   What is a doubly linked list? Write a C program to perform the following operations on doubly linked list: (i) Insert node at beginning   (ii) Delete node at beginning   **(08 Marks)**
    c.   Write a C function to count number of element present in a singly linked list.   **(05 Marks)**

OR

6   a.   Define a stack. List the operation on stack and write a C implementation of those functions.
                                                                                             (10 Marks)
    b.   List out the application of stack and convert the following in fix expression :
         $A + B * C - D / E * H$ into its equivalent postfix.   **(05 Marks)**
    c.   What is the output of given post fix expression $6523 + 8 * + 3 + *$ **(05 Marks)**

Module-4

7   a.   What is a queue? Explain primitive operation on queue.   **(05 Marks)**
    b.   Write a C function to insert, delete and display an element in a linear queue.   **(10 Marks)**
    c.   What is double ended queue? Explain the operation that can be performed on queue.
                                                                                             (05 Marks)

OR

8 a. What is binary tree? Explain the following with suitable diagram:
   (i)   Strictly binary tree
   (ii) Complete binary tree
   (iii) Almost complete binary tree   **(10 Marks)**
   b. Write the algorithm for pre-order, post order and in order, find the three order traversals of the following binary tree. [Refer Fig.Q8(b)]
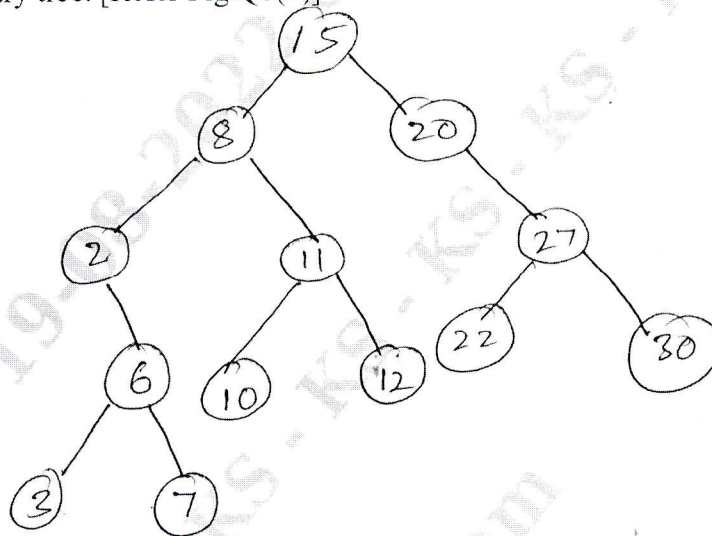

Fig.Q8(b)   **(10 Marks)**

Module-5

9 a. Design a bubble sort algorithm with suitable example and find its time complexity. **(10 Marks)**
   b. Design a selection sort algorithm with suitable example, and find its time complexity. **(10 Marks)**

OR

10 a. Design a binary search algorithm with suitable example and find its best case worst case time complexity.   **(10 Marks)**
   b. What is hashing? Explain any one hash collision resolution technique. **(05 Marks)**
   c. Write a short note on Graph Representation.   **(05 Marks)**

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USN [| | | | | | | | |]   **18CS654**

Sixth Semester B.E. Degree Examination, July/August 2022
Introduction to Operating System

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Define an Operating System. Explain the role of an operating system from different viewpoints. **(06 Marks)**
   b. What are the eight major activities of an operating system with regard to process management, memory and mass storage management? **(08 Marks)**
   c. Describe the services provided by an operating system which are helpful to the user. **(06 Marks)**

OR

2 a. Explain Dual-mode operation with a neat diagram. **(04 Marks)**
   b. Define simple, layered and micro kernels approach for structuring the operating system along with relevant diagrams. **(12 Marks)**
   c. Explain the "graceful degradation" and "fault tolerant" in a multiprocessor systems. **(04 Marks)**

Module-2

3 a. What is a process? Describe the different states of a process with a neat diagram. **(06 Marks)**
   b. Briefly explain co-operating processes and mechanisms of IPC using shared memory and message passing with relevant diagrams. **(12 Marks)**
   c. Explain the need for context switching between processes. **(02 Marks)**

OR

4 a. What is a thread? Explain the different multi threading models. **(06 Marks)**
   b. What information is kept in process control block? Explain with a neat diagram. **(08 Marks)**
   c. Demonstrate the operations of process creation and process termination. **(06 Marks)**

Module-3

5 a. Describe the scheduling criteria that must be kept in mind while choosing different scheduling algorithms. **(06 Marks)**
   b. Give the differences between short-term, medium-term and long-term scheduling. **(06 Marks)**
   c. Briefly describe the FCFS and SJF scheduling algorithms with examples. **(08 Marks)**

OR

6 a. Consider the following set of processes, with the length of the cpu burst given in milliseconds.

Process	Burst time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5 all at time 0. Draw 4 Gantt charts that illustrates the execution of these processes using the following scheduling algorithms: FCFS, SJF non preemptive priority (smaller priority number implies a higher priority) and RR (quantum = 1). What is the average turnaround time and waiting time for each of these scheduling algorithms? **(14 Marks)**

b. Differentiate the following with examples:
   i)   Preemptive and non-preemptive scheduling.
   ii)   I/O bound and cpu bound
   iii) Scheduler and dispatcher.
                                                                    (06 Marks)

Module-4

7 a. Define dead lock. Write a note on 4 necessary conditions that arise dead locks.   (06 Marks)

    b. Assume that there are 5 processes P_0 through P_4 and 4 types of resources. At time T_0 we have the following state.

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

       Apply Bankers algorithm to answer the following:
       i)   What is the content of need matrix?
       ii)   Is the system in a safe state?
       iii) If a request from a process $P_1(0, 4, 2, 0)$ arrives, can it be granted?   (08 Marks)

    c. Write a note on "safe state".   (06 Marks)

OR

8 a. Write short notes on:
       i)   External and Internal fragmentation.
       ii)   Dynamic loading and linking.   (06 Marks)

    b. Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212K, 417K, 112K and 426K (in order) which algorithm makes the most efficient use of memory.   (06 Marks)

    c. Explain with the help of supporting hardware diagram. How the TLB improves the performance of a demand paging system.   (08 Marks)

Module-5

9 a. Explain virtual memory and its advantages.   (06 Marks)

    b. What is the procedure for handling page fault with a neat block diagram?   (08 Marks)

    c. Write a note on copy-on-write.   (06 Marks)

OR

10 a. What are the typical attributes of a file?   (06 Marks)

    b. Define operations that can be performed on files.   (06 Marks)

    c. Explain various access methods of files.   (08 Marks)

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