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18CS61

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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.   Define System Software. Distinguish between system software and application software.
(06 Marks)
    b.   Explain SIC/XE architecture **(08 Marks)**
    c.   Write an algorithm for pass 2 assembler of SIC assembler.   **(06 Marks)**

OR

2   a.   Explain the data structure and pass 1 algorithm of SIC assembler.   **(08 Marks)**
    b.   List all assembler independent and dependent features and explain program relocation.
(06 Marks)
    c.   What is loader? What are the basic functions the loader has to perform?   **(06 Marks)**

Module-2

3   a.   What is compiler? Explain various phases of compiler with the help of neat diagram.
(10 Marks)
    b.   Explain the concept of input buffering with sentinels in the lexical analysis.   **(06 Marks)**
    c.   List the formal definitions of operations on languages with notations.   **(04 Marks)**

OR

4   a.   Write the regular definition using extended regular expression notation and also draw the transition diagram to recognize the following tokens:
(i) Identifier   (ii) Unsigned   **(10 Marks)**
    b.   Explain three types of software productivity tools.   **(05 Marks)**
    c.   Enlist algebraic laws for regular expressions.   **(05 Marks)**

Module-3

5   a.   Define left-recursion grammar, also write an algorithm to eliminate left recursion from a grammar.   **(05 Marks)**
    b.   How to verify whether grammar is LL(1) or not? Show that :
$S \rightarrow AaAb \mid BbBa$
$A \rightarrow E$
$B \rightarrow E$
is LL(1), without constructing any table.   **(10 Marks)**
    c.   For the grammar $A \rightarrow (A) \mid a$, construct LR(0) set of items   **(05 Marks)**

OR

6 a. Explain the working of shift reduce parser. Parse the input string id * id using the grammar.
$$E \rightarrow E + T \mid T$$
$$T \rightarrow T * F \mid F$$
$$F \rightarrow (E) \mid id$$
(08 Marks)

   b. With a diagram, explain the model of an LR parser. **(04 Marks)**

   c. For the given grammar $E \rightarrow E + n/n$ construct parsing table of LL(1). Verify 3+4+7 and show each step of verification with reference to parsing table. **(08 Marks)**

Module-4

7 a. Explain the structure of LEX program, with an example. **(06 Marks)**

   b. Write a LEX program for the tokens given below:

Lexemes	Token Name	Attribute value
Any WS	-	-
if	if	-
then	then	-
else	else	-
Any id	id	Ptr to table entry
Any number	number	Ptr to table entry
<	relop	LT
<=	relop	LE
=	relop	EQ
< >	relop	NE
>	relop	GT
>=	relop	GE

(10 Marks)

   c. Write a LEX program to count the number of vowels and consonants in a given input string. **(04 Marks)**

OR

8 a. List and explain with an example the different wildcard characters used in LEX. **(08 Marks)**

   b. Write a YACC program to evaluate the arithmetic expression. **(06 Marks)**

   c. Explain the structure of YACC program. **(06 Marks)**

Module-5

9 a. Write annotated parse tree for $3 * 5 + 4n$ using top down approach. Write semantic rules for each step. **(10 Marks)**

   b. Define (i) Synthesized attribute   (ii) Inherited attribute. **(06 Marks)**

   c. Explain the concept of syntax directed definition. **(04 Marks)**

OR

10 a. Construct DAG and three address code for the following expression:
$$a + a * (b - c) + (b - c) * d$$
(04 Marks)

   b. Explain the following with an example:
   i) quadruples   ii) triples **(08 Marks)**

   c. Discuss the various issues in the design of a code generator. **(08 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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.   What is DDA? With the help of a suitable example demonstrate the working principle of Bresenham's Line drawing algorithm for different slopes of a line.   **(10 Marks)**
    b.   With a neat diagram, explain the basic design and operation of Cathode Ray tube.   **(10 Marks)**

OR

2   a.   Explain with diagram the different Cartesian reference frames are used in the process of constructing and displaying a scene.   **(10 Marks)**
    b.   With a neat diagram, explain the architecture of a raster display system with integrated display processor.   **(10 Marks)**

Module-2

3   a.   Give the reason to convert transformation matrix to homogeneous co-ordinate representation and show the process of conversion. Shear the polygon A(2, 2), B(4, 2), C(4, 4), D(3, 5), E(2, 4) along X-axis with a shearing factor of 0.2   **(10 Marks)**
    b.   Explain General scan line polygon fill algorithm support your claim with a neat diagram.   **(10 Marks)**

OR

4   a.   Explain with example any two algorithms used to identify the interior area of a polygon.   **(10 Marks)**
    b.   Develop composite homogenous transformation matrix to rotate an object with respect to a pivot point. For the triangle A(3, 2), B(6, 2), C(6, 6) rotate it in anticlockwise direction by $90°$ degree keeping A(3, 2) fixed, draw the new polygon.   **(10 Marks)**

Module-3

5   a.   Explain basic illumination models.   **(10 Marks)**
    b.   Obtain the matrix representation for rotation of a object about an arbitrary axis.   **(10 Marks)**

OR

6   a.   Explain RGB and CMY color models with examples. Explain the transformation between CMY and RGB color spaces.   **(10 Marks)**
    b.   Explain Cohen Sutherland line clipping Algorithm clip. The lines with coordinates, $(X_0, Y_0) = (60, 20)$, $(X_1, Y_1) = (80, 120)$, given the window boundaries. $(X_{wmin}, Y_{wmin}) = (50, 50)$ and $(X_{wmax}, Y_{wmax}) = (100, 100)$ **(10 Marks)**

Module-4

7   a.   Explain 2 classifications of visible surface detection algorithm.   **(05 Marks)**
    b.   Compare perspective and parallel projection.   **(05 Marks)**
    c.   What is 3D viewing? With the help of block diagram, explain 3D viewing pipeline architecture.   **(10 Marks)**

OR

8 a. Design the transformation matrix for perspective projection and give OpenGL 3D viewing function. **(10 Marks)**
   b. Explain perspective projections with reference point and vanishing point with neat diagram. **(10 Marks)**

Module-5

9 a. List the properties of Bezier curve and also explain Bazier techniques of generating curves. **(10 Marks)**
   b. Explain Request, sample and event input modes with block diagram. **(10 Marks)**

OR

10 a. With the help of a suitable programming construct, explain event driven input menu picking and building interactive models. **(10 Marks)**
   b. With the role of glCallList( ) function in creating DisplayLists in OpenGL. Write OpenGL code for rendering a Simple Animated face. **(10 Marks)**

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18CS63

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Explain the Anchor (a) tag to create wide range of links with suitable example. **(08 Marks)**
   b. Discuss the advantages of semantic HTML elements. **(06 Marks)**
   c. Write HTML code segment to display following context using list elements :
      1. Introduction
      2. Literature survey
      3. My solution - Methodology
                     - Results
      4. Conclusion. **(06 Marks)**

OR

2 a. What is CSS? Explain different location of styles with suitable example. **(06 Marks)**
   b. What is Selector? Explain any 4 selector with suitable example. **(06 Marks)**
   c. Discuss the cascading principles with examples. **(08 Marks)**

Module-2

3 a. Design the following table using HTML code :

Items	Details		Total Amount
	Units	Amount	
Computers	50000/-	2	100000
Projector	25000/-	3	75000
Total Amount			175000

(08 Marks)

   b. Explain basic form structure with suitable example. **(06 Marks)**
   c. Explain different types of button control elements. **(06 Marks)**

OR

4 a. Briefly explain any two positioning elements with suitable example. **(08 Marks)**
   b. What is Micro format? Explain with neat diagram. **(06 Marks)**
   c. Design 3 column layout using positioning and float property with suitable example. **(06 Marks)**

Module-3

5 a. What is client side scripting? Discuss its advantages and disadvantages. **(06 Marks)**
   b. List any four methods of DOM. Write the code segment to modify the context of HTML documents using DOM methods. **(08 Marks)**
   c. Write a Java Script code to calculate cubes of numbers from 0 to n. **(06 Marks)**

OR

6 a. List the keyboard events. Write Java script code segments to display key pressed in the keyboard on alert message. **(08 Marks)**

b. List any six web server responsibilities. **(06 Marks)**

c. Explain different types of parameters passing in PHP , with suitable example. **(06 Marks)**

Module-4

7 a. Discuss how arrays are different in PHP compare to other tradition programming languages. **(06 Marks)**

b. Explain different file size restriction mechanism with suitable code segments. **(08 Marks)**

c. Illustrate data flow from HTML form to PHP. **(06 Marks)**

OR

8 a. Implement a PHP code to create a class with following specification :
   Data members : E_name , E_No , DOB , Salary
   Member functions : Read , Write.
   Use the above specification to read and write the 2 employee information. **(08 Marks)**

b. What is Interface? Discuss the implementation of Interface with suitable example. **(06 Marks)**

c. Explain static member with suitable example. **(06 Marks)**

Module-5

9 a. What is Cookies? Write PHP code segment to read and write cookies. **(06 Marks)**

b. Discuss how web storages are better than cookies. Write PHP code segment to read from webstorage. **(08 Marks)**

c. What is Caching? Explain page output caching with neat diagrams. **(06 Marks)**

OR

10 a. Write PHP code segment to convert JSON string into PHP object. **(06 Marks)**

b. Explain MVC frame work with neat diagram. **(08 Marks)**

c. What is AJAX? Explain how the asynchronous request is handled with suitable diagram. **(06 Marks)**

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18CS652

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Give the syntax of switch statement. Write a program to find the frequency of individual digits in a given number. Trace the program for the input 843825. **(08 Marks)**
   b. What are the differences between while and do while statements. Write a program to find the sum of first 20 integers using do while statement. **(06 Marks)**
   c. List the elements of user defined function. Discuss all elements with suitable program. **(06 Marks)**

OR

2 a. List the various types of operators used in C. Explain any two types in detail. **(08 Marks)**
   b. What are the three categories of data types used in C? Discuss the various primary data types along with their size and range. **(06 Marks)**
   c. Define string. Write a program to print the reverse of a string. **(06 Marks)**

Module-2

3 a. What is an Algorithm? What are its characteristics? Explain the various asymptotic notations. **(08 Marks)**
   b. Discuss how the insertion and deletion operations can be performed on arrays. Write a program to perform array deletion. **(06 Marks)**
   c. Write a program to sort an array of 'n' elements using Bubble sort. **(06 Marks)**

OR

4 a. What is an array? Explain the representation of one dimensional array. A 2D array A[5] [10] is implemented in row order and column order. Find the address of A[3] [5] if the base address is 3000 and the word size is 2 in both cases. Assume lower bound is 1. **(08 Marks)**
   b. What is searching? Write a program to perform linear search on an array. Discuss its efficiency. **(06 Marks)**
   c. What is a data structure? Discuss the different types of data structures. **(06 Marks)**

Module-3

5 a. How to declare the node in double linked list? Write a program to implement doubly linked list and perform insertion and deletion operation. **(10 Marks)**
   b. Define stack. What are its applications? Write a program to implement a stack using arrays and perform its common operations. **(10 Marks)**

OR

6 a. What is linked implementation of stack? Write separate algorithm to implement the following operations under linked implementation of stack:
   i) Push   ii) POP. **(10 Marks)**

b. Write the algorithm to perform the following operations.
   i)   Search a specific element in the liked list.
   ii) Delete an element from a circular linked list. **(10 Marks)**

Module-4

7 a. Discuss various operations performed on queue. Write an algorithm to realize the delete operation under array implementation of queue. **(06 Marks)**
  b. Discuss pre order, in order and post order traversal of a binary tree with an example. **(06 Marks)**
  c. Write a note on:
     i)   Priority queue
     ii) AVL Tress. **(08 Marks)**

OR

8 a. Define circular queue. Write an algorithm to realize the insert operation for array implemented circular queue. **(06 Marks)**
  b. Write a C function for inserting an element into binary search tree. **(06 Marks)**
  c. Write a C function to realize the following operations for array implemented double-ended queue.
     i)   Insertion at the front end of the queue
     ii) Deletion from rear end of the queue. **(08 Marks)**

Module-5

9 a. Discuss how to implement graphs using adjacency matrix. Write the Warshall's algorithm for deriving the path matrix of a diagraph G. **(08 Marks)**
  b. Write a program to perform selection sort on an array of 'n' elements. Discuss its efficiency. **(06 Marks)**
  c. Write an algorithm to perform quick sort on a given array of integers. Discuss the worst case complexity of quick sort. **(06 Marks)**

OR

10 a. Differentiate between BFS and DFS. Write an algorithm for the DFS graph traversal method. **(08 Marks)**
   b. Write an algorithm to perform insertion sort on a given array of integers. Discuss its efficiency. **(06 Marks)**
   c. Explain binary search technique with an algorithm. Discuss its efficiency. **(06 Marks)**

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Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. What is Operating System? Explain Multiprogramming and Time Sharing System.
(06 Marks)
   b. List and explain services provided by an Operating System for the use and efficient Operation of system.
(06 Marks)
   c. Explain the role of Operating system from different view points. Explain the dual mode of operation of Operating system.
(08 Marks)

OR

2 a. What are System Calls? Briefly discuss its types.
(06 Marks)
   b. Explain the concept of virtual machines with a neat diagram. Discuss its benefits.
(08 Marks)
   c. What are Multiprocessor System? Explain their three main advantages. Also explain the types of multiprocessor system.
(06 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. Consider the following set of processes with arrival time:

Process	Arrival time	Burst time
P_1	0	10
P_2	0	1
P_3	1	2
P_4	2	4
P_5	2	3

   i) Draw Gantt charts using FCFS, SJF preemptive and non-preemptive scheduling.
   ii) Calculate the average waiting time for each of the scheduling algorithm.   **(10 Marks)**
   b. What are Semaphores? Using wait( ) and signal( ) semaphore operations for implementation, explain binary and counting semaphore with an example.
(10 Marks)

OR

6 a. Explain how monitors can solve dining philosophers problem. **(10 Marks)**
   b. Explain critical section problem. List the requirements that critical section problem must satisfy. Explain Peterson's solution to critical section problem. **(10 Marks)**

Module-4

7 a. Discuss various approaches for deadlock recovery. **(06 Marks)**
   b. What is Resource Allocation Graph? Explain how it is useful in determining deadlock. Illustrate with example. **(06 Marks)**
   c. Determine whether the following system is in safe state using Bankers algorithm.

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P_0	1	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	2	0	0	4	3	3			

If a request for P1 arrives for (1, 0, 2) can the request be granted immediately. **(08 Marks)**

OR

8 a. Define Internal and External fragmentation. 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 most efficient use of memory? **(07 Marks)**
   b. Define Paging. Explain paging hardware with neat block diagram. **(06 Marks)**
   c. Analyse the problems in simple paging technique and show how TLB is used to solve the problem. **(07 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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