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18CS61

Sixth Semester B.E. Degree Examination, June/July 2024 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 architecture of SIC/XE machine. (10 Marks)
 b. Generate Target address for the following object codes :
 i) 032600
 ii) 03C300
 Contents of X = 000090 B = 006000 PC = 003000 (04 Marks)
 c. Define control section. Explain EXTDEF and EXTREF with examples. (06 Marks)

OR

- 2 a. Write steps and algorithm of pass 2 of two pass assembler. (10 Marks)
 b. Give the general formats of the following records :
 i) Header Record
 ii) Text Record (06 Marks)
 iii) End Record (04 Marks)
 c. Write the algorithm for absolute loader.

Module-2

- 3 a. With the help of diagram, explain the various phases of a compiler. (08 Marks)
 b. Write the transition diagram to recognize the token below.
 i) Identifier (06 Marks)
 ii) Relational operator. (06 Marks)
 c. Explain the concept of input buffering in the lexical analysis. (06 Marks)

OR

- 4 a. Explain interaction between lexical analyzer and parser with the help of diagram. (08 Marks)
 b. What are the applications of compiler technologies? Explain any two. (06 Marks)
 c. What are operations on Languages? List and explain. (06 Marks)

Module-3

- 5 a. Write an algorithm to eliminate left recursion. Elimination left recursion from grammar.
 $S \rightarrow Aa \mid b$
 $A \rightarrow Ac \mid sd \mid E$ (08 Marks)
 b. Give rules for constructing FIRST and FOLLOW sets. (06 Marks)
 c. List actions of shift Reduce parser. Show the actions for input string $w = id * id$ using the grammar.
 $E \rightarrow E + T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid id$ (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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OR

- 6 a. Explain ambiguity in “dangling else” grammar. How do you eliminate it? Explain. (10 Marks)
 b. Construct predictive parsing table by making necessary changes to the grammar given below and parsing string $w = id + id$ (10 Marks)
 $E \rightarrow E * T \mid T$
 $T \rightarrow id + T \mid id$

Module-4

- 7 a. With an example program, explain the structure of a LEX program. (06 Marks)
 b. What is regular expression? Explain any 8 characters that form a regular expression. (10 Marks)
 c. Explain the use of `yywrap()` function. (04 Marks)

OR

- 8 a. Explain shift Reduce parser with an example. (10 Marks)
 b. Write a YACC program to evaluate arithmetic expression involving operators $+$, $-$, $*$, $/$. (10 Marks)

Module-5

- 9 a. Write SDD for simple disk calculator, and give annotated parse tree for $3 * 5 + 4n$. (10 Marks)
 b. Construct syntax tree and DAG for the expression $a + a * (b - c) + (b - c) * d$ (06 Marks)
 c. Define synthesized and inherited attributes with example. (04 Marks)

OR

- 10 a. Explain design issues in code generation. (08 Marks)
 b. Explain the following with examples :
 i) Quadruples
 ii) Triples
 iii) Indirect Triples (09 Marks)
 c. Write the machine instruction for the following three address instruction $x = y - z$. (03 Marks)

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18CS62

Sixth Semester B.E. Degree Examination, June/July 2024 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. With a neat diagram, explain the working nature of CRT with its different parts. (08 Marks)
- b. Write an OpenGL program to draw a line segment. (06 Marks)
- c. With suitable OpenGL code segments and examples, define different OpenGL line primitive constants available. (06 Marks)

OR

- 2 a. Explain DDA line drawing algorithm with necessary equations. (06 Marks)
- b. Illustrate the logic of Bresenham's line generation algorithm by digitizing the line with endpoints (20, 10) and (30, 18). Find out all intermediate pixel points along the line. (06 Marks)
- c. Explain the classification of Flat-Panel display monitors with examples. (08 Marks)

Module-2

- 3 a. With suitable code segments, define different polygon fill primitives available in OpenGL. (06 Marks)
- b. Explain general scan-line polygon fill algorithm. (08 Marks)
- c. Briefly explain the data-structures with respect to polygon table with an example. (06 Marks)

OR

- 4 a. Prove that :
 - (i) Two successive translations are additive in nature.
 - (ii) Two successive rotations are additive in nature
 - (iii) Two successive scalings are multiplicative in nature(06 Marks)
- b. Derive the matrix for rotation about a fixed point. (08 Marks)
- c. With syntax and examples, define OpenGL functions available for basic transformation methods. (06 Marks)

Module-3

- 5 a. Explain the concept of Cohen-Sutherland line clipping algorithm with necessary sketches and equations. (08 Marks)
- b. Explain Sutherland-Hodgeman polygon clipping algorithm. (06 Marks)
- c. Apply Sutherland-Hodgeman polygon clipping to clip the following polygon Fig.Q5(c) against the given clipping window.

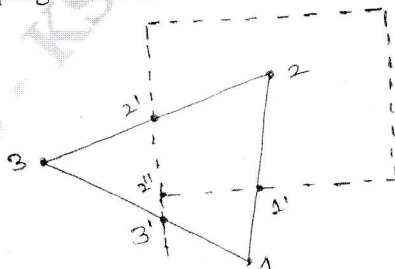


Fig.Q5(c)

(06 Marks)

OR

- 6 a. In detail explain the 3-D transformations in homogeneous coordinate system with necessary matrices. (08 Marks)
- b. Explain RGB and CMY color models. (06 Marks)
- c. Briefly explain the different light sources. (06 Marks)

Module-4

- 7 a. With a neat diagram, explain 3-D viewing pipeline. (08 Marks)
- b. Explain the transformation from world to viewing coordinates with necessary matrices and equations. (06 Marks)
- c. With a neat sketch, define types of projections. Also compare them. (06 Marks)

OR

- 8 a. With necessary sketches, define the syntax of following OpenGL functions in 3D:
(i) For perspective projection
(ii) For orthographic projection
(iii) Look At function (08 Marks)
- b. Briefly explain different OpenGL visibility detection functions available in OpenGL. (06 Marks)
- c. Explain depth-Buffer algorithm in detail. (06 Marks)

Module-5

- 9 a. Explain the classifications of logical input devices. (06 Marks)
- b. With a neat diagram, explain different input modes. (06 Marks)
- c. With an example of code-segment, explain how to define and execute display lists using OpenGL. (08 Marks)

OR

- 10 a. With an example of code segment, explain different functions used to create menus in OpenGL. (08 Marks)
- b. Describe how to generate text using OpenGL functions along with its types. (06 Marks)
- c. Explain Bezier Spline curves with its necessary equations. (06 Marks)

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18CS63

Sixth Semester B.E. Degree Examination, June/July 2024 Web Technology and Its Application

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain five different forms of URL relative referencing with suitable script segments and folder tree structure. (10 Marks)
- b. Explain three different types of author created CSS rules with suitable script segments. (10 Marks)

OR

- 2 a. Justify the need for semantic elements in HTML. Explain the role of the following semantic elements with script segments. <article>, <nav>, <section> <aside>, <figure>. (10 Marks)
- b. Justify the need for CSS selectors in stapling. Explain the following selectors with syntax and script segments class, Id, pseudo, contextual, attribute. (10 Marks)

Module-2

- 3 a. Explain the role of Table header, table row span, table column span, table footer and column graph elements with suitable HTML script. (10 Marks)
- b. Explain the role of CSS clear, visibility, display, z-index and float properties with suitable CSS segments to each. (10 Marks)

OR

- 4 a. Explain the following HTML user interface (UI) controls with examples hidden, file, number, check box and select list. (10 Marks)
- b. Explain the key components of responsive wet design with suitable code segments. (10 Marks)

Module-3

- 5 a. Explain three different ways of linking JavaScript to HTML page with suitable code segments. (10 Marks)
- b. Explain two approaches for event handling in JavaScript with suitable code segments. (10 Marks)

OR

- 6 a. Explain DOM tree and its node types. With syntax explain the role of four DOM methods with examples. (10 Marks)
- b. With a block diagram, explain the components and sequence of events during the execution of PHP script with Zed engine. (10 Marks)

Module-4

- 7 a. Explain procedural and object oriented error handling mechanisms in PHP with code segments. (10 Marks)
- b. Develop HTML JavaScript and PHP code required for file uploads. (10 Marks)

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OR

- 8 a. With suitable code segments and UMC class diagram, explain the support for inheritance in PHP. (10 Marks)
- b. Explain reading/Writing of files with stream access and in-memory access methods. (10 Marks)

Module-5

- 9 a. Explain append(), prepend(), prependTo() and Wrap() methods to modify DOM in jQuery with code segments. (08 Marks)
- b. Explain two types of cookies. Develop a code in PHP to create and access cookies. (06 Marks)
- c. Explain JSON processing in PHP with code segments. (06 Marks)

OR

- 10 a. Explain session state with an example. With code segments, explain accessing session state and check for session existence. (08 Marks)
- b. Explain AJAX Post requests with syntax and code segment. (06 Marks)
- c. Explain XML processing in JavaScript with suitable code segments. (06 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2024 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. What are different data types in C? Define constants, variables, identifiers in C. (08 Marks)
 b. Explain the different types of operators with suitable example. (07 Marks)
 c. Write the different types of loops used in C, give the working example of do-while loop. (05 Marks)

OR

- 2 a. Explain the usage of break and continue with respect to the for loop with example. (07 Marks)
 b. Why structures are used in C? What are ways to define the structure and illustrate the major differences between structure and union? (08 Marks)
 c. Define string and illustrate any three-string library functions with syntax and example. (05 Marks)

Module-2

- 3 a. Define algorithm and its characteristics. Write an algorithm for GCD(m, n). (06 Marks)
 b. Why asymptotic notations are used? Discuss three major asymptotic notations used with respect to an algorithms. (08 Marks)
 c. Explain data structures and its types. List and explain different data structures operations. (06 Marks)

OR

- 4 a. Define an array and its representation in memory. Write a function to insert an element at specific index location in 1-D array. (07 Marks)
 b. Write a C program to sort n-element using bubble sort. (06 Marks)
 c. What are the ways to represent 2-D array in memory, discuss with example. Write a function to multiply two matrices. (07 Marks)

Module-3

- 5 a. Explain the linked list representation and its types. Write a function to perform following operations in singly-linked list.
 i) Insert at front
 ii) Delete from end. (10 Marks)
 b. Write a function to search for a key element in singly linked list. (05 Marks)
 c. Write a function to perform insertion of an element at the end in Doubly-linked list. (05 Marks)

OR

- 6 a. Define stack and its applications. Implement push and pop operations using array and check for overflow and underflow conditions. (10 Marks)
 b. How to represent circular SLL and write a function to insert a node at front? (06 Marks)
 c. What are the advantages of linked implementation of stack over array implementation? (04 Marks)

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Module-4

- 7 a. What is priority queue? How its different from a regular queue. (05 Marks)
b. Write a C program to perform primitive operations of circular queue. (07 Marks)
c. Write a recursive function for binary tree traversal techniques. (08 Marks)

OR

- 8 a. In a circular queue of size 5 has 3-elements 10, 30, 25 where $F = 2$, $R = 4$. Solve the following conditions:
i) After inserting 50 and 60, what F and R?
ii) What happens, try inserting 30 at this stage?
iii) Delete two elements from queue and insert 90, show sequence of steps and values of F and R? (06 Marks)
- b. What are ways to represent binary tree in C? Define:
i) Complete Binary Tree
ii) Perfect Binary Tree. (08 Marks)
- c. Define Binary search Tree and write a function to insert a node in BST. (06 Marks)

Module-5

- 9 a. Define a graph and the ways to represent the graph. (08 Marks)
b. Write a function to traverse the graph using DFS or BFS. (06 Marks)
c. Explain the insertion sort with its C-function. (06 Marks)

OR

- 10 a. Explain the working of quick sort with its C implementation. (10 Marks)
b. Write a C-function to implement binary-search with example. (10 Marks)

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18CS654

Sixth Semester B.E. Degree Examination, June/July 2024 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. Give an abstract view of the components of a computer system. (08 Marks)
 b. Explain various special-purpose systems. (08 Marks)
 c. Discuss Microkernels approach in operating system. (04 Marks)

OR

- 2 a. Give a brief note on efficient operation services provided by operating system. (12 Marks)
 b. Discuss with a neat diagram, VM ware architecture and Java virtual machine. (08 Marks)

Module-2

- 3 a. With a neat diagram, illustrate different process states and also explain process control block. (10 Marks)
 b. Illustrate the difference between single threaded process and a multithreaded process. (04 Marks)
 c. Explain the concept of synchronization. (06 Marks)

OR

- 4 a. Discuss the concept of shared memory with reference to producer and consumer problem with code snippets. (10 Marks)
 b. Write a note on following :
 (i) The fork () and exec () system calls.
 (ii) Signal handling
 (iii) Many to many models. (10 Marks)

Module-3

- 5 a. Consider the following process with length of the CPU burst time given in milliseconds :

Process	Arrival time	Burst time	Priority
P ₁	0	10	3
P ₂	0	1	1
P ₃	3	2	3
P ₄	5	1	4
P ₅	10	5	2

Table Q5 (a)

- (i) Draw Gantt charts illustrating the execution of these processes using FCFS, SJF, Preemptive priority scheduling and RR (Quantum 2 MS) scheduling.
 (ii) What is the average turnaround time of process for each of the scheduling algorithm in Table Q5 (a)
 (iii) What is the average waiting time of process for each of the scheduling algorithm in Table Q5 (a). (12 Marks)
 b. Explain critical section problem. (08 Marks)

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OR

- 6 a. With a help of code snippet show how semaphore can be implemented. (08 Marks)
 b. Elaborate the syntax of monitor and its usage. (08 Marks)
 c. Discuss the Log-Based recovery in Atomic transaction. (04 Marks)

Module-4

- 7 a. Explain the necessary condition to hold Deadlock situation. (08 Marks)
 b. Discuss the mechanism of swapping. (08 Marks)
 c. Compare and contrast between logical versus physical addresses. (04 Marks)

OR

- 8 a. System consists of 5 jobs (J_1, J_2, J_3, J_4, J_5) and 3 resources (R_1, R_2, R_3). Resource type R_1 has 10 Instances resources type R_2 has 5 Instances and R_3 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			

- (i) Find need matrix and calculate the safe sequence by using Banker's algorithm. Mention the above system is safe or not safe.
 (ii) Check for the state of the system when resource R_1 requests = (1, 0, 2) of instances, can these resource be granted? (08 Marks)
- b. What is Resource Allocation Graph (RAG)? Explain how RAG is very useful in describing deadlocks, embrace by considering own example. (06 Marks)
 c. Given the memory partition as 100 K, 500 K, 200 K, 300 K and 600 K apply first fit, best fit and Worst fit algorithm to place 212 K, 417 K, 112 K and 426 K. (06 Marks)

Module-5

- 9 a. Draw a neat sketch and explain the concepts involved in demand loading of a page. (10 Marks)
 b. 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,
 (i) LRU
 (ii) FIFO replacements
 (iii) Optimal page replacement algorithm.
 Which one of the above is most efficient for three frames? (10 Marks)

OR

- 10 a. Explain various files operations performed on files. (10 Marks)
 b. Explain the following :
 (i) Two-level Directory structure.
 (ii) Tree-structural directories. (10 Marks)

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