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18CS61

Sixth Semester B.E. Degree Examination, June/July 2023
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.   With reference to SIC/XE machine architectures explain instruction formats and addressing modes, clearly indicating the settings of different flag bits. **(10 Marks)**

  b.   With an illustrate example, explain the need for a two pass assembler. Explain the data structures used in 2-pass assembler. Mention their functions clearly during pass 1 and pass 2. **(10 Marks)**

OR

2   a.   Generate the complete object program for the following SIC/XE assembly language programs. Assume : CLEAR = B4, LDT = 74, TD = EO, JEQ = 30, TIXR = B8, JLT = 38, RSUB = 4C, LDCH = 50, WD = DC, X = 1, T = 5.

```
WRREC    START      105D
         CLEAR      X
         LDT        LENGTH
WLOOP    TD         OUTPUT
         JEQ        WLOOP
         LDCH       BUFFER, X
         WD         OUTPUT
         TIXR       T
         JLT        WLOOP
         RSUB
OUTPUT   BYTE       X'O5'
BUFFER   RESB       400
LENGTH   RESB       2
         END        WRREC
```
(10 Marks)

  b.   Explain the absolute loader and Bootstrap loader with algorithm/source code. **(10 Marks)**

Module-2

3   a.   What is a Compiler? Explain the various phases of a compiler with a neat diagram and show the output of each phase for the expression a = b + c * 25. Assume all variable are a type float. **(10 Marks)**

  b.   Write a note on the commonly used compiler – construction tools. **(04 Marks)**

  c.   Describe Input Buffering mechanism with an algorithm for lookahead code with sentinels. **(06 Marks)**

OR

4   a.   Construct the transition diagrams to recognize the tokens given below and explain the same.
       i) relop   ii) Identifier   iii) unsigned numbers **(10 Marks)**

  b.   With example, define the operations on languages. **(04 Marks)**

  c.   Discuss the issues/errors of lexical analysis and the error recovery actions that can be performed. **(06 Marks)**

Module-3

5 a. What is recursive-decent parsing? Explain with a pseudocode. Take the grammar S → cAd, A → ab|a as an example and trace it for input string w = cad. Explain how backtracking can be used for tracing. **(10 Marks)**

   b. Consider the context free grammar :
   S → SS + | SS * |a and string w = aa + a*
   i)   Give the leftmost and rightmost derivation and parse tree for the string
   ii) Is the grammar ambiguous or unambiguous? Justify your answer
   iii) Eliminate left Recursion **(10 Marks)**

OR

6 a. With a neat diagram, explain the model of a table driven predictive parser. Write and explain the predictive parsing algorithm. **(10 Marks)**

   b. Consider the following grammar with terminals (, [,),].
   S → TS | [S] S |)S | ∈
   T → (X)
   X → TX | [X] X | ∈
   i)   Construct FIRST and FOLLOW sets
   ii) Construct its LL(1) parsing table
   iii) Is this grammar LL(1)? **(10 Marks)**

Module-4

7 a. Explain the meta – characters used in regular expression with examples. **(10 Marks)**

   b. Write a LEX program to recognize and count the number of identifiers in a given input file. Show how the program is complied and executed. **(10 Marks)**

OR

8 a. What are the ambiguities that arise while evaluating a regular expression? Explain with example. **(10 Marks)**

   b. Write a YACC program to recognize a valid arithmetic expression that uses operators +, –, * and /. **(10 Marks)**

Module-5

9 a. What is a dependency graph? Give a syntax directed definition for simple type declaration including int and float type. Construct annotated parse tree and dependency graph for the input, float a, b, c. **(10 Marks)**

   b. Explain synthesized attribute, inherited attribute, S – attributed definition and L- attributed definitions with examples. **(10 Marks)**

OR

10 a. What is a three – address code? explain the different ways of representing three – address codes with examples. **(10 Marks)**

   b. What is target computer model? Explain the different kinds of instructions and addressing modes available in assembly language or a target machine. **(10 Marks)**

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18CS62

Sixth Semester B.E. Degree Examination, June/July 2023
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 computer graphics? Mention the list of applications. How they are classified? **(06 Marks)**
   b. Explain with neat diagram operation of cathode-Ray tubes and shadow-mask CRT. **(08 Marks)**
   c. Explain the logical organization of the video-controller. **(06 Marks)**

OR

2 a. Write Bresenham's line drawing algorithm. Using Bresenhams algorithm calculate the pixel positions for the screen coordinates (1, 1) and (6, 7). **(10 Marks)**
   b. Write midpoint circle algorithm. Draw the circle with 8 as radius. **(10 Marks)**

Module-2

3 a. Explain scanline polygon filling algorithm with neat sketches and example. **(06 Marks)**
   b. With a neat figure explain various polygon types in OpenGL. **(06 Marks)**
   c. What is concatenation of transformation? Explain the following considered 2D:
      i) Rotation about a fixed point
      ii) Scaling about a fixed point. **(08 Marks)**

OR

4 a. Define the following two dimensional transformations translation, rotation, scaling reflection and shearing. Give example for each. **(10 Marks)**
   b. With a neat figure explain two dimensional viewing pipeline? Explain OpenGL 2D viewing functions. **(10 Marks)**

Module-3

5 a. Explain window to view port coordinate transformation. **(04 Marks)**
   b. Explain the Cohen Sutherland line clipping algorithm considering are all cases. **(08 Marks)**
   c. With an example explain Sutherland Hodgeman polygon clipping algorithm. **(08 Marks)**

OR

6 a. Discuss the OpenGL functions for the following 3D dimensional transformations:
      i) Translation   ii) Scaling   iii) Rotation. **(06 Marks)**
   b. Explain the following color models:
      i) RGB color model   ii) CMY color model. **(08 Marks)**
   c. Explain the basic illumination models. **(06 Marks)**

Module-4

7 a. What is three dimensional viewing? Explain three dimensional viewing pipeline with neat diagram. (08 Marks)

   b. Explain OpenGL three dimensional viewing functions, with example for each:
   i) gluLookAt   ii) glOrtho   iii) glPerspective   iv) glFrustum. (12 Marks)

OR

8 a. Explain classification of visible surface detection and back face detection algorithm. (08 Marks)

   b. Explain Z-buffer or depth buffer algorithm for visible surface detection. (06 Marks)

   c. Discuss OpenGL visibility-detection functions with an example. (06 Marks)

Module-5

9 a. List and explain the various classes of logical input devices that are supported by OpenGL. With suitable diagrams, explain various input modes. (10 Marks)

   b. Explain how keyboard, window and mouse events are recognized by GLUT. Give suitable example. (10 Marks)

OR

10 a. How pop-up menus are created using GLUT? Illustrate with an example. (06 Marks)

    b. What are the features of a good interactive program? What are the advantages of double buffering? Explain. (08 Marks)

    c. Explain Bezier cubic curves. Give the properties of Bezier curves. (06 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2023
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 the structure of HTML document with an example.   **(10 Marks)**
   b. Explain ordered and unordered list in HTML5 with code.   **(10 Marks)**

OR

2 a. Explain embedded style sheet and external style sheet with code.   **(10 Marks)**
   b. Discuss class selector and id selector with code.   **(10 Marks)**

Module-2

3 a. List and describe different button controls.   **(08 Marks)**
   b. Explain the elements used to define the structure of HTML table. Give an example of table.
                                                                                 (12 Marks)

OR

4 a. What is normal flow in the context of CSS?   **(10 Marks)**
   b. What is responsive design? What are its four components, explain them.   **(10 Marks)**

Module-3

5 a. With diagrams, explain client script and server script execution.   **(10 Marks)**
   b. Explain the php module in the apache and describe the difference between multi-threaded and multi-process setup.   **(10 Marks)**

OR

6 a. Describe different comparison operators in javascript.   **(12 Marks)**
   b. What is DOM? Briefly explain the different types of nodes.   **(08 Marks)**

Module-4

7 a. Describe polymorphism and data encapsulation in php.   **(10 Marks)**
   b. Highlight the techniques for reading and writing of files in php with example. **(10 Marks)**

OR

8 a. What are errors and exceptions?   **(10 Marks)**
   b. Discuss $ - SERVER array. How is it used?   **(10 Marks)**

Module-5

9 a. What are cookies? Explain php mechanism for writing and reading cookies with example.
                                                                                 (10 Marks)
   b. Discuss strategies to caching web applications.   **(10 Marks)**

OR

10 a. What is AJAX? Explain how asynchronous request is handled using UML diagrams.
                                                                                 (10 Marks)
   b. Describe how XML is processed in javascript and php.   **(10 Marks)**

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18CS643

Sixth Semester B.E. Degree Examination, June/July 2023
Cloud Computing 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. Define cloud computing. Explain its characteristics and benefits.   (06 Marks)
    b. List and explain pro's and con's of virtualization.   (06 Marks)
    c. Explain the following :
        i) Amazon web services
        ii) Microsoft Azure.   (08 Marks)

OR

2   a. Explain with neat diagram, Type – I and Type – II hypervisor.   (06 Marks)
    b. List and explain the different various cloud competing platforms and technologies.   (06 Marks)
    c. With the help of neat diagram, explain the cloud computing reference model.   (08 Marks)

Module-2

3   a. What is Iaas? Explain its reference implementation with neat diagram.   (10 Marks)
    b. Explain hardware and software stack of private cloud. List any 2 advantages of using private cloud interface.   (10 Marks)

OR

4   a. Explain the different services located in the Aneka Container.   (10 Marks)
    b. Explain with the neat diagram, logical organization of the Aneka cloud.   (10 Marks)

Module-3

5   a. What are the two major technique used to define parallel implantation of computer algorithm? Explain.   (06 Marks)
    b. Describe how to implement a parallel matrix scalar product by using domain decomposition.   (06 Marks)
    c. Define thread? Explain the relation between process and thread with suitable diagram.   (08 Marks)

OR

6   a. Explain Aneka thread application model with simple Application.   (08 Marks)
    b. Define task. Explain the computing categories that relate to task.   (06 Marks)
    c. Explain MPI program structure with neat diagram.   (06 Marks)

Module-4

7   a. What is data intensive computing? What are the open challenges in the data intensive computing?   (06 Marks)
    b. Discuss the features of Google file system and Amazon Simple Storage Service (S3).   (06 Marks)
    c. Explain with a reference scenario, the characteristics and applications of data grid. (08 Marks)

OR

8 a. What does the term NOSQL mean? Explain Google bigtable with its architecture. (06 Marks)
b. Explain Mapreduce execution Service of Aneka with a neat diagram. (06 Marks)
c. Explain the following Mapreduce similar framework.
   i) Pig   ii) Hive   iii) Hadoop. (08 Marks)

Module-5

9 a. Explain the various storage and communication services provided by AWS. (08 Marks)
b. With a neat diagram, explain the Google AppEngine platform architecture. (06 Marks)
c. Establish the relationship on how the cloud computing technology can be applied to support ECG monitoring. (06 Marks)

OR

10 a. With a detailed inference, explain the CRM and ERP implantation based on cloud computing technologies. (08 Marks)
b. Demonstrate with a neat sketch, the architecture of Windows Azure. (06 Marks)
c. Describe an application of cloud technologies for online gaming. (06 Marks)

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18CS645

Sixth Semester B.E. Degree Examination, June/July 2023
System Modelling and Simulation

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 Simulation? List any four circumstances, when the simulation is the appropriate tool and when it is not. **(10 Marks)**
    b. With a neat flow diagram, explain the steps in simulation study. **(10 Marks)**

OR

2   a. Define the following :
    i) System ii) Entity   iii) Activity   iv) Endogenous event   v) Exogenous event   vi) State. Indentify them four any one system. **(10 Marks)**
    b. The news stand buys the paper for 33 paise each and sells them for 50 paise each. Newspaper not sold at the day are sold as scarp for 5 paise each, Newspaper can be purchased in the bundle of 10, thus newsstand can buy 50, 60 and 70 so on. There are three types of days, Good, Fair and Poor, they have probabilities of 0.35, 0.45 and 0.20, distribution of newspaper demanded on each of the three days is given in the table, simulate the demand for 10 days and record, profit from sales each day, find the optimal number of papers newsstand should purchase. Assume the newsstand buys 70 news papers each day.
    Random digits for types of news days :
    58, 17, 21, 45, 43, 36, 27, 73, 86, 19
    Random digit for types of demand:
    96, 63, 31,19, 91,75, 84, 37, 23, 02.

Demand	Demand distribution probability		
	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	
100	0.07		

(10 Marks)

Module-2

3   a. Explain binomial and Poisson distribution and give probability mass function, mean and variance. **(08 Marks)**
    b. Explain the following continuous distributions.
       i) Exponential distribution
       ii) Normal distribution
       iii) Uniform distribution
       iv) Triangular distribution **(12 Marks)**

OR

4   a. Explain the characteristics of queuing system. **(10 Marks)**
    b. State and explain the Kendall notation of queuing system. **(05 Marks)**
    c. List the steady state parameters of M/G/1 queue. **(05 Marks)**

Module-3

5   a.   What are Pseudo-random numbers? List out the problems that occur and important considerations during generation of Pseudo – random numbers. **(10 Marks)**

    b.   The sequence of the random numbers 0.15, 0.94, 0.05, 0.51 and 0.29 has been generated. Use Kolmogorav – Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the number are uniformly distributed on the interval [0, 1] can be rejected. Take $D_\alpha = 0.565$. **(10 Marks)**

OR

6   a.   Suggest a step by step procedure to generate random variates using acceptance – rejection technique for Poisson distribution and Gamma distribution. **(10 Marks)**

    b.   Consider the sequence of random numbers : 0.12, 0.01, 0.23, 0.28, 0.89, 0.31, 0.64, 0.28, 0.83, 0.93, 0.99, 0.15, 0.33, 0.35, 0.91, 0.41, 0.60, 0.27, 0.75, 0.88, 0.68, 0.49, 0.05, 0.43, 0.95, 0.58, 0.19, 0.36, 0.69, 0.87. Test whether 3rd, 8th, 13th and so on numbers in the above sequence are auto correlated. At significance $\alpha = 0.05$, Normal critical table value is given as 1.96. **(10 Marks)**

Module-4

7   a.   Explain the selecting input model when data is not available. **(05 Marks)**

    b.   Write the suggested estimators for distributions often used in simulation. **(05 Marks)**

    c.   Six dump trucks are used to haul coal form the entrance of a small mine to the rail road. Each truck is loaded by one of two loaders. After loading truck immediately moves to the scale to be weighed. Loader and scale have First – Come – First – Serve (FCFS) queue. The travel time from loader to scale in negligible. After being weighed, a truck begins a travel time, afterward unload the coal and returns to the loader queue. It is assumed that five trucks are at loader and one is at the scale at time = 0. Carryout simulation process till the completion of two weighing from the scale. The activities of loading, weighing and travel time are given in the following table

Loading time	10	5	5	10	15	10	10
Weighing time	12	12	12	16	12	16	
Travel time	60	100	40	40	80		

Calculate : i) The busy time of both the loader and scale   ii) Average loader and scale utilization. **(10 Marks)**

OR

8   a.   Explain the measures of performance and their estimation. **(10 Marks)**

    b.   Apply Chi-square goodness of fit test for Poisson distribution with $\alpha = 3.64$, data size = 100 and observed frequency O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1 $[\eta_{0.05, 5} = 11.1]$. **(10 Marks)**

Module-5

9   a.   Discuss output analysis for steady state simulation in detail. **(10 Marks)**

    b.   Discuss output analysis for terminating simulation in detail. **(10 Marks)**

OR

10   a.   Explain with neat diagram, a model building verification and validation. **(10 Marks)**

    b.   Describe the three steps approach formulated by Naylor and Finger in the validation process. **(10 Marks)**

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CBCS SCHEME

18CS652

Sixth Semester B.E. Degree Examination, June/July 2023
Introduction to Data Structures and Algorithm

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. List and explain the key features and elements of C program.   **(08 Marks)**
    b. Define a constant. Explain different types of constants with example.   **(06 Marks)**
    c. Write a C program to find the sum and average of 3 numbers.   **(06 Marks)**

OR

2   a. What is a pointer? Explain pointers with a program.   **(08 Marks)**
    b. Explain various types of operators supported by C.   **(06 Marks)**
    c. Write a C program to concatenate 2 strings.   **(06 Marks)**

Module-2

3   a. Write a C program to perform matrix multiplication on two 3×3 matrixes.   **(08 Marks)**
    b. List the types of data structures. Write their characteristics and efficiency. **(06 Marks)**
    c. Define algorithm. Explain their characteristics and efficiency.   **(06 Marks)**

OR

4   a. Discuss asymptotic notation in detail.   **(08 Marks)**
    b. List and explain the typical operators associated with data structure types.   **(06 Marks)**
    c. Write a C program to explain insertion and deletion in arrays.   **(06 Marks)**

Module-3

5   a. Write a program to implement linked list operations and perform its operations.   **(10 Marks)**
    b. Write an algorithm to perform circular linked list operations.   **(10 Marks)**

OR

6   a. Give linked list implementation of stack.   **(10 Marks)**
    b. Write an algorithm to insert and delete elements at the end of doubly linked list.   **(10 Marks)**

Module-4

7   a. Write a C program to explain implementation of Queues using array.   **(08 Marks)**
    b. List the operations on Dequeue. Explain implementation of Dequeue on arrays.   **(06 Marks)**
    c. Write a C program to implement priority queue to add and delete elements.   **(06 Marks)**

OR

8   a. Write a note on Traversing a binary tree.   **(08 Marks)**
    b. Write a note on AVL tree.   **(06 Marks)**
    c. Write a C program to implement a binary search tree.   **(06 Marks)**

Module-5

9 a. Explain Breadth First Search and Depth First Search in detail. (08 Marks)
   b. Write notes on: (i) Adjacency Matrix (ii) Path Matrix or Incidence Matrix (06 Marks)
   c. Using Warshall's algorithm derive the shortest path matrix of a digraph G. (06 Marks)

OR

10 a. Write an algorithm for selection and insertion sort with example. What is the efficiency level of both? (08 Marks)
    b. Explain Hash Searching Technique with example. (06 Marks)
    c. Write a C program to implement bubble sort for a given array of integers in ascending order: 6, 4, 3, 8, 9, 0, 1, 5, 2, 7 (06 Marks)

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Sixth Semester B.E. Degree Examination, June/July 2023
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 operating system. Explain the systems and users view of an operating system.
(10 Marks)
   b. Explain the essential properties of batch, real time and distributed operating systems.
(10 Marks)

OR

2 a. List and explain services provided by an operating system that are designed to make using computer systems more convenient for users. **(10 Marks)**
   b. With a neat diagram of VM-Ware architecture, explain the concept of virtual machine and the main advantage of using VM architecture. **(10 Marks)**

Module-2

3 a. What is process control block? List the information stored in process control block. Explain the different states of a process during its life cycle. **(10 Marks)**
   b. Explain shared memory and message passing technique for Inter-process communication between co-operating processes. **(10 Marks)**

OR

4 a. Explain multithreading models with examples. **(10 Marks)**
   b. Explain operations on process. **(10 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. Define deadlock. What are the necessary conditions for deadlock to occur? Describe resource allocation graph: i) With deadlock   ii) With a cycle but no deadlock.   **(10 Marks)**

   b. Consider the following snapshot of a system and answer the following questions using Banker's algorithm.
   - i)   What is the content of matrix need?
   - ii)   Is the system in a safe state?
   - iii) If a request from process P1 arrives for (1, 0, 2), can the request be granted immediately?

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	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	0	0	2	4	3	3			

(10 Marks)

OR

8 a. What is swapping? Does this increase the operating systems overhead? Justify your answer.   **(10 Marks)**

   b. What are the drawbacks of contiguous memory allocation? Given five 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, 426K in order? Which algorithm makes the most efficient use of memory?   **(10 Marks)**

Module-5

9 a. A hypothetical main memory can store only 3 frames simultaneously. The sequence in which the pages will be required is given below:
   7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 (20 operations)
   Indicate the sequence in which the three frames will be filled in.
   - i)   FIFO
   - ii)   Optimal page replacement
   - iii) Least recently used methods of page replacement indicate number of page faults in each case.

   Which is the most efficient among them?   **(10 Marks)**

   b. Discuss on performance of demand paging. Explain copy-on-write process in virtual memory.   **(10 Marks)**

OR

10 a. List any five typical file attributes and any five file operations indicating their purpose in one line each.   **(10 Marks)**

    b. What are directories? Describe various directory structures.   **(10 Marks)**

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