

CBCS SCHEME

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18CS61

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.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 registers, instruction formats and addressing modes of SIC/XE architecture. (08 Marks)
- b. Explain the following records with their formats:
i) Header Record ii) Text Record iii) End Record (06 Marks)
- c. What are the various data structures used by assembler? Explain. (06 Marks)

OR

- 2 a. Write the Pass 1 algorithms for two pass assembler. (08 Marks)
- b. List the various machine independent assembler features? Explain any one feature in detail. (06 Marks)
- c. What are the basic functions of the loader? Write an algorithm for design of an absolute loader. (06 Marks)

Module-2

- 3 a. Explain the various phases of the compiler? Clearly specify the output at each phase for the input $A = B * C + 369$ (10 Marks)
- b. List and explain the reasons for separating analysis phase into lexical and syntax. (04 Marks)
- c. What are the applications of compiler technology? Discuss any two. (06 Marks)

OR

- 4 a. Explain various input buffering schemes used in lexical analysis? Write the look ahead code for sentinel. (08 Marks)
- b. Enlist the algebraic laws for regular expressions. (04 Marks)
- c. Give the Regular definition and draw the transition diagram for
i) Relational operator in C
ii) Unsigned number
iii) Identifier and keyword (08 Marks)

Module-3

- 5 a. Define ambiguity. Show that the grammar $E \rightarrow E + E \mid E * E \mid id$ is ambiguous? Eliminate the ambiguity and rewrite the grammar. (08 Marks)
- b. For the following grammar eliminate the left recursion and for the resultant grammar construct the LL(1) parsing table and parse the input string (a, a)
 $S \rightarrow (L) \mid a$
 $L \rightarrow L, S \mid S$ (08 Marks)
- c. Give an algorithm for recursive descent parsing? What are its limitation and how to overcome it? (04 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. Consider the following grammar
- $$E \rightarrow 1 + T \mid 2 - T$$
- $$T \rightarrow V \mid V * V \mid V + V \mid V - V$$
- $$V \rightarrow a \mid b$$
- i) Do the left factoring
 ii) Write an algorithm for FIRST and follow and obtain it for the left factored grammar
 iii) Construct it for the above left factored grammar. (10 Marks)
- b. What is shift reduce parsing? Explain the conflicts that may occur during shift reduce parsing? Show the working of shift reduce parser for the following grammar and input string id * id.
- $$E \rightarrow E + T \mid T$$
- $$T \rightarrow T * F \mid F$$
- $$F \rightarrow (E) \mid id$$
- (10 Marks)

Module-4

- 7 a. What is lex? With an example explain the structure of lex program. (06 Marks)
 b. Write the regular compression to identify the following :
 i) Identifier ii) Decimal number iii) -ve integer iv) +ve fraction (08 Marks)
 c. Write a yacc program to evaluate an arithmetic expression. (06 Marks)

OR

- 8 a. Explain the yacc tool with a sample program. (08 Marks)
 b. Write a short note on parser-lexer communication. (06 Marks)
 c. Discuss how to compile a yacc file. (06 Marks)

Module-5

- 9 a. Give the SDD for a simple desk calculator and show the annotated parse tree for $(3 + 4) * (5 + 6) n$ (08 Marks)
 b. Give the SDD for simple type declaration construct a dependency graph for the declaration
`int sum, num1, num2;` (06 Marks)
 c. Explain how DAG helps in intermediate code generation? Construct a DAG for the following :
 (i) $a + b + (a + b)$
 (ii) $a + b + a + b$ (06 Marks)

OR

- 10 a. What are the different three address code instructions? Translate the arithmetic expression $a + -(b + c)$ into quadruples, triples and indirect triples. (08 Marks)
 b. Explain the issues in design of code generator. (08 Marks)
 c. Generate the assembly code for the following address statements.
 (i) $x = b * c$ (ii) $y = a + x$ (04 Marks)

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18CS62

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.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. List and explain any 6 applications of computer graphics. (06 Marks)
- b. Describe the basic structure of an OpenGL graphics program with the necessary OpenGL functions. (06 Marks)
- c. Digitize the line by using Bresenham's line drawing algorithm with end points (-2, 5) and (5, 12). List the drawbacks of DDA line drawing algorithm. (08 Marks)

OR

- 2 a. Compare and contrast Raster and Random-scan displays with suitable figure. (06 Marks)
- b. Explain the coordinate reference frames. How is a 2D world coordinate reference frame specified using OpenGL? (06 Marks)
- c. Explain the Bresenham's circle generation algorithm using suitable examples. (08 Marks)

Module-2

- 3 a. Explain the General Scan line polygon fill algorithm. (08 Marks)
- b. Scale the given triangle A(3, 2), B(6, 2), C(6, 6) using the scaling factors $S_x = \frac{1}{3}$, $S_y = \frac{1}{2}$ about the point A(3, 2). Draw the original and the scaled object. (06 Marks)
- c. Explain shear and reflection transformation technique. (06 Marks)

OR

- 4 a. Explain the two commonly used algorithm for identifying the interior areas of an object. (08 Marks)
- b. Develop a composite homogenous transformation matrix to rotate an object with respect to a pivot point. (06 Marks)
- c. Explain the 2D viewing pipeline. (06 Marks)

Module-3

- 5 a. Explain the working of Cohen-Sutherland line clipping algorithm. (06 Marks)
- b. Demonstrate 2D normalization and window to viewport transformation using appropriate matrices. (08 Marks)
- c. Explain RGB and CMY color models. (06 Marks)

OR

- 6 a. Explain Sutherland-Hodgeman polygon clipping algorithm with suitable example. (08 Marks)
- b. Explain rotation of a 3D object about an axis parallel to one of the coordinate axis. (06 Marks)
- c. Explain specular reflection and the Phong model. (06 Marks)

Module-4

- 7 a. Explain transformation from world to view coordinate system. (04 Marks)
- b. Explain the orthogonal projection in detail. (08 Marks)
- c. Explain the depth-buffer algorithm. (08 Marks)

OR

- 8 a. List the 3D viewing coordinate parameters and explain. (06 Marks)
b. Derive the general-perspective transformation equation and explain the special cases of perspective projection equation. (08 Marks)
c. Explain the OpenGL visibility detection functions. (06 Marks)

Module-5

- 9 a. Explain Request, Sample and Event mode with suitable diagram. (06 Marks)
b. Explain Bezia Spline curves and list the properties of Bezier curves. (08 Marks)
c. What is a display list? Explain how a display list is defined and executed in OpenGL. (06 Marks)

OR

- 10 a. Define double buffering. Explain how double buffering is implemented in OpenGL. (04 Marks)
b. Explain Quadric and Curved Surfaces with necessary OpenGL functions. (08 Marks)
c. Explain Menu creation in OpenGL. Write an interactive OpenGL program to display a square when the left button is pressed and to exit the program if right button is pressed. (08 Marks)

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18CS63

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024 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 are the main aims of HTML5? (04 Marks)
b. Explain the structure of HTML documents. (08 Marks)
c. What is CSS? List and explain benefits of CSS. (08 Marks)

OR

- 2 a. Explain two types of URL referencing technique with suitable script in HTML5. (08 Marks)
b. List the different selectors available in CSS. Explain. (08 Marks)
c. Discuss ordered and unordered list with example. (04 Marks)

Module-2

- 3 a. Create a table that correctly uses the caption, thead, tfoot and tbody elements. Briefly discuss the role of each of these elements. (08 Marks)
b. What is responsive design? Explain the four key components that make a responsive design work. (08 Marks)
c. Explain different form widgets created with <input> tags. (04 Marks)

OR

- 4 a. Explain different ways of positioning elements in CSS layout techniques. (08 Marks)
b. List all the choice-controls with proper description. (08 Marks)
c. Discuss the role of CSS preprocessor in the web development workflow. (04 Marks)

Module-3

- 5 a. Write Java Script code that display text "WEB TECHNOLOGY" with increasing font size in the interval of 100 ms in blue color, when font size reaches 50 pt in teal colour and should stop. (08 Marks)
b. Define software layer. Explain the various common software design layers in Java script with a neat diagram. (08 Marks)
c. List and explain different form events. (04 Marks)

OR

- 6 a. Write PHP program to greet the user based on time. (08 Marks)
b. Discuss the different ways the Javascript can be included in HTML page with example. (08 Marks)
c. Explain web server's responsibilities. (04 Marks)

Module-4

- 7 a. What are the superglobal arrays in PHP? What function is used to determine if a value was sent via query string? (10 Marks)
b. Explain the different error handling methods with suitable code segments. (10 Marks)

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OR

- 8 a. Write PHP program to create a class employee with the following specifications:
Data members : Name, ID, Payment
Member functions : Read (getters) and Write (setters)
Use the above specification to read and print the information of 10 students. (10 Marks)
- b. Explain `_construct()` and `_destruct()` with example. (10 Marks)

Module-5

- 9 a. What is session state? How does session state works with suitable example. (08 Marks)
- b. Explain different types of caching need to improve performance of web application. (08 Marks)
- c. What does `$()` shorthand stand for in jQuery? (04 Marks)

OR

- 10 a. Define AJAX. Explain AJAX request by writing UML diagram. (08 Marks)
- b. What are the commonly used animations in jQuery? Explain with suitable example. (08 Marks)
- c. Write a jQuery to get all the `<p>` that contain the word "Hello". (04 Marks)

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18CS645

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024 System Modeling 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. Explain with a flowchart the steps involved in simulation study. (10 Marks)
b. A grocery store has one check out counter. Customers arrive at this checkout counter at random 1 to 8 minutes apart and each inter arrival time has the same probability of occurrence. The service time may vary from 1 to 6 minutes with probabilities given below:

Service (min)	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 using the following sequence of random numbers.

Random digits for arrival	913	727	015	948	309	922
Random digits for service time	84	10	53	74	17	79

Estimate : (i) Average waiting time of customer

(ii) Average service time

(iii) Probability of idle server.

(10 Marks)

OR

- 2 a. Explain the various components of discrete event simulation. Write the flowcharts for arrival and departure events. (10 Marks)
b. 6 dump trucks are used to haul coal from the entrance of a small mine to rail road. Each track is loaded by one of 2 loaders. After loading, the truck immediately moves to the scale to be weighed as soon as possible. Both the loaders and the scale have a FCFS waiting line for trucks. Travel time from a loader to the scale is considered negligible. After being weighed, a truck begins travel and then afterward returns to the loader queue. The distribution of loading time, weighing time and travel time are given below. Estimate the loader and scale utilization. Assume 5 trucks are at the loader and one is at the scale, at time '0' stopping time $T_E = 64$ min.

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

Depict simulation table and estimate the loader and scale utilization.

(10 Marks)

Module-2

- 3 a. Define discrete and continuous random variable. Explain continuous distribution types. (10 Marks)
b. A production process manufactures computer chips on the average at 20% non conforming. Every day, a random sample of size 50 is taken from the process. If the sample contains more than two non conforming chips, the process will be stopped. Compute the probability that the process is stopped by the sampling scheme. (10 Marks)

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OR

- 4 a. Explain the characteristics of queueing systems. List different queueing notations. (10 Marks)
 b. Explain steady state parameters of M/M/1 queue and M/G/1 queue. (10 Marks)

Module-3

- 5 a. Explain linear congruential method for generating random number. Using the same technique generate a sequence of random numbers with $X_0 = 27$, $a = 17$, $c = 43$ and $m = 100$. (10 Marks)
 b. Explain the inverse transformation technique for exponential and triangular distribution. (10 Marks)

OR

- 6 a. Explain Kolmogorov-Smirnov test. The sequence of 5 numbers 0.44, 0.81, 0.14, 0.05 and 0.93 were generated. Using KS-test with the level of significance $\alpha = 0.05$, $D_{0.05} = 0.565$. Compare $F(x)$ and $S_r(x)$ on a graph. (10 Marks)
 b. Explain acceptance-rejection technique and generate 3 Poisson variates with mean $\alpha = 0.2$ for the given random number 0.4357, 0.4146, 0.8353, 0.9952, 0.8004. (10 Marks)

Module-4

- 7 a. List and explain the steps involved in development of a useful model of input data. (10 Marks)
 b. Explain Chi-square Goodness of fit test with Poisson assumption. Using the same, test whether random numbers are uniformly distributed with level of significance $\alpha = 0.05$, $\hat{\alpha} = 3.64$, $X_{0.05,5}^2 = 11.1$. Sample data are ;

Interval :	0	1	2	3	4	5	6	7	8	9	10	11
Observed frequency :	12	10	19	17	10	8	7	5	5	3	3	1

(10 Marks)

OR

- 8 a. The time required for 30 different employers to compute and record the number of hours worked during week days given :
 0.34 0.90 1.88 1.90 0.74 2.62 2.67 8.53 4.91 5.50
 1.10 1.03 1.73 1.00 2.03 1.49 2.16 0.80 0.48 5.60
 0.45 0.26 0.24 0.63 0.36 1.28 0.82 2.16 0.05 0.04
 $K = 6$ and Critical value = 9.49 (10 Marks)
 b. Explain histograms with example. Mention its drawbacks and advantages of Q-Q plot. (10 Marks)

Module-5

- 9 a. Why is optimization via simulation difficult? What compromises are made during that process? (10 Marks)
 b. Explain point estimation and interval estimation. (10 Marks)

OR

- 10 a. Explain in detail about the model building, verifying and validation in the model building process with a diagram. (10 Marks)
 b. Explain 3-steps approach to validation of simulation model by Naylor and Finger. (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2023/Jan.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 the different types of conditional statements? Explain if, if-else and nested if with syntax and examples. (08 Marks)
- b. List the difference between while and do – while loop. (06 Marks)
- c. Write a C program to find the sum of natural numbers from 1 to n using while loop. (06 Marks)

OR

- 2 a. Define function. What are the advantages of user defined function? (06 Marks)
- b. Implement :
i) Copying one string to another (08 Marks)
ii) Reverse the given string. (06 Marks)
- c. What is pointer? Explain with the help of an example (06 Marks)

Module-2

- 3 a. What is an algorithm? List the characteristics of an algorithm. (08 Marks)
- b. What is an asymptotic notation? Explain the various types of asymptotic notations. (12 Marks)

OR

- 4 a. Define array. Interpret the representation of one dimensional array in memory with the help of an illustration. (10 Marks)
- b. Write a C program to show how matrices are realized using two-dimensional arrays. (10 Marks)

Module-3

- 5 a. What is a linked list? Explain the typical operations that are performed on a linked list. (10 Marks)
- b. Define doubly linked list. Show the logical representation and implementation of doubly linked list. (10 Marks)

OR

- 6 a. Briefly describe the LIFO principle in stack. What are the various operations that can be performed on stacks? (10 Marks)
- b. Write a C function to implement PUSH and POP operation using arrays? (10 Marks)

Module-4

- 7 a. State linear queue. Mention the applications of queue. How to insert an item into the queue. (10 Marks)
- b. Write a C function to insert and delete an item in queue. (10 Marks)

OR

- 8 a. What is the difference between complete binary tree and perfect binary tree? (06 Marks)
b. What is binary search tree? Explain with the help of an example. (06 Marks)
c. How to insert an element into a binary search tree? (08 Marks)

Module-5

- 9 a. Define the graph and the following terms :
i) Indegree and out degree
ii) Weighted graph
iii) Connected graph
iv) Strongly connected graphs. (10 Marks)
b. What is BFS? Explain with the help of an example. (10 Marks)

OR

- 10 a. Write a C program that uses the bubble sorting technique to sort an array of elements. (10 Marks)
b. Write a C program that sorts the given set of integers and performs binary search on them. (10 Marks)

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Sixth Semester B.E. Degree Examination, Dec.2023/Jan.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. Explain Storage device hierarchy with a neat diagram. (06 Marks)
- b. Discuss the working of modern computer system with a neat diagram. (06 Marks)
- c. Discuss (i) Traditional Computing (ii) Client – Server computing. (06 Marks)
- d. Define (i) Operating System (ii) Control program. (02 Marks)

OR

- 2 a. Discuss different functions provided by the operating system services. (06 Marks)
- b. Discuss about system programs in detail. (06 Marks)
- c. Discuss about the Java Virtual Machine with a neat diagram. (04 Marks)
- d. Discuss MS-DOS layered structure of an operating system with a neat diagram. (04 Marks)

Module-2

- 3 a. Discuss process control block with a neat diagram. (06 Marks)
- b. Explain Interprocess Communication model with respect to (i) Message passing (ii) Shared memory. (06 Marks)
- c. Discuss communication in Client-Server systems using sockets. (04 Marks)
- d. Discuss any four reasons for providing an environment that allow process co-operation. (04 Marks)

OR

- 4 a. Explain the benefits of a multithreaded programming. (04 Marks)
- b. Discuss different multithreaded models. (06 Marks)
- c. Explain (i) P-threads (ii) Win-32 threads (iii) Java threads. (06 Marks)
- d. Discuss any two threading issues with multithreaded programs. (04 Marks)

Module-3

- 5 a. Using priority scheduling, calculate the average waiting time for the process given below:

Process	Burst-Time	Priority
P ₁	10	3
P ₂	1	1
P ₃	2	4
P ₄	1	5
P ₅	5	2

- b. Explain Symmetric Multithreading architecture with a neat diagram. (04 Marks)
- c. Discuss (i) Multilevel Queue Scheduling (ii) Multilevel feedback queue scheduling with a neat diagram. (06 Marks)
- d. (i) Define Dispatch latency (ii) Discuss different criterias involved in scheduling an algorithm. (06 Marks)

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OR

- 6 a. Explain about Semaphores. (04 Marks)
 b. Discuss (i) Readers - Writers problem (ii) Bounded - Buffer problem. (06 Marks)
 c. Differentiate between preemptive kernels and non-preemptive kernels. (06 Marks)
 d. Discuss about different types of Storage media. (04 Marks)

Module-4

- 7 a. Discuss different methods of handling deadlocks. (06 Marks)
 b. Define Deadlock. Discuss any three issues need to be addressed if preemption is required. (04 Marks)
 c. Discuss (i) Resource allocation graph algorithm. (ii) Bankers algorithm. (06 Marks)
 d. Discuss different methods of process termination. (04 Marks)

OR

- 8 a. Discuss Segmentation Hardware with an example and a neat diagram. (06 Marks)
 b. Discuss the structure of the page table. (06 Marks)
 c. Discuss (i) Memory allocation (ii) Fragmentation. (06 Marks)
 d. Define (i) Logical address (ii) Memory - Address Register. (02 Marks)

Module-5

- 9 a. Discuss the sequence for a page fault occurrence. (06 Marks)
 b. Discuss (i) FIFO page replacement (ii) Optimal page replacement. (06 Marks)
 c. Discuss basic mechanism of memory-mapped files with a neat diagram. (06 Marks)
 d. Discuss the benefits of a slab allocator. (02 Marks)

OR

- 10 a. Discuss file's attributes of an operating system. (07 Marks)
 b. Discuss basic file operations. (06 Marks)
 c. Discuss some of the operations associated with opening a file. (04 Marks)
 d. Discuss any 3 file types. (03 Marks)
