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18CS61

## Sixth Semester B.E. Degree Examination, Jan./Feb. 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. Explain the SIC/XE machine architecture. **(10 Marks)**
   b. Suppose alpha is an array of 100 words. Write a sequence of instruction for SIC/XE to set all 100 elements of an array to 0. **(05 Marks)**
   c. What is system software? Compare system software with application software and give couple of example. **(05 Marks)**

### OR

2. a. Explain the assembler directive and data structures used in assembler. **(10 Marks)**
   b. Write an algorithm of pass 1 of 2 – pass assembler. **(05 Marks)**
   c. Explain the bootstrap loader. **(05 Marks)**

### Module-2

3. a. Explain the structure of a complier with an example. **(10 Marks)**
   b. List and example the applications of compiler technology. **(06 Marks)**
   c. Differentiate between type checking and bound checking. **(04 Marks)**

### OR

4. a. Explain the role of lexical analyzer. **(08 Marks)**
   b. What is regular expression? Write the algebraic laws of regular expression. **(06 Marks)**
   c. Explain the concept of input buffering in the Lenticels analysis. **(06 Marks)**

### Module-3

5. a. Explain the different types of error recovery strategies in process. **(06 Marks)**
   b. Explain context free grammer and derivation. **(06 Marks)**
   c. Explain the top down parsing and process for the string id + id $*$ id. Given the grammer :
   i) $E \rightarrow E + E$
   ii) $E \rightarrow E * E$
   iii) $E \rightarrow (E)$
   iv) $E \rightarrow id$
   **(08 Marks)**

### OR

6. a. Write the algorithm for recursive descent parser. For the following grammer write a recursive descent parser
   $E \rightarrow T$
   $T \rightarrow F$
   $E \rightarrow E + T$
   $T \rightarrow T * F$
   $F \rightarrow (E)/id.$ **(08 Marks)**
   b. Is the following grammer ambiguous?
   (if – statement or if – then – else)
   $S \rightarrow i\ c\ t\ S\ |\ i\ c\ t\ S\ e\ S\ |\ a$
   $C \rightarrow b.$ **(04 Marks)**
   c. Explain bottom – up parsing, shift-reduce parsing and LL(1) grammer. **(08 Marks)**

## Module-4

7  a. Explain the LEX specification with an example to count number vowels and consonants.
**(10 Marks)**

b. Explain the meta characters used in regular expression with an example. **(05 Marks)**

c. Write a LEX program to count the number of scanf and printf statement and replacing them with readf and writef respectively. **(05 Marks)**

## OR

8  a. Explain the YACC specification with an example. **(10 Marks)**

b. Write a YACC program to accept strings of the form $a^n b^n$ (n > 0). **(05 Marks)**

c. Discuss two types of conflict in YACC with an example. **(05 Marks)**

## Module-5

9  a. What is syntax directed definition? Write the grammer and SDD for a simple desk calculation and show annotated Parse tree for the expression (3 + 4) * (5 + 6). **(08 Marks)**

b. What is an attribute? Explain the different types of attributes with example. **(08 Marks)**

c. What is the difference between syntax tree and parse tree? **(04 Marks)**

## OR

10  a. Explain the Intermediate Code Generation (ICG) and type of method used to convert ICG.
**(10 Marks)**

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

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## Sixth Semester B.E. Degree Examination, Jan./Feb. 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. List and explain any six applications of computer graphics. **(08 Marks)**
   b. Explain the Refresh Cathod Ray Tubes with the neat diagram. **(12 Marks)**

**OR**

2  a. Develop the code of the Bresenhams Line Drawing Algorithm. Also illustrate the algorithm the line end points are (20, 10) and (30, 18). **(10 Marks)**
   b. Write circle drawing algorithm. Given a circle radius r = 10, solve the midpoint circle algorithm by determining positions along the circle octant in the first quadrant from x = 0 to x = y. **(10 Marks)**

### Module-2

3  a. Classify the polygon. Explain two methods for inside-outside test of a polygon. **(10 Marks)**
   b. Develop the concept of Scanfill algorithm for filling algorithm for filling polygon with suitable diagrams. **(10 Marks)**

**OR**

4  a. Explain translation, rotation and scaling of 2D transformation with suitable diagrams, code and matrix. **(10 Marks)**
   b. Explain OpenGL raster transformations and OpenGL geometric transformation functions. **(10 Marks)**

### Module-3

5  a. Develop the Cohen Sutherland Line Clipping program using OpenGL. **(10 Marks)**
   b. Explain any two of the 3D geometrical transformation. **(10 Marks)**

**OR**

6  a. Explain the Sutherland Hodgeman Polygon clipping with example. **(10 Marks)**
   b. Discuss the RGB color model and CMY color model. **(10 Marks)**

### Module-4

7  a. Define orthogonal projections. Explain clipping window and orthogonal projection view volume in 3D. **(10 Marks)**
   b. Explain the three dimensional view pipeline. **(10 Marks)**

**OR**

8  a. Construct perspective-projection transformation coordinates and perspective projection equations special cases. **(10 Marks)**
   b. Explain the Depth-Buffer method and develop its algorithm. **(10 Marks)**

### Module-5

9  a. Explain any three programming event driven input with suitable examples. **(10 Marks)**
   b. Explain the various input modes with neat diagram. **(10 Marks)**

**OR**

10  a. Explain Animating Interactive Program. **(10 Marks)**
    b. Discuss Logical Device and Hierarchical Menus. **(10 Marks)**

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18CS63

## Sixth Semester B.E. Degree Examination, Jan./Feb. 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. What is HTML? What are the three aims of HTML5? (04 Marks)
  b. What is list? What are the different types of lists? Explain with example. (06 Marks)
  c. Explain semantic structure elements of HTML5. (10 Marks)

**OR**

2 a. What is CSS? Why it is important? (02 Marks)
  b. Explain the CSS syntax. (08 Marks)
  c. Describe the common Backround properties. (10 Marks)

### Module-2

3 a. Write HTML code for the following table :

SUMMER & RAINY SEASON

| Year – 2022 | | |
|---|---|---|
| April | May | June |
| Summer Holiday | | School Open |
| | | Rainy Season |
| Water Melon | Mango | Guava |

(10 Marks)
  b. Explain positioning elements in CSS. (10 Marks)

**OR**

4 a. Explain media queries in CSS. (10 Marks)
  b. What are the two different ways to hide the CSS elements? Explain. (04 Marks)
  c. Write a HTML code for the following choice controls :
     (i) SelectLists    (ii) Radiobuttons    (iii) Checkboxes (06 Marks)

### Module-3

5 a. Explain the JavaScript objects. (10 Marks)
  b. Explain Include Files and its scope in PHP. (07 Marks)
  c. Write PHP program using,
     (i)    Switch.
     (ii)   If...else (03 Marks)

**OR**

6 a. Explain where does Javascript go. (10 Marks)
  b. Explain : (i) PHP Tags                    (ii) PHP comments
             (iii) Variables, datatypes and constant  (iv) Writing to output (10 Marks)

## Module-4

7  a.  Explain Error codes in PHP for file upload.                                    (08 Marks)
   b.  Write a script to open, read and closing the file.                             (02 Marks)
   c.  Explain the relationship between the class and object.                         (10 Marks)

### OR

8  a.  Explain the role of interface in object oriented programming.                  (10 Marks)
   b.  Describe some key array functions in PHP.                                      (10 Marks)

## Module-5

9  a.  Define JQuery. Explain JQuery selectors with suitable code.                    (10 Marks)
   b.  What are Cookies? How do you handles them in PHP.                              (10 Marks)

### OR

10 a.  Explain page output caching.                                                   (10 Marks)
   b.  Explain JSON representation of XML data.                                       (10 Marks)

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## Sixth Semester B.E. Degree Examination, Jan./Feb. 2023
## 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. Specify the situations when simulation is an appropriate tool. **(10 Marks)**
   b. Simulate a single server queuing system for 10 customers and find i) Average waiting time ii) Probability that a customer has to wait iii) Average service time iv) Average system time Interarrival time and service time distribution are given as follows :

   Interarrival time (min)  1   3   5
   Probability            0.5  0.3  0.2
   Random Numbers   8, 5, 2, 1, 0, 9, 6, 7, 5

   Service time (min)    1    2    3    4
   Probability        0.30  0.35  0.15  0.20
   Random Numbers  21, 10, 94, 76, 43, 19, 69, 17, 86, 38

   **(10 Marks)**

### OR

2  a. Define the concepts used in discrete event simulation with an example for each. **(10 Marks)**
   b. Write event scheduling algorithm. Illustrate the execution of arrival event and departure event in event scheduling approach using flowchart. **(10 Marks)**

### Module-2

3  a. Explain Poisson distribution and its properties. **(05 Marks)**
   b. A production process manufactures computer chips on the average at 3% defective. Every day, a random sample of size 50 is taken from the process. If the sample contains more than two defective chips the process will be stopped. Compute the probability that the process is stopped by the sampling scheme. **(05 Marks)**
   c. Highlight the characteristics of a queuing system to be observed while applying simulation as a tool to solve. **(10 Marks)**

### OR

4  a. A bus arrives every 15 minutes at a specified stop beginning at 6.45am and continuing until 9.00am. A certain passenger does not know the schedule, but arrives randomly (uniformly distributed) between 7.00am and 7.30am every morning. What is the probability that the passenger waits for more than 5 minutes for a bus? **(10 Marks)**
   b. Illustrate with an example, the Kendall's queuing notation. **(04 Marks)**
   c. Given the number of customers in the system at time 't', how do you compute the long, run time average number of customers in system and in queue? Justify with an example. **(06 Marks)**

## Module-3

5 a. Define pseudo random numbers. What are the problems that occur while generating pseudo random numbers? **(06 Marks)**

b. Use mixed congruential method to generate a sequence of four two digit random integers between 0 and 24 and corresponding random numbers with $x_0 = 13$, $a = 19$ and $c = 35$. **(04 Marks)**

c. The sequence of numbers 0.54, 0.76, 0.98, 0.11 and 0.68 has been generated. Use Kolmogorov – Smirnov test with $\alpha = 0.05$ to learn whether the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected, Consider $D_\alpha = 0.565$. **(10 Marks)**

### OR

6 a. Test whether the following numbers are uniformly distributed using chi-square test at $\alpha = 0.05$. Consider 10 intervals and $\chi^2_{0.05,9} = 16.9$.

0.59, 0.92, 0.51, 0.05, 0.50, 0.35, 0.26, 0.79, 0.78, 0.44, 0.09, 0.79, 0.22, 0.12, 0.47, 0.82, 0.07, 0.18, 0.92, 0.85, 0.03, 0.87, 0.45, 0.34, 0.12, 0.98, 0.45, 0.90, 0.83, 0.01, 0.32, 0.98, 0.43, 0.3, 0.21, 0.12, 0.01, 0.7, 0.43, 0.12, 0.78, 0.76, 0.32, 0.54, 0.65, 0.43, 0.21, 0.56, 0.43, 0.86. **(10 Marks)**

b. Test whether the $2^{nd}$, $6^{th}$ and $10^{th}$ and so on numbers are autocorrelated at $\alpha = 0.05$ in the following sequence. Consider $z_{0.025} = -1.96$
0.59, 0.92, 0.51, 0.05, 0.50, 0.35, 0.26, 0.79, 0.78, 0.44, 0.09, 0.79, 0.22, 0.12, 0.47, 0.85, 0.07, 0.18, 0.92, 0.85. **(10 Marks)**

## Module-4

7 a. What are the steps in the development of a useful model of input data? What is the importance of histogram in this process? How is a histogram constructed? **(10 Marks)**

b. Which are the measures of performance of a simulated system? How do you estimate them? **(10 Marks)**

### OR

8 a. How do you estimate the parameters of the following distributions? Highlight the features of these distributions.
i) Poisson ii) Exponential iii) Gamma iv) Normal v) Lognormal. **(10 Marks)**

b. Highlight the features of the types of simulations with respect to output analysis with examples for each. **(10 Marks)**

## Module-5

9 a. Explain model building, verification and validation with respect to simulation models. **(10 Marks)**

b. Explain Naylor and Finger 3 steps approach to aid in the validation process. **(10 Marks)**

### OR

10 a. Differentiate between verification and validation of simulation models. Suggest the techniques which help in verification. **(10 Marks)**

b. Illustrate the calibration technique for simulator model. **(10 Marks)**

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18CS652

### Sixth Semester B.E. Degree Examination, Jan./Feb. 2023
## Introduction to Data Structure 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. Write an algorithm, pseudocode and flow chart for finding roots of a quadratic equation.
**(10 Marks)**

 b. Write a program to generate the following pyramid using an array:
```
              1
           2  1  2
        3  2  1  2  3
     4  3  2  1  2  3  4
```
**(05 Marks)**

 c. Write a program to find the factorial of a given number using recursive function. **(05 Marks)**

### OR

2  a. Explain the following looping statement. Using syntax, flow chart and code snippet.
i) While loop    ii) For loop. **(10 Marks)**

 b. Write a program to swap two integers x and y using function call (call by value). **(05 Marks)**

 c. Write a program using structure to store and display:
i) Name    ii) Age    iii) Salary of 03 employees. **(05 Marks)**

### Module-2

3  a. Define the following asymptotic notations and explain its relevance  i) Big oh    ii) Omega.
**(10 Marks)**

 b. Write a code to multiply two matrices A and B and display result using matrix C. **(10 Marks)**

### OR

4  a. Briefly explain the following:
i) Linked list    ii) Stacks    iii) Queue    iv) Tree    v) Graph. **(10 Marks)**

 b. Write a code to read marks of 05 different subjects of students into an array and display the average. **(05 Marks)**

 c. Write a program to store and print 12 data elements in a three dimensional array. **(05 Marks)**

### Module-3

5  a. Explain the different types of linked list with suitable logical diagram. **(10 Marks)**

 b. Write a program to implement a stack using an array. **(10 Marks)**

### OR

6  a. Explain push( ) and pop( ) operation of stack with the help of algorithm and logical diagram.
**(10 Marks)**

 b. Write a program to delete a node from singly linked list. **(10 Marks)**

## Module-4

**7** a. What is a circular queue? Explain with an example. **(05 Marks)**
b. Explain insert and delete operation in linked list implementation of a queue. **(05 Marks)**
c. Write a program to i) Insert   ii) Delete   and   iii) Search in a binary search using linked list. **(10 Marks)**

### OR

**8** a. Explain the following binary tree concepts with examples:
i) Strictly binary   ii) Complete binary   iii) Perfect binary   iv) Balanced binary. **(10 Marks)**

b. Perform the following operation on the given queue:

| Q     | 4 | 5 | -9 | 66 |   |   |   |   |
|-------|---|---|----|----|---|---|---|---|
| Index | 0 | 1 | 2  | 3  | 4 | 5 | 6 | 7 |

i) Insert (Q, 6)   ii) Delete Q   iii) Delete Q   iv) Insert (Q7)   v) Delete Q. **(10 Marks)**

## Module-5

**9** a. Explain the following graph data structure: i) Adjacency matrix   ii) Path matrix   iii) Adjacency list. **(10 Marks)**
b. Write a program/Algorithm to implement bucket sort technique to sort random integers. **(10 Marks)**

### OR

**10** a. Explain the bubble sort technique for an array using algorithm and logical diagram. **(10 Marks)**

b. Write a program/algorithm to find shortest path matrix of a weighted diagraph using Warshall's algorithm. **(10 Marks)**

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**18CS654**

## Sixth Semester B.E. Degree Examination, Jan./Feb. 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 role of operating system from different point of view. **(06 Marks)**

   b. Explain the following briefly:
   i) Process Management
   ii) Memory Management **(06 Marks)**

   c. Define a virtual machine. With a neat diagram, explain the working of a VM. **(08 Marks)**

**OR**

2  a. Explain the dual mode of a operating system with a neat diagram. **(08 Marks)**

   b. Compare multiprogramming and time-sharing systems. **(06 Marks)**

   c. What are system calls? Briefly point out its types. **(06 Marks)**

### Module-2

3  a. With neat diagram, explain the different states of a process and process control block. **(10 Marks)**

   b. Define IPC (Inter Process Communication). What are the different methods used for logical implementation of message-passing system. **(10 Marks)**

**OR**

4  a. Discuss the various multi-threading models with diagram. **(06 Marks)**

   b. Discuss benefits of multithreaded programming. **(04 Marks)**

   c. Consider the following set of processes:

   | Process | Arrival Time | Burst time |
   |---------|--------------|------------|
   | $P_1$ | 0 | 1 |
   | $P_2$ | 1 | 9 |
   | $P_3$ | 2 | 1 |
   | $P_4$ | 3 | 9 |

   i) Draw the Gantt chart for execution of these processes using FCFS, preemptive SJF and RR with time quantum = 4.
   ii) Compute the average turn around time for all the above algorithm.
   iii) Compute the average waiting time for all the above algorithms. **(10 Marks)**

### Module-3

5  a. Illustrate with example he Peterson's solution for critical section problem and prove that the mutual exclusion property is preserved. **(10 Marks)**

   b. Show how semaphore provides solution to reader – writer problem. **(10 Marks)**

**OR**

6  a. What is deadlock? Explain the necessary conditions for deadlock situation to arise in a system. **(08 Marks)**

b. Consider the following snapshot of a system:

| Process | Allocation | | | | Maximum | | | | 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 | | | | |

Answer the following questions using Banker's algorithm:
i) What is the content of the matrix need?
ii) Is the system is in safe state?
iii) If a request from process $P_1$ arrive for (0, 4, 2, 0) can the request granted immediately?
(12 Marks)

## Module-4

7  a. Define paging. Explain paging hardware with a neat block diagram. (08 Marks)
   b. Analyze the problem in simple paging technique and show how TLB is used to solve the problem. (06 Marks)
   c. Given memory partition of 200K, 400K, 500K, 300K, 500K, 400K. Apply first fit and best fit to place 315K, 427K, 250K, 550K. (06 Marks)

## OR

8  a. What is segmentation? Explain basic method of segmentation with an example. (10 Marks)
   b. What is swapping? Does this increase the OS overhead? Justify your answer. (04 Marks)
   c. Illustrate with an example, the internal and external fragmentation problem encountered in continuous memory allocation. (06 Marks)

## Module-5

9  a. Consider the following page reference string:
      7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
      For a memory with 3 frames. How many page faults would occur for LRU, FIFD and optimal page replacement algorithm? Which is the most efficient among them? (10 Marks)
   b. What is demand paging? Discuss the steps involved in handling a page fault. (10 Marks)

## OR

10 a. Explain access matrix method of system protection. (06 Marks)
   b. Discuss various access methods of file system. (06 Marks)
   c. Explain the various types of directory structures. (08 Marks)

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