

**School of Computing**  
**Second CIA Exam –March 2024**  
Course Code: CSE215  
Course Name: Software Engineering  
Duration: 90 minutes Max Marks: 50

## PART A

### Answer to all Questions

**10 x 2 marks = 20 marks**

1. Design a use case diagram of “withdrawing Money from ATM” Scenario and get a concurrent message from the bank with 3 types of actors.
2. Develop sequence diagram for “Rhyme App” to school children that narrates chosen English rhymes then translates its meaning automatically towards NLP using google translator and finally stored in a google drive.
3. Identify Domain classes, Analysis classes, Potential classes, Design classes of “online Food ordering system”
4. Build the design pattern template.
5. Find the online, offline collaborators of the following to the Online Hospital Management System: HomePage, DBAdmin, Patients, Doctors, Receptionist, TokenNo, Visitors, Camera, medicines, prescription\_report, Scan\_report, XRay\_machine and draw collaboration diagram
6. Find architectural style of the following:
  - a. Mobile phone recharge system by multiple clients, ISP
  - b. Online exam system through centralized Question repository for JEE exam.
  - c. Binary pipeline search of Not-available element
  - d. Component, Package, Modules, program, instruction and data design
7. Why does a good software design must exhibits firmness, commodity, delight? Justify.
8. What are the design issues of UI design and design models of it?

9. Find correct terms and Match the following architectural genre:

Artificial Intelligence - Netflix

Commercial – Alexa

Communication - cricInfo

Sports - telegram

10. What is the need for refactoring?

## PART-B

**Answer any three Questions:**

**3 x 10 marks = 30 marks**

11. a. Explain all Design principles, b. Elaborate all types of coupling and cohesion of component level design. (5+5 marks)

12. Explain all OO concepts and Fundamental design concepts with example (5+5 marks)

13. Explain all UI principles.

14. Explain the components (5marks) of Conversion process of “analysis to design model” with suitable pyramid picture. (5marks)



# SASTRA

DEEMED TO BE UNIVERSITY  
MANAGEMENT TECHNOLOGY INSTITUTE



School of Computing  
Second CIA Exam -Mar 2024  
Course Code: CSE208  
Course Name: Operating Systems  
Duration: 90 minutes Max Marks: 50

MANAGEMENT TECHNOLOGY INSTITUTE

## PART A (2 \* 10 = 20) Answer all the questions

1. Consider the following program execution involving 2 threads accessing the shared variable 'i' = 0.

Thread1

```
i++;  
while(i<2);
```

Thread2

```
i++;  
while(i<2);
```

Which of the following statement(s) is/are correct? justify .

- A. Both threads will never finish execution
- B. Both threads will always finish execution
- C. At least one of the threads will always finish execution
- D. Either both threads will finish, or none of them will finish execution

2. Mention the syntax of pthread\_create and pthread\_join
3. Define target thread and mention the two scenarios how it can be cancelled
4. Specify any two programming examples to claim multithreading provides better performance than a single-threaded solution.
5. Relate strong semaphore and the need for spinlock.
6. Define monitor and mention its use.
7. Is mutual exclusion guaranteed in counting semaphore state yes or no then justify.
8. Consider a non negative semaphore S. 20P(S) and 14 V(S)operations are performed on S in some order, where P(S) decrements S and V(S) increments. Estimate the largest initial value of S that will keep at least one process blocked.
9. Consider a system having m resources of the same type. These resources are shared by 3 processes A, B and C which have peak demands of 3, 4 and 6 respectively. For what value of m, deadlock will not occur?

10. Consider the following threads, T1, T2 and T3 executing on a single processor, synchronized using three binary semaphore variables, S1, S2 and S3, operated upon using standard wait( ) and signal( ). The threads can be context switched in any order and at any time.

T1	T2	T3
<pre>while(true) { wait(S3)  print("C")  signal(S2) }</pre>	<pre>while(true) { wait(S1)  print("B")  signal(S3) }</pre>	<pre>while(true) { wait(S2)  print("A")  signal(S1) }</pre>

Find the initial value of S1,S2,S3 that would print the sequence BCABCABCA..... ?

### PART B (3 \* 10 = 30) Answer any three questions

11. Develop the structure of the reader and writer process to achieve synchronization between multiple readers and writers. Mention the challenge posed on writers by allowing concurrent readers and how it can be resolved.
12. Elaborate multithreading models and highlight the benefits of multithreaded programming.
13. Consider a system of 6 process P0 to P5 using 4 types of resources A,B,C and D as 15,6, 9,10 instances of each type respectively. For the given allocation and maximum matrix determine safe allocation is possible. If so mention the safe sequence.

	Current Allocation				Maximum Need			
	A	B	C	D	A	B	C	D
P0	2	0	2	1	9	5	5	5
P1	0	1	1	1	2	2	3	3
P2	4	1	0	2	7	5	4	4
P3	1	0	0	1	3	3	3	2
P4	1	1	0	0	5	2	2	1
P5	1	0	1	1	4	4	4	4

With reference to the above question no. 13, determine whether a new request from P5 with (3,2,3,3) instances from each type can be accepted. If it is possible, generate the safe sequence otherwise estimate the minimum no of additional instances required from each type to handle a deadlock free execution.



**PART A**

**5 X 2 = 10 MARKS**

**Answer all the questions**

1. Mention the innovation at three levels.
2. Explain Ishikawa fishbone diagram with an illustrative example.
3. Discuss the concept of technology watch.
4. List down the various terms involved in effectuation process.
5. Sketch out the Lean management technique, as a scientific approach to creating and managing startups.

**PART B**

**2 X 15 = 30 MARKS**

**Answer ANY 2 questions**

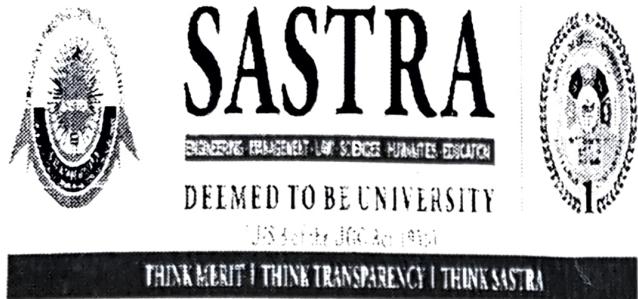
6. As an entrepreneur, explain the various forms of business. Also describe the strategies for going global.
7. “It is a solution-based approach to solving problems, with an iterative process, categorizing alternative strategies and solutions.” Identify the process and summarize the iterative process in detail.
8. Rani is a project manager with lot of projects to choose from. Give a guideline for Rani to evaluate the best project with both discounting and non-discounting criteria. Moreover, Rani would like to appraise her company with proper interpretation through ratio analysis. Explain the various ratios involved in it.

**PART C**

**1 X 10 = 10 MARKS**

**Answer the question**

9. Elucidate the stages of innovation with a clear mention of the various idea creation methodologies or techniques available.



**School of Computing**  
**Second CIA Exam –March 2024**  
Course Code: ENG212  
Course Name: Business  
Communication & Value Science III  
Duration: 90 minutes Max Marks: 50

## **PART A**

**Answer any 3 of the following questions in about 300 words:**

**(3x10=30 Marks)**

1. Produce a user manual for any gadget, you have recently purchased. Include Logo, Caption, safety guidelines, functions and capabilities of the product, variants, instructions for installation, use & troubleshooting and warranty statement
2. Motivation causes you to act in a way that gets you closer to your goals - substantiate with adequate example and pictorial representation.
3. Draft a Feasibility Report to start a organic products manufacturing unit. Organic production is a system that integrates cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.. Your report should contain- terms of reference, work done, findings, recommendations and conclusion.
4. The influence of river in culture – Substantiate with adequate examples

## **Part B**

**Answer the following question in about 400 words (1x20=20 Marks)**

5. Design your University in 2035 anticipating the future, embedded with modern digital technology.

### PART A

Answer all the questions

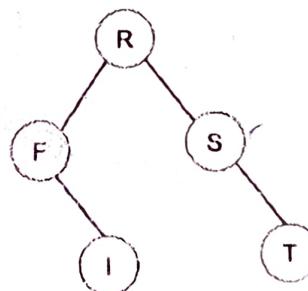
**10 x 2 = 20 Marks**

1. Compare the backtracking strategy with brute-force approach.
2. Predict the algorithm design strategy used in the following algorithms. (a) 0/1 Knapsack Problem (b) Sum of Subset Problem  
(b) String Editing Problem (d) Kruskal's Algorithm
3. Relate the hamiltonian cycles problem with the Travelling Salesman Problem.
4. Mention the bounding conditions used for backtracking in sum of subset problem.
5. Say True or False
  - (a) In the adjacency matrix representation of directed graph, the matrix is symmetric.
  - (b) In the adjacency matrix representation of undirected graph, the number of 1's is twice the number of vertices.
6. Match the following.

Prim's Algorithm	Topological Order
BFS	Priority Queue
DFS	SET concept
Kruskal's Algorithm	Queue

7. Find the search cost for the following BST with the given probability of key elements.

n=5	0	1	2	3	4	5
Keys[1..5]	F	I	R	S	T	
P[1..5]		0.15	0.1	0.05	0.1	0.2
Q[0..5]	0.05	0.1	0.05	0.05	0.05	0.1



8. Write the recursive formula of optimal sub structure property for the 0/1 knapsack problem.
9. Describe the n-Queen problem
10. What is the use of State Space Tree?

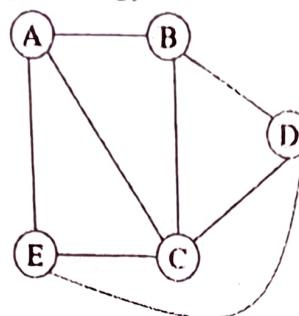
## PART B

Answer any three questions

**3 x 10 = 30 Marks**

11. (a) Write the algorithm using backtracking strategy for the sum of subset problem. **(5 Marks)**

- (b) Find all the hamiltonian cycles present in the following graph by applying backtracking strategy. **(5 Marks)**

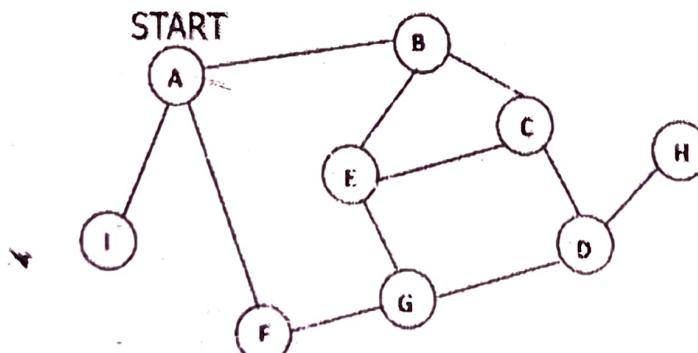


12. (a) Write dynamic programming algorithm for constructing optimal binary search tree. **(5 Marks)**

- (b) Construct the optimal binary search tree for the following root table ( $r$ ) which is obtained by applying dynamic programming approach for the key elements: Keys[1..5] = {F, I, R, S, T}. **(5 Marks)**

0	1	2	3	4	5	$r$
0	1	1	2	2	2	0
0	2	2	2	4		1
0	3	4	5			2
0	4	5				3
0	5					4
0						5

13. Which traversal algorithm used for finding shortest distance from the given starting vertex to all other vertices in a unweighted graph. Write the algorithm and find the shortest distance from 'A' to all other vertices by tracing algorithm.



14. Transform a string "L E V E N S H T E I N" into another string "M E I L E N S T E I N" by using minimum numbers of editing operations by applying dynamic programming approach.



**SASTRA**  
SASTRA DEEMED TO BE UNIVERSITY



UGC-Accredited (2013-2018)  
THANJAVUR | KUMBAKONAM | CHENNAI

**School of Arts, Science, Humanities and Education (SASHE)**

**SECOND CIA Test – MARCH 2024**

**Course Code:** MAT330R01

**Course Name:** OPERATIONS RESEARCH

**Duration:** 90 minutes

**Max Marks:** 50

### PART-A

[ $5 \times 2 = 40$  Marks]

**Answer all the questions:**

1. Define Basic Feasible Solution (BFS) to the transportation problem.
2. Define degenerate and non-degenerate in transportation problems.
3. What do you mean by balanced and unbalanced transportation problems?
4. Give any two differences of the Transportation problem and the Assignment Problem.
5. Write the mathematical formulation of an assignment problem..

### PART B

[ $4 \times 10 = 40$  Marks]

**Answer ANY FOUR questions:**

6. Obtain an initial basic feasible solution to the following transportation problem using the NORTH-WEST Corner rule:

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

7. Obtain an optimum basic feasible solution to the following transportation problem.

	$B_1$	$B_2$	$B_3$	$B_4$	$B_5$	Supply
$A_1$	5	8	6	5	3	8
$A_2$	4	7	7	6	5	5
$A_3$	8	4	6	6	4	9
Demand	4	4	5	4	8	

8. Obtain an optimal basic feasible solution to the transportation problem given in the following table:

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$S_1$	19	30	50	10	7
$S_2$	70	30	40	60	9
$S_3$	40	8	70	20	18
Demand	5	8	7	14	

9. Write an algorithm for the Hungarian method.
10. A company is faced with the problem of assigning four different salesmen to four territories for promoting its sales. Territories are not equally rich in their sales potential and the salesmen also differ in their ability to promote sales. The following table gives the expected annual sales (in thousand of rupees) for each salesman if assigned to various territories. Find the assignment of salesmen so as to maximize the annual sales.

	Territories			
	$T_1$	$T_2$	$T_3$	$T_4$
$S_1$	60	50	40	30
$S_2$	40	30	20	15
$S_3$	40	20	35	10
$S_4$	30	30	25	20