

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-15.
CSPC51 - Computer Architecture
V Semester - Section B / Cycle Test 1**

Answer ALL Questions

**Date: 8.09.2023
Max: Marks: 20**

1. Let a program have a portion of its code enhanced to run 4 times faster, to yield a system speedup 3.3 times faster (so $S = 3.3$). What is the fraction enhanced? (2)
2. A quad core processor could speed up a computer by a factor of 4 but this rarely happens. Use Amdahl's Law to compute the percentage of program execution that needs to be distributed across all 4 cores to achieve an overall speedup of 3, of 2, of 1.5, of 1.25. (3)
3. A benchmark has a breakdown of the following: 39% loads, 12% stores, 28% ALU operations other than multiplies/divides, 6% multiplies, 2% divides, 10% conditional branches, 3% unconditional branches. A processor has a CPI of 5 for loads/stores, 3 for all ALU operations other than multiplies/divides, 6 for multiplies, 15 for divides, and 4 for branches. We are considering making one of several enhancements to the ALU. Which should we make? (5)
 - a. Improving the condition tester so that conditional branch CPI is reduced to 2
 - b. Improving the multiplier so that the CPI for multiplies is reduced to 3
 - c. Improving the divider so that the CPI for divides is reduced to 7
 - d. Improving the ALU so non-multiply/divide operations have a CPI of 2
4. Consider an implementation of MIPS ISA with 500 MHz clock and (5)
 - each ALU instruction takes 3 clock cycles,
 - each branch/jump instruction takes 2 clock cycles,
 - each sw instruction takes 4 clock cycles,
 - each lw instruction takes 5 clock cycles.

Also, consider a program that during its execution executes:

- $x=200$ million ALU instructions
- $y=55$ million branch/jump instructions
- $z=25$ million sw instructions
- $w=20$ million lw instructions

Find CPU time. Assume sequentially executing CPU.

5. Consider a bus-based shared memory system consisting of three processors. The shared memory is divided into three blocks x, y, z. Each processor has a cache that can fit only two blocks at any given time. Each block can be in one of two states: valid (V) or invalid (I). Assume that caches are initially flushed (empty) and that the contents of the memory are as follows: (5)

Memory block	X	y	z
Contents	10	100	1000

Consider the following sequence of memory access events given in order: 1) P1: Read(x, y), 2) P2: Read(x, z), 3) P3: Read(y, z), 4) P1: $x = x + 10$, 5) P1: Read(z), 6) P2: Read(x), 7) P3: $x = 15$, 8) P1: $z = z + 10$, 9) P2: $x = 15$, 10) P2: $z = z + 30$.

Show the contents of the caches and memory and the state of cache blocks after each of the above operations using the write-through and write-invalidate protocol as shown below.

Instruction	Action	XYZ	P1	P2	P3

NATIONAL INSTITUTE OF TECHNOLOGY,
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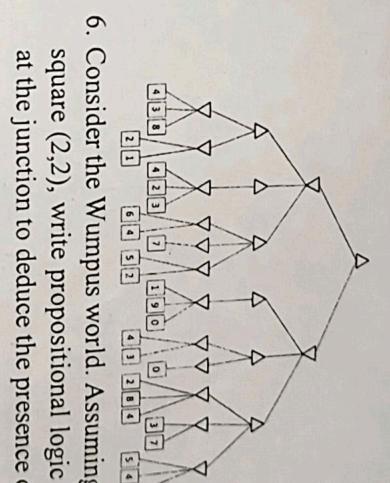
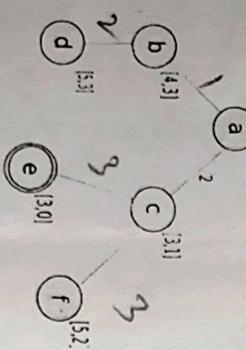
B.Tech (CSE) - Cycle Test 1 – July - December 2023

CSPC54- Introduction to Artificial Intelligence and Machine learning
 Semester: V
 Curriculum: NITTUGCSE21

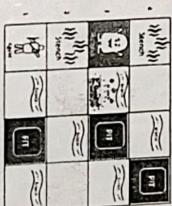
Max Marks: 15
 Time: 1 hour

Date of Exam: 11th September 2023

1. Give PEAS for the following activities: (CO2) (2)
- Knitting a Sweater
 - AI News Reader.
2. Give a complete problem formulation for the following problem so that the implementation is possible. Discuss the state space. "To navigate a robot out of a maze. The robot starts in the centre of the maze facing north. You can turn the robot to face north, south, east, or west. You can direct the robot to move forward a certain distance, although it will stop before hitting the wall." (CO2) (2)
3. Consider the search problem represented in the following figure, where a is the start node and e is the goal node. The pair $[f, h]$ at each node indicates the value of the f and h functions for the path ending at that node. (CO1) (3)
- Given this information, what is the cost of each arc?
 - Is the heuristic function h admissible? Explain why or why not.
- Trace A* on this problem. Show what paths are in the frontier at each step.
- Best Wishes ---



6. Consider the Wumpus world. Assuming that the agent has moved to square (2,2), write propositional logic statements that are required at the junction to deduce the presence of wumpus in cave $W_{1,3}$. (CO3) (2)



4. Create a representation of the n-queens problem on a $4 * 4$ square. Take a representation and compute the heuristics value. Perform hill search on the computed heuristics value and show the efficiency of the approach. (CO1) (2)
5. Determine the values of each node by applying minimax procedure. Show the results after applying $\alpha\beta$ pruning. (CO1) (4)



Department of Computer Science and Engin

EYEL E TEST Examination

CSPE 51 – Augmented and Virtual Reality

Date : 08.09.2023

Time : 11 am – 12 pm

Max. mark : 20

1.
 - a) What is DoF? How is the relationship between DoF and immersion level? (2)
 - b) What is the need for a tracker? List out the different trackers used in Virtual Reality. (2)
 - c) What is a haptic device? How does it work in Virtual reality? (2)
 - d) What kind of immersion will you get in the following visual display? (2)
i) Head Mounted Display, b) Stationary Display, c) Hand based display and d) Desktop display
 - e) What is move – the – world in travel? What is the difference between move –the –world and scale – the – world? (2)

2.
 - a) Obtain a transformation matrix for the rotation of an object in the clockwise direction about a specified pivot point (x_f, y_f) . (2)
 - b) Check whether the following is true (Case 1 = Case 2) w.r.t. a line AB whose end points are $A = (1,1)$ & $B = (10,10)$ (3)
Case 1: First reflect the line AB about y-axis and then the line $y = -x$.
Case 2: Rotate the line AB by -270°
Justify your answer.
 - c) Reflect the object ABC about the line $2y = x + 4$. The position vector of the coordinate ABC is $A = [6,3,3]$, $B = [3,2,1]$ and $C = [2,4,2]$. (5)

National Institute of Technology, Tiruchirappalli - 15.
Department of Computer Science & Engineering
CSPC52- Database Management Systems
Cycle Test -I

Class / Semester : III yr CSE / V sem.

Time : 11:00 to 12.00 Noon

Venue/ Date : ORION S5& S6 / 11/09/2023

Max. Marks : 20

Answer all questions

1. Define views. How views are created in SQL? What are the problems associated with views? (2)
2. What are compatible relations? List two operations that are applied on compatible relations. (2)
3. Consider Ternary relationship exist between Employee, his skillset and the Project assigned to him. How will you break it into binary relationship? Assume your own attributes and draw the ER diagram for both the binary and ternary form of relationship for the above scenario. (2)
4. Consider the following information about a university database: (4)

Professors have an SSN, a name, an age, a rank, and a research specialty. Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.). Each project is managed by one professor (known as the project's principal investigator). Each project is worked on by one or more professors (known as the project's co-investigators). Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students (known as the project's research assistants). When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one. Departments have a department number, a department name, and a main office. Departments have a professor (known as the chairman) who runs the department. Professors work in one or more departments, and for each department that they work in, a time percentage is associated with their job. Graduate students have one major department in which they are working on their degree. Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.

Design and draw an ER diagram that captures the information about the university. Use only the basic ER model here; that is, entities, relationships, and attributes. Be sure to indicate any key, mapping and participation constraints. State any assumptions necessary to support your design.

5. Discuss about referential integrity constraints with respect to data base modification? (2)
6. A relation R(A, B, C, D, E, F, G, H) and set of functional dependencies are
CH→G,
A→BC,
B→CFH,
E→A,
F→EG
Then how many possible super keys are present? Also find possible candidate keys. (3)

7. Consider the two relations:

(2)

Branch:

<i>branch-name</i>	<i>branch-city</i>	<i>assets</i>
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
<u>Pownal</u>	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

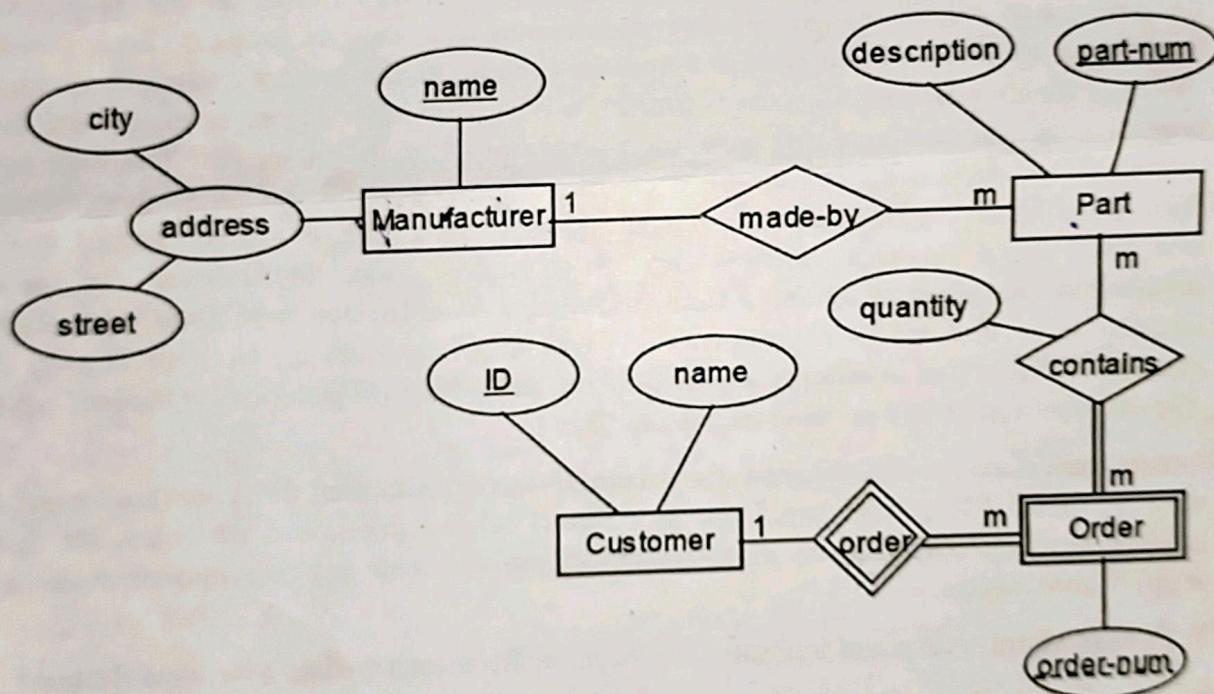
Account:

<i>account-number</i>	<i>branch-name</i>	<i>balance</i>
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

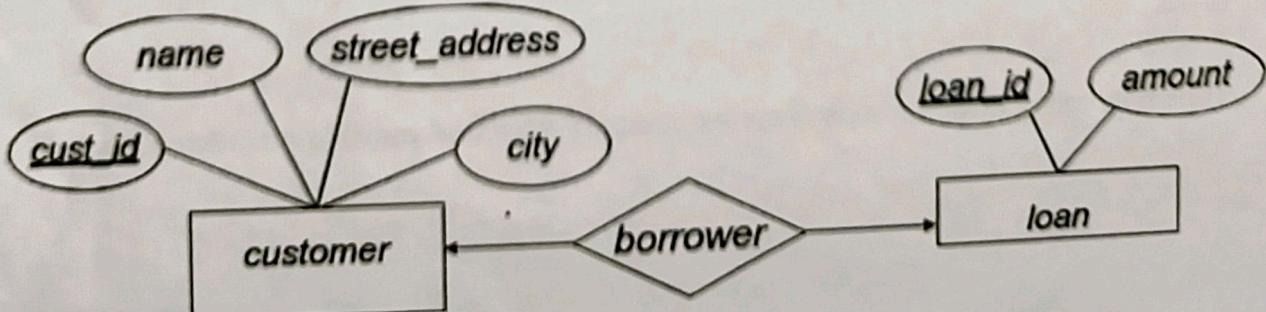
How many tuples do $\sigma_{\text{branch-name} = \text{"Pownal"}}$ branch \times Account have?

8. Consider the following ER diagram. While converting to relational model, how many tables are possible at maximum and minimum?

(2)



9. Consider the following ER diagram. Where the attribute Access data which describes the date on which the loan has been accessed recently, can be placed to avoid null values? (1)



National Institute of Technology Tiruchirappalli

Computer Science and Engineering

V Semester-Section A

CSPE56 - Cloud Computing

Cycle Test 2

DATE: 02.11.2022

DURATION: 60 minutes

Max. Marks: 20

Instructions: Answer all the questions and draw diagrams where necessary.

1. Perform MapReduce for the following sentences to count the number of occurrences of each word:
Sentence 1: Ali and the Magic Carpet
Sentence 2: George and the Dragon
Sentence 3: The Princess and the Dragon [3M]
2. Mention the issues of static resource provisioning in Intercloud and discuss the dynamic resource provisioning methods that overcome those issues. [2M]
3. Briefly describe the three common agents designed to forward the collected usage data to the log database. [3M]
4. Discuss any two monitors used for specialized cloud mechanisms with diagrams. [4M]
5. What are the tasks that are commonly performed by a cloud consumer via the remote administration console? [3M]
6. What are the main components of Identity and Access Management? Explain. [2M]
7. Consider the scenario where there are several trusted users who can each access the same application on a cloud. Which security mechanism will you use to provide both data integrity and protection, and how? [3M]

*****All The Best*****