NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-620015
B.TECH. DEGREE (FIFTH SEMESTER)
BRANCH: COMPUTER SCIENCE AND ENGINEERING
COMPENSATION ASSESSMENT
SUB.CODE & TITLE: CSPC53 COMPUTER NETWORKS

TIME: 11.00 A.M.- 12 NOON.   DATE: 08.11.2024   MAX. MARKS: 20

ANSWER ALL QUESTIONS

1. Compare:

    i) Data Link layer and transport Layer

    ii) Virtual circuit and Datagram

    iii) Half Duplex and Full Duplex   (3)

2. Why protocols are needed in Networking?   (2)

3. Why statistical multiplexer is more efficient than synchronous multiplexer?   (2)

4. Draw the frame format of IEEE 802.3 and describe the role of each field.   (3)

5. Consider the following message and generator polynomial:

    $M = \overline{1100101011000101}$

    $G = 1010$

    Demonstrate the working of CRC.   (3)

6. Explain the various types of transmission impairments.   (3)

7. Explain the working of Pure ALOHA and Slotted ALOHA.   (4)

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1. a) List out the challenges involved in immersive technologies.
   b) What is FoV? In what way is it useful in VR technologies?   (1
   c) How many degrees of freedom does Oculus Quest 2 HMD track? Explain them.   (1
   d) In what ways does the participant interact with the objects in the virtual world? Explain the interaction ways with suitable examples.   (1

2. a) How is the reality perceived in VR?
   b) What is haptic feedback and how is it useful in VR? Give an example of it.   (3)
   c) Explain different travel paradigms used in VR experiences.   (2)

3. a) A Bezier curve is drawn with the control points P, Q, R, S. To alter the shape of the curve one needs to shift ------------------.   (2)

   b) Consider a circle of radius 2 with center located at (2,2). Perform a rotation of $90°$ to the center. What is the new coordinate value after rotation?   (4)

   c) In a 2D graphics system, the transformation matrix reflects a point about the diagonal line passing through the origin and line (10,10). Is the resultant transformation being same as the following? "The coordinate matrix rotated $45°$ clockwise direction followed by the reflection about X-axis and finally applying inverse rotation about the origin". Justify your answer with an example.   (1)
   (2)
   (3)

Branch/Semester/ Section : CSE/ V/ B   Time   : 10:30AM to 11:30 M

Date   : 06.11.2024   Max Marks : 20

Answer All Questions

1. a. We want to compare the computers R1 and R2, which differ that R1 has the machine instructions for the floating point operations, while R2 has not (FP operations are implemented in the software using several non-FP instructions). Both computers have a clock frequency of 400 MHz. In both we perform the same program, which has the following mixture of commands: (2.5)

Type the command	Dynamic Share of instructions in program (p_i)	Instruction duration (Number of clock periods CPI_i)	
		R1	R2
FP addition	16%	6	20
FP multiplication	10%	8	32
FP division	8%	10	66
Non - FP instructions	66%	3	3

i) Calculate the MIPS for the computers R1 and R2.
ii) Calculate the CPU program execution time on the computers R1 and R2, if there are 12000 instructions in the program?

b. Assuming that N instructions are executed, and all N instructions are add instructions(takes 4clock cycles), what is the speedup of a pipelined implementation when compared to a multi-cycle implementation? Your answer should be an expression that is a function of N. (Assume clock cycle time is 305 ps)   (2.5)

2. a. In the following loop, find all the true dependences, output dependences, and antidependences. Eliminate the output dependences and antidependences by renaming.   (2.5)

```
for (i=0;i<100;i++) {
    A[i] = A[i] * B[i]; /* S1 */
    B[i] = A[i] + c; /* S2 */
    A[i] = C[i] * c; /* S3 */
    C[i] = D[i] * A[i]; /* S4 */
}
```

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b. Consider the following loop: (2.5)

for (i=0;i < 100;i++) {

$$A[i] = A[i] + B[i]; /* S1 */$$
$$B[i+1] = C[i] + D[i]; /* S2 */$$

}

Are there dependences between S1 and S2? Is this loop parallel? If not, show how to make it parallel.

3. Explain the two classes of the protocols? A snapshot of the state associated with 2 caches, on 2 separate cores, in a centralized shared memory system is shown below. In this system, cache coherency is maintained with an MSI snooping protocol. You can assume that the caches are direct mapped.

(10)

P0	Tag	Data Word 1	Data Word 2	Data Word 3	Data Word 4	Coherency State
Block	1000	10	20	30	40	M
Block 1	4000	500	600	700	800	S
...	...	...	...	...	..	...
Block N	3000	2	4	6	8	S

P1	Tag	Data Word 1	Data Word 2	Data Word 3	Data Word 4	Coherency State
Block	1000	10	10	10	10	I
Block 1	8000	500	600	700	800	S
...	...	...	...	...	..	...
Block N	3000	2	4	6	8	S

i. If P0 wants to write Block 0, what happens to its coherency state?
ii. If P1 writes to Block 1, is Block 1 on P0 invalidated? Why or why not?
iii. If P1 brings in Block M for reading, and no other cache has a copy, what state is it cached in?

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National Institute of Technology, Tiruchirappalli - 15.
Department of Computer Science & Engineering
CSPC52- Database Management Systems
Retest-2024

Class / Semester : III yr CSE / V sem.   Time : 9:30 to 10.30 A.M
Date   : 29/10/2024   Max. Marks : 20

Answer all Questions

1. Consider the below table: (4)

| OID	O Date	CID	C Name	C State	PID	P Desc	P Price	Qty
A	B	C	D	E	F	G	H	3
1006	10 24 09	2	Apex	NC	7, 5, 4	Table. Desk. Chair	800. 325. 200	1, 1, 5
1007	10 25 09	6	Acme	GA	11, 4	Dresser. Chair	500. 200	4, 6

    a. Derive the functional dependencies of the above table.
    b. What is the maximum normal form of this relation. Normalize it till 3NF.

2. (a) A university registrar's office maintains data about the following entities: (a) courses, including number, title, credits, syllabus, and prerequisites; (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.
(2)
(b) Find the minimum number of tables required to represent the given ER diagram in relational model. Also, derive the relation schemas for the tables.
(2)
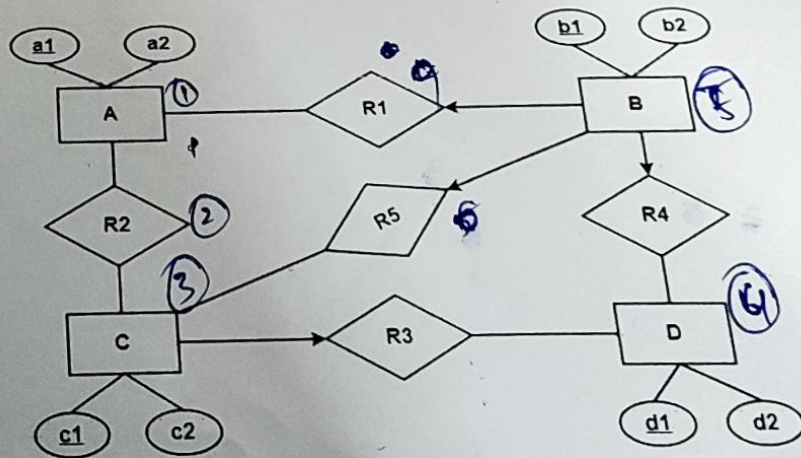
3. Discuss any two concurrency control schemes with neat examples and analyze it with respect to various parameters like conflict serializability, deadlock, inconsistency, Recoverable schedule, Cascadeless Schedules and Starvation.
(4)

4.List and explain the deadlock prevention schemes with neat examples. Explain the advantages and disadvantages of each scheme. (4)

5. Consider a B+-tree with a maximum number of pointers per node is 5 and the maximum number of entries is 4. (4)
a. Show the results of entering one by one the keys that are three letter strings: (era, ban, bat, kin, day, log, rye, max, won, ace, ado, bug, cop, gas, let, fax) (in that order) to an initially empty B+-tree. Assume that you use lexicographic ordering to compare the strings. Show the state of the tree after every 4 insertions.
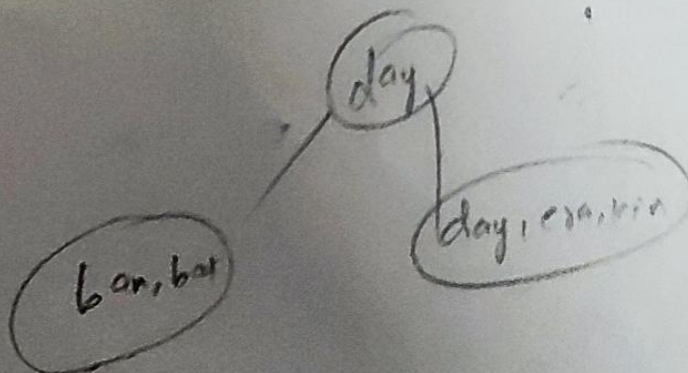b. What is the utilization of the tree? The utilization of the tree is defined as the total number of entries in all the nodes of the tree (both leaf and non-leaf nodes) over the maximum number of entries that the same nodes can store.

$\pi \frac{-1}{2}$ $5-1$ ② $(\frac{n-1}{2})$ 5^{-1} ②

ban, era   Lat, ban.

day,
ban, bat, era, kin

day

ban, bat   day, era, kin

B.Tech (CSE) - Compensation Test – July - December 2024
CSPC54– Introduction to Artificial Intelligence and Machine learning

Semester: V, Section B   Max Marks: 15
Curriculum: NITTUGCSE21   Time: 1 hour
Date of Exam: 5th October 2024

1. Construct a Naïve Bayes model for the following data and predict the risk class of a car driver based on the following attributes: Time 1- 2 year, Female, Urban. (2)

Time in years	Gender	Area	Risk
1-2	M	Urban	LOW
2-7	M	Rural	HIGH
>7	F	Rural	LOW
1-2	F	Rural	HIGH
>7	M	Rural	HIGH
1-2	M	Rural	HIGH
2-7	F	Urban	LOW
2-7	M	Urban	LOW

2. Cluster the following points using k-means clustering and show the clusters. Show the no. of epochs as well. A1= (12,18, 15), A2=(20,15, 21), A3=(16, 14, 21), A4=(19, 8, 12), A5=(17,15, 1),   A6=(16, 4, 12), A7=(11, 2, 14), A8=(14, 9, 12). The seed points are A2, A5.   (3)

3. Explain the A* algorithm use that solve the following TSP problem and compare their performances with Greedy Best First Search. Assume a Heuristic function.   (4)
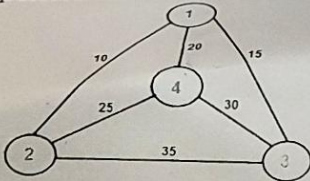
4. Define PEAS for a BABYSITTER and CRICKET UMPIRE. What type of agent will you use it for designing these two agents? Describe diagrammatically the representation of the various actions and percept that these agents need to use for carrying out their job.   (3)

5. Give a complete problem formulation for the following so that it is precise enough to be implemented: (3)
" A 3-foot-tall monkey is in a room where some bananas are suspended from the 8-foot ceiling. He would like to get the bananas. The room contains two stackable, movable, climbable 3-foot-high crates".

--- Best Wishes ---