NATIONAL INSTITUTE OF TECHNOLOGY

B.TECH. DEGREE (FIFTH SEMESTER)
BRANCH: COMPUTER SCIENCE AND ENGINEERING
ASSESSMENT 3
SUB.CODE & TITLE: CSPC53 COMPUTER NETWORKS

TIME: 10.30 A.M.- 11.30 A.M. DATE: 14.10.2024 MAX. MARKS: 20

ANSWER ALL QUESTIONS

1. What is block coding? What are the steps involved in Block Coding? How it is represented? Give an example. (3)
2. What are the components of PCM encoder? Explain the functions of each component. (3)
3. Explain the implementation of BASK and BFSK using diagrams. (3)
4. Using diagrams, describe the following:
   i) Sender sending one frame to receiver and receiver sending an ack frame.
   ii) Sender sending a set of frames to receiver and receiver sending a set of frames with ack. Also demonstrate Go Back N and Selective Repeat techniques. (3)
5. Explain the role of exponential back-off algorithm in random access protocols. (2)
6. Why would the token-ring protocol be inefficient if a LAN had a very large perimeter? (2)
7. Describe how packet loss can occur at routers. (2)
8. What is the use of the following fields in IP Header?
   i) TTL
   ii) Options field (2)

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NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI – 620015
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
B.Tech (CSE) - Cycle Test 2 – July - December 2024
CSPC54 – Introduction to Artificial Intelligence and Machine learning

Semester: V
Curriculum: NITTUGCSE21 — *Max Marks: 15*
Date of Exam: 14th October 2024 — *Time: 1 hour*

1. Write FOL statements for the following scenario and verify whether the conclusion is true? (2) (CO3)
   - Anyone who owns a rabbit hates anything that chases any rabbit.
   - Any student who does not study does not pass

2. Consider the following Wumpus world environment where the terms S (stench), B (Breeze) Pit, Gold and Wum are as discussed in the class. Consider the Hunter is at position (1,1). Deduce the path that the Hunter would take to grab gold. Justify the path using propositional logic statement substantiation. (CO3) (3)

4	Wum	S , B	Pit	B
3	S	B	B	Gold
2	B	Pit	B	B
1	Hun	B	B	Pit
	1	2	3	4

3. Construct a Decision tree model that evaluates the following expression: (3) (CO4)

   $y = \sim x_1 \wedge x_2 \mid x_3$

4. Carry out K-medoids clustering for the following data points and prove the effectiveness of your clustering. A(2, 3), B (7, 2), C (1, 1), D (8, 5), E (3, 6), F (9, 7) (3) (CO5)

5. Explain the updating of weight method in an ANN model using necessary equations. (2) (CO4)

6. What are the issues in Decision Tree model and how are they addressed? (2) (CO4)

--- Best Wishes ---

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
B.TECH. VI-SEMESTER :: CYCLE TEST II
CSPC51 – COMPUTER ARCHITECTURE

Course/ Branch/Section: B. Tech/CSE/B **Date: 15.10.2024**
Max. Marks: 20 **Duration: 1 hour**

Answer All Questions

1. Consider the following four RISC machine code fragments each containing two instructions:

i.	ii.	iii.	iv.
addi r1 ← r1, #4	add r3 ← r1, r2	breq r1, place	store r3, 17(r10)
load r2, 7(r1)	store r2, 7(r1)	store r1, 7(r1)	load r2, 12(r8)

a) i. For each code fragment (i) to (iv) identify each dependence that exists or that may exist (a fragment may have no dependencies). [1]

ii. For each code fragment, indicate whether data forwarding is sufficient to resolve the dependence or if stall cycles are required. Indicate the number of stall cycles. [1]

b) The 5 stages of the processor have the following latencies: [3]

	Fetch	Decode	Execute	Memory	Writeback
a.	300ps	400ps	350ps	550ps	100ps
b.	200ps	150ps	100ps	190ps	140ps

What is the cycle time? What is the latency of an instruction? What is the throughput?: For Non-pipelined processor and pipelined processor.

2. The following MIPS program is to be run on a MIPS pipeline processor of form IF-ID-EX-MEM-WB.

a) Please identify all data dependencies beside each instruction, in the form: <type>on <register> from <line.no> to<line.no> , as WAW on $t6 from L_8 to L_10 [3]

```
L1 lw $t2, 60($t1)
L2 lw $t1, 40($t2)
L3 slt $t1, $t1, $t2
L4 sw $t1, 20($t2)
```

b) Work out and diagram the optimal pipeline schedule using forwarding from EX or MEM stages to any other stage, then compute the pipeline CPI: [2]

3. Find the hazards in the below code and reorder the instructions to avoid any stalls. [5]

```
lw $t1, 0($t0)
lw $t2, 4($t0)
add $t3, $t1, $t2
sw $t3, 12($t0)
lw $t4, 8($t0)
add $t5, $t1, $t4
sw $t5, 16($t0)
```

4. Consider the following code. Assume an architecture with a unified register file that both floating point and integer ISA registers map to ("x" and "f" registers).

```
loop: (1)  faddi f1, f5, 5
      (2)  sub x6, x5, x4
      (3)  flw f1, 0(x6)
      (4)  fmul f3, f1, f4
      (5)  fmul f9, f9, f8
      (6)  fadd f4, f2, f3
      (7)  fcvt x6, f3 // Convert f3 to an integer and store in x6
      (8)  fsw f4, 0(x6)
      (9)  bne x7, x0, loop // Assume not taken
      (10) faddi f4, f4, 8
      (11) faddi f6, f6, 8
```

a) How many RAW hazards are there in the above segment? Write your answer in the form of "(I) -> (J)" to show a dependency between instruction I and J (J reads, I writes). [1]

b) Show how the processor would perform register renaming in the given code sequence such as to maximize performance by minimizing stalls. Denote renamed registers with P starting with index 1 (i.e., P1). Non-renamed registers can keep their ISA register name. What kinds of hazards does register renaming help with? Explain. [4]

**********Best Wishes**********

2->3
3->4
4->6
7->8
8->10
2->10

Department of Computer Science & Engineering
National Institute of Technology

CSPE51 – Augmented & Virtual Reality
Cycle Test -2

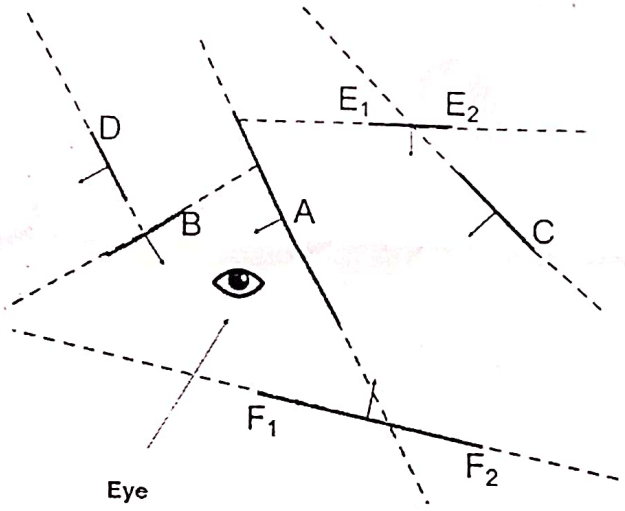
Date : 16.10.2024 **Time : 10.30 – 11.30 am** **Max. mark : 20**

1. a) In 3D graphics, the projection matrix $\begin{matrix} 1 & 0 & 0 & p \\ 0 & 1 & 0 & q \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{matrix}$ has a vanishing point located on -------- (1)

b) Do the following operations provide the same result? (2)
"3D rotations about the x-axis followed by an equal angle of rotation about the y-axis is equal to rotation about the y-axis followed by an equal rotation about the x-axis". Justify your answer.

c) List the difference between diffusion and specular reflection. (2)

d) Construct a BSP tree for the following (Note: Start with A) (2)



e) Consider a unit cube with two vertices at (0,0,0) and (1,1,1). Three of its edges are aligned with the x, y, and z-axis. The cube is rotated about the y-axis by -30 degree, 45 degree on the x-axis, and projected onto the z = 0 plane with the center of projection at z =2.5. Find the perspective projection of the cube and the principal vanishing point. (3)

2. a) What is genlock? (1)

b) What will happen if the line of sight is missed in the interactive device? (2)

c) Why is user-specific calibration required in the sensing gloves? (2)

d) Explain the Tactile feedback interface with an example. (2)

e) How is the tracker information measured on the inertial tracker? List the advantages of the inertial tracker. (3)

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BD ABCE

National Institute of Technology, Tiruchirappalli - 15.

Department of Computer Science & Engineering

CSPC52- Database Management Systems

Cycle Test –II

Class / Semester : III yr CSE / V sem. Time : 03.30 to 04.30 PM

Venue & Date : ORION-F10 & 16/11/2024 Max. Marks : 20

1. Consider the following two transactions: (4)

T1: read(A);
read(B);
if A = 0 then B := B + 1;
write(B).
T2: read(B);
read(A);
if B = 0 then A := A + 1;
write(A).

Let the consistency requirement be A = 0 ∨ B = 0, with A = B = 0 the initial values.

a. Show that every serial execution involving these two transactions preserves the consistency of the database.
b. Show a concurrent execution of T1 and T2 that produces a nonserializable schedule.
c. Is there a concurrent execution of T1 and T2 that produces a serializable schedule?

2. Identify the type of representation of records for the following figure: (4)

0	Perryridge	A-102	400	
1	Round Hill	A-305	350	
2	Mianus	A-215	700	
3	Downtown	A-101	500	
4	Redwood	A-222	700	
5		A-201	900	
6	Brighton	A-217	750	
7		A-110	600	
8		A-218	700	

Show the structure of the file of the above figure after each of the following steps:

a. Insert (Mianus, A-101, 2800).
b. Insert (Brighton, A-323, 1600).
c. Delete (Perryridge, A-102, 400).

AB ~~→ E~~ CD
C

3. Consider a relation R (A, B, C, D, E) with FDs {AB -> C, DE -> C and B -> D} (4)

a. Indicate all BCNF violations for R.
b. Decompose the relations into collections of relations that are in BCNF.
c. Indicate which dependencies if any are not preserved by the BCNF decomposition.

BD ABCE

(P.T.O)

4. (a) Consider the following log sequence of two transactions on a bank account, with initial balance 12000, that transfer 2000 to a mortgage payment and then apply a 5% interest. (2)

1. T1 start
2. T1 B old=12000 new=10000
3. T1 M old=0 new=2000
4. T1 commit
5. T2 start
6. T2 B old=10000 new=10500
7. T2 commit

Suppose the database system crashes just before log record 7 is written. When the system is restarted, which operations to be done by the recovery procedure?

(b) Consider the following log records: (2)

1	<START T1>
2	<T1, A, a>
3	<T1, B, b>
4	<START T2>
5	<T2 C, c>
6	<START T3>
7	<T3 D, d>
8	<T2,E,e>
9	<START T4>
10	<T4,F,f>
11	<T3,G,g>
12	<COMMIT T2>

(i) When can we write each datum in the disk?
(ii) What do we do after the DBMS crashes and restarts? Write the recovery procedure.

5. With suitable locks/unlocks, make the following schedule to be allowed in 2PL and not by strict 2PL? Justify. (4)

T1	T2
R(A)	
W(A)	
	R(A)
	W(A)
	R(B)
	W(B)
	Commit
Abort	