Theory Assignment Report

Only for course Teacher						
		Needs Improvement	Developing	Sufficient	Above Average	Total Mark
Allocate mark & Percentage		25%	50%	75%	100%	5
Clarity	1					
Content Quality	2					
Spelling & Grammar	1					
Organization and Formatting	1					
					Total obtained mark	
Comments						

Semester: SPRING 2025

Student Name: S. M. Nihal Ahmed

Student ID: 232-35-002

Batch: 41　　　　　　**Section: C**

Course Code: SE223

Course Name: Database System

Course Teacher Name: Kazi Rifat Ahmed

Designation: Lecturer

Submission Date: 12/02/2025

Basic Queries:

① π_{Name} (Students)

② π_{Name} (Instructors)

③ $\pi_{CourseName}$ (Courses)

④ π_{Name} ($\sigma_{Department = 'Computer\ Science'}$ (Students))

⑤ π_{Name} ($\sigma_{Department = 'Mathematics'}$ (Instructors))

⑥ $\pi_{CoursName}$ ($\sigma_{credits > 3}$ (Courses))

⑦ π_{Name} ($\sigma_{year = 3}$ (Students))

⑧ π_{Name} ($\sigma_{Name\ LIKE\ 'A\%'}$ (Students))

⑨ $\pi_{CoursName}$ ($\sigma_{Department = 'Physics'}$ (Instructors) $\bowtie$ Courses)

⑩ π_{Name} (Students $\bowtie$ Enrollments)

Join Operations

11. $\pi_{Name, CourseName}$ (Students $\bowtie$ Enrollments $\bowtie$ Courses)

12. $\pi_{Name, CourseName}$ (Instructors $\bowtie$ Courses)

13. $\pi_{Name, Grade, CourseName}$ (Students $\bowtie$ Enrollments $\bowtie$ Courses)

14. π_{Name} (Students $\bowtie$ Enrollment $\bowtie$ (Instructors $\bowtie$ $\sigma_{Department = "Computer Science"}$ (Instructors)

15. π_{Name} (Students $\bowtie$ Enrollments $\bowtie$ $\sigma_{credit > 3}$ (Courses))

16. π_{Name} (Instructors $\bowtie$ $\sigma_{credit < 2}$ (Courses))

17. π_{Name} (Students $\bowtie$ Enrollments $\bowtie$ (Instructors $\bowtie$ $\sigma_{Name\ LIKE\ 'B\%'}$ (Instructors)))

18. π_{Name} (Students $\bowtie$ Enrollments $\bowtie$ $\sigma_{courseName\ LIKE\ '\%Database'}$ (Courses))

19. π_{Name} (Students $\bowtie$ Enrollements $\bowtie$ (Instructors $\bowtie$ $\sigma_{students.Department = Instructor}$ (Instructor) Depart

20. π_{Name} (students $\bowtie$ Enrollments $\bowtie$ (Instructors $\bowtie$ $\sigma_{students.Name. = Instructor.Department}$ (Instru))

Set operations

(21)
$$\pi_{Name}(\sigma_{Department = 'Computer Science'}(Students)) \cup \pi_{Name}(\sigma_{credits > 3}^{(Courses \bowtie Enrollment \bowtie Students)})$$

(22)
$$\pi_{Name}(\sigma_{Department = 'Mathmetics'}(Students)) \cap \pi_{Name}(\sigma_{credits < 2}^{(Course \bowtie Enrollmt)})$$

(23)
$$\pi_{Name}(\sigma_{Department = 'physics'}(Students)) - \pi_{Name}(Students \bowtie Enrollments)$$

(24)
$$\pi_{Name}((\sigma_{courseName = 'Database Systems'}^{(Courses)} \bowtie Enrollments \bowtie Students)$$
$$\cap (\sigma_{courseName = 'Operating System'}^{(Courses)} \bowtie Enrollment \bowtie Students))$$

(25)
$$\pi_{Name}((\sigma_{courseName = 'Database Systems'}^{(Courses)} \bowtie Enrollements \bowtie Students) -$$
$$(\sigma_{courseName = 'Operating Systems'}^{(Courses)} \bowtie Enrollements \bowtie Students))$$

Aggregation and Grouping

(26)

$$\pi_{Department, \, COUNT(StudentID)} (Students)$$

(27)

$$\pi_{InstructorID, \, COUNT(CourseID)} (Instructors \bowtie (Courses \bowtie Enrollments))$$

(28)

$$\pi_{AVG(Grade)} (Enrollments)$$

(29)

$$\pi_{Name} (\sigma_{AVG(Grade) > 80} (Enrollments \bowtie Students))$$

(30)

$$\pi_{CourseName} (\sigma_{count(StudentID) = MAX(count(StudentID))} (Courses \bowtie Enrollments))$$

(32)

$$\pi_{Name} (\sigma_{count(CourseID) = MAX(COUNT(CourseID))} (Student \bowtie Enrollments))$$

(33)

$$\pi_{CourseName} (Courses - \pi_{CourseID} (Enrollments))$$

(34)

$$\pi_{Name} (Students - \pi_{StudentID} (Enrollments))$$

(35)

$$\pi_{Name} (Instructors - \pi_{InstructorID} (Course \bowtie Enrollment))$$

36)

$$\pi_{Name}(Students \bowtie Enrollments) \div \pi_{CourseID}(Courses)$$

37)

$$\pi_{Name}(Students \bowtie Enrollments \bowtie (\sigma_{Department='Computer Science'}(Instructors) \bowtie Courses$$

$$\div \; \pi_{CourseID}(\sigma_{Department='Computer Science'}(Instructors) \bowtie Courses)$$

38)

$$\pi_{Name}(Students \bowtie Enrollments \bowtie (\sigma_{credits>3}(Courses))) \div$$

$$\pi_{CourseID}(\sigma_{credits>3}(Courses))$$

39)

$$\pi_{Name}(Instructors \bowtie (\sigma_{Department='Mathematics'}(Instructors) \bowtie Courses)$$

$$\div \; \pi_{CourseID}(\sigma_{Department='Mathematics'}(Instructors) \bowtie Courses))$$

40)

$$\pi_{Name}(Students \bowtie Enrollments \bowtie (\sigma_{Name \; LIKE \; 'C\%'}(Instructors)$$

$$\bowtie Courses)) \div \pi_{CourseID}(\sigma_{Name \; LIKE \; 'C\%'}(Instructors) \bowtie Courses)$$

Advanched Queries

(41) π_{Name} (Students ⋈ Enrollments) $- \pi_{Name}$ ((Students ⋈ Enrollments) ⋈

$$(\sigma_{Department = 'Physics'} \text{(Instructors)} ⋈ \text{Courses}))$$

(42) π_{Name} (Students) $\div \pi_{CourseID}$ ((Instructors ⋈ Students) ⋈ Courses)

(43) π_{Name} $(\sigma_{COUNT(CourseID) > 2}$ (Enrollment ⋈ Students))

(44) π_{Name} (Students) $\div \pi_{CourseID}$ $(\sigma_{Department = "computer Science"}$ (Instructors)

⋈ Courses)

(45) π_{Name} (Students ⋈ Enrollments ⋈ (Instructors ⋈ $\sigma_{Department 1}$

$\neq Department 2$ (Instructors)

)

(46) π_{Name} (Students ⋈ Enrollments ⋈ $(\sigma_{Name\ LIKE\ '\%ex'}$ (Instructors)

)

(47) π_{Name} (Students ⋈ Enrollments ⋈ (Instructors ⋈ $\sigma_{Student.Name}$

$= Instructors.Name$ (Instructors)));

(18)

π_{Name} ((Students $\bowtie$ Enrollments $\bowtie$ ($\sigma_{Department = 'Mathematics'}$ (Instructors)

$\bowtie$ Courses)) − (Students $\bowtie$ Enrollments $\bowtie$ ($\sigma_{Department = 'physics'}$

(Instructors)

$\bowtie$ Courses))

(19)

π_{Name} ($\sigma_{Grade > 90}$ (Students $\bowtie$ Enrollments $\bowtie$ ($\sigma_{Name\ LIKE\ 'A\%'}$ (Instructors)

$\bowtie$ Courses)))

(20)

π_{Name} ($\sigma_{Grade < 60}$ (Students $\bowtie$ Enrollments $\bowtie$ ($\sigma_{Department = 'Computer\ science'}$ (Instructor)

$\bowtie$ Courses))