

1) $\pi_{\text{itemName}} (\sigma_{\text{isAvailable} = 0 \wedge \text{price} > 500} (\text{Menu Item}))$

2) $\pi_{\text{itemName}} (\sigma_{(\text{category} = \text{"Beverage"} \wedge \text{price} > 300)} \vee \text{category} = \text{"Dessert"}) (\text{Menu Item}))$

3) $\pi_{\text{itemName}, \text{price}} (\sigma_{\text{category} = \text{"Snack"} \wedge \text{isAvailable} = 1} (\text{Menu Item}))$

4) $\pi_{\text{itemName}, \text{price} / 100} (\sigma_{\text{category} = \text{"Snack"} \wedge \text{isAvailable} = 1} (\text{Menu Item}))$

5) $\pi_{\text{supplierID}} (\text{Supplies} \bowtie \text{Menu Item} \wedge \text{itemName} = \text{"Cappuccino"}) (\text{Menu Item}))$

6) $\pi_{\text{supplierID}} (\text{Supplies} \bowtie \text{Menu Item} \wedge \text{itemName})$

6) $\pi_{\text{Employee.name}, \text{Cafe.cafeName}} (\sigma_{\text{Employee.cafeID} = \text{Cafe.cafeID} \wedge \text{Employee.address} = \text{Cafe.city}} (\text{Employee} \bowtie \text{Cafe}))$

HoD -

2312560

200-300

7) $\pi_{\text{empID}} (\sigma_{\text{salary} \neq 50000} (\text{EmpInfo}))$

8) $\pi_{\text{supplierID}} (\sigma_{\text{city} = \text{'Karachi'}} (\text{Supplier}))$
 $\cap \pi_{\text{supplierID}} (\sigma_{\text{city} = \text{'Lahore'}} (\text{Supplier}))$

9) $\pi_{\text{item Name}} (\text{Menu Item}) : \pi_{\text{item Name}}$
 $(\text{Menu Item} \bowtie \text{Supplier})$

Q1:-

1) $\pi_{\text{country-name}}$ ($\sigma_{\text{severity-level} = \text{"critical"}}$

$\wedge \text{Date_Reported} \geq \text{"2025-01-01"} \wedge$

$\wedge \text{Date_Reported} \leq \text{"2025-12-31"}$

(COUNTRY \bowtie INCIDENT \bowtie THREAT))

"To select countries where severity level is "critical" and the incident was reported in 2025"

Q2:-

π

($\sigma_{\text{Threat-Name} = \text{"Ransomware"} \wedge$
 $\text{Team-Name Resolution-status} = \text{"Resolved"}}$

(~~Report~~ RESPONSE-TEAM \bowtie ACTION-TAKEN \bowtie
INCIDENT \bowtie THREAT))

"To find the teams that took action on ransomware incidents and marked them as resolved."

Q3:-

$\pi_{\text{COUNTRY-NAME}}$ (COUNTRY) $\rightarrow \pi_{\text{COUNTRY-NAME}}$ (COUNTRY \bowtie RESPONSE-TEAM)

So list the countries that don't appear in the RESPONSE-TEAM relation.

Q4:-

$\pi_{\text{THREAT-NAME}}$ (SELECT COUNT (COUNTRY-#0) > 1 (SELECT Threat-name COUNT (COUNTRY (THREAT \bowtie INCIDENT)))

So group threats by name & count distinct countries, then keep only those with count > 1.

Q5:-

$\pi_{\text{Threat-Name, Country-Name, Impact-Score}}$

(SELECT category = 'AI ATTACK' AND Impact-Score > 80 (THREAT \bowtie INCIDENT \bowtie COUNTRY))

Joins THREAT, INCIDENT, and COUNTRY to get threat name, country name, and impact score for AI Attacks with impact > 80