CS 550 Database Systems
Assignment 2 | Part B | Relational Calculus
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A)

$$\{S \mid \exists\, S \in \text{Student}\ (\exists T \in \text{Transcript}\ (T.\text{dcode} = \text{“CS”} \wedge T.\text{cno} = \text{“530”} \wedge T.\text{ssn} = S.\text{ssn}))\}$$

B)

$$\{S \mid \exists\, S \in \text{Student}(\ S.\text{name} = \text{“John”} \wedge (\exists T \in \text{Transcript}\ (T.\text{dcode} = \text{“CS”} \wedge T.\text{cno} = \text{“530”} \wedge T.\text{ssn} = S.\text{ssn})))\}$$

C)

$$\{S \mid \exists\, S \in \text{Student} \wedge \neg\ (\ \exists E \in \text{Enrollment}\ (\exists C \in \text{Class}\ (C.\text{class} = E.\text{class} \wedge E.\text{ssn} = S.\text{ssn} \wedge \neg(\forall P \in \text{Prereq}(P.\text{dcode} = C.\text{dcode} \wedge P.\text{cno} = d.\text{cno} \wedge\ \exists T \in \text{Transcript}\ (T.\text{dcode} = P.\text{pcode} \wedge T.\text{cno} = P.\text{pno} \wedge (T.\text{grade} = \text{“A”} \vee T.\text{grade} = \text{“B”})))))\}$$

D)

$$\{S \mid \exists\, S \in \text{Student}\ (\ \exists E \in \text{Enrollment}\ (\exists C \in \text{Class}\ (C.\text{class} = E.\text{class} \wedge E.\text{ssn} = S.\text{ssn} \wedge \neg(\forall P \in \text{Prereq}(P.\text{dcode} = C.\text{dcode} \wedge P.\text{cno} = d.\text{cno} \wedge\ \exists T \in \text{Transcript}\ (T.\text{dcode} = P.\text{pcode} \wedge T.\text{cno} = P.\text{pno} \wedge (T.\text{grade} = \text{“A”} \vee T.\text{grade} = \text{“B”})))))\}$$

E)

$\{S \mid \exists S \in Student(S.name = \text{“John”} \wedge (\exists E \in Enrollment (\exists C \in Class (C.class = E.class \wedge E.ssn = S.ssn \wedge \neg(\forall P \in Prereq(P.dcode = C.dcode \wedge P.cno = d.cno \wedge \exists T \in Transcript (T.dcode = P.pcode \wedge T.cno = P.pno \wedge (T.grade = \text{“A”} \vee T.grade = \text{“B”}))))))\}$

F)

$\{R \mid \exists C \in Course \wedge (\neg (\exists P \in Prereq (P.dcode = C.dcode \wedge P.cno = C.cno)) \wedge R.dcode = C.dcode \wedge R.cno = C.cno)\}$

G)

$\{R \mid \exists C \in Course \wedge (\exists P \in Prereq (P.dcode = C.dcode \wedge P.cno = C.cno \wedge R.dcode = C.dcode \wedge R.cno = C.cno))\}$

H)

$\{C \mid C \in Class \wedge (\exists P \in Prereq (P.dcode = C.dcode \wedge P.cno = C.cno))\}$

I)

$\{S \mid S \in Student \wedge \neg (\exists T \in Transcript (T.ssn = S.ssn \wedge (T.grade = \text{“C”} \vee T.grade = \text{“F”})))\}$

J)

$\{S \mid S \in Student (\exists E \in Enrollment (\exists C \in Class(\exists F \in Faculty (F.name = \text{“Brodsky”} \wedge C.instr = F.ssn \wedge E.class = C.class \wedge E.ssn = S.ssn)))\}$

K)

$\{R \mid \exists S \in Student (\forall C \in Class (\exists E \in Enrollment (C.class = E.class \wedge E.ssn = S.ssn)) \wedge R.ssn = S.ssn)\}$

L)

$\{R \mid \exists S \in Student (S.major = \text{“CS”} \wedge (\forall C \in Class (C.dcode = \text{“MTH”} \wedge (\exists E \in Enrollment(C.class = E.class \wedge E.ssn = S.ssn)))) \wedge R.ssn = S.ssn)\}$