PES2UG20CS237
P k Navin Shrinivas

Question-3

①	LDR R1, [R2, #40]	F	D	E	M	W
②	ADD R2, R3, R3		F	D	E	M	W
③	ADD R1, R1, R2			F	D	E	M	W
④	STR R1, [R2, #20]				F	D	E	M	W

without forwarding:

a) ① & ② : Anti dependence on R2
② & ③ : true dependence on R2
② & ③ true dependence on R1
③ & ④ : output dependence on R1
① & ② " " "
① & ③ : output " " "

a) without forwarding:

① & ② : Anti dependence on R2
① & ③ : Output dependence on R1
① & ④ : true dependence on R1
if no partitioning.

② & ③ : true dependence on R2
② & ④ : true dependence on R2

③ & ④ : true dependence on R1

b) Considering Seperate I-cache & D-cache
with fwding
① & ③

without:
① ③
① ④ if no partition
② ③
② ④
③ ④

c) ① ins
② ins
NOP (mem access)
③ ins
④ ins.

→ Question: 4

a) LDR F D E M W
BEQ F D E M W
ADD discarded → F D Not executed.

F D E M W
BEQ F D E M W
STR F D E M W
AND F D E M W

b) with delay. (Branch logic in Ex stage)

LDR F D E M W
BEQ F D E M W
SAFE INSTRUCTION.
SAFE INSTRUCTION.
F D E M W
BEQ F D E M W
STR F D E M W