National University of Computer and Emerging Sciences, Lahore Campus

Course:	Computer Architecture	Course Code:	EE204
Program:	BS(Computer Science)	Semester:	Fall 2016
Duration:	30 Minutes	Total Marks:	20
Paper Date:	07-11-2016	Weight	~4
Section:	A	Page(s):	2
Exam:	Quiz 3b		

Q1: Identify all type of hazards. How many stall cycles will be introduced during execution of the following code fragment on a 5-stage pipelined datapath ? 10 marks

a) **without forwarding**
b) **with forwarding**

```
load   R5, 100(R3)
and    R3,  R5, R1
add    R2, R5, R3
store  R2, 100(R3)
sub    R14, R3, R2
```

Q2: Why in the above code all hazards cannot be solved with forwarding. What is the solution in this case and how we implement it in MIPS pipeline. Write pseudo code to detect load-use hazard and details of modifications in MIPS pipeline. Diagram is not necessary. 10 marks