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:	B	**Page(s):**	2
	Exam:	Quiz 3a		

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    R6, 100(R4)
sub     R4,  R1, R6
or      R2, R6, R4
store   R2, 100(R4)
add     R14, R4, 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**