Registration Number: Solution

Marks: 5 each

1) What are the main advantage of using a Commit unit and Re-Order Buffer in speculative execution?
2) What is the difference between statically scheduled and dynamically scheduled processor. How these two approaches affect processor design and compiler design?
3) What is basic advantage of Tomasulo’s Design over scoreboard?
4) What is a 2-bit bimodal local predictor. Explain with a state-diagram.

1) Wrongly predicted branches are not committed and program semantics/sequence is preserved thus eliminating the possibility of any imprecise exceptions.

2) Static Scheduling: in order instruction issue & in-order execution

Dynamic Scheduling: in order instruction issue & out of order execution

Dynamic scheduling simplifies compiler design since some cases where dependences are unknown at compile time (e.g., because they may involve a memory reference) can now be handled by hardware. Consequently, processor (hardware) design becomes more complicated.

3) An instruction is issued in each clock cycle in Tomasulo's Algo whereas in scoreboardin, instruction is issued only if a functional unit is available. Register renaming done in hardware by having reservation stations thereby removing WAR & WAW hazards [in Tomasulo].

No structural hazards.
A prediction has to be wrong twice before it is changed in a 2-bit branch predictor.