1 a) Hardware Constraint to improve scalability:

**Refer Page No 352 in Darryl Gove book.**

**TOPICS TO COVER: Bandwidth sharing between cores, False Sharing, Cache conflict and capacity, Pipeline resource starvation**

**(or)**

**Refer rejinpaul notes attached**

1 b) Describe various approaches in parallel Programming.

ANSWER : [Link](u2Ib.pdf)

2. Synchroization Primitives

3. Data race, tools to detect data race and how to avoid data race.

4. Necessity of structure reflects in performance.

**Refer Page No 53 in Darryl Gove book.**

**Or**

**Refer rejinpaul notes attached.**

5. Explain condition variable with Producer consumer problem.

**Refer Page No 135 in Darryl Gove book.**

**Or**

**Refer rejinpaul notes attached.**

6. Concept of communication between threads.

**Refer Page No 135 in Darryl Gove book.**

**TOPICS TO COVER:**

* Memory, shared memory and memory-mapped files
* Condition variables
* Signals and events
* Message Queues
* Named Pipes
* Communication through the network stack
* Storing thread-private data

**Or**

**Refer rejinpaul notes attached.**