

CS6023 GPU Programming

A3 (13 marks) due September 24 by 23:55 at moodle. Submit ROLLNO.pdf.

1. [4 marks] Find all possible outputs for the following code.

```
#include<cuda.h>
#include <stdio.h>

__global__ void alloutputs(int *counter) {
    atomicAdd(counter, 1);
    printf("%d\n", *counter);
}

int main() {
    int *counter, hcounter = 0;
    cudaMalloc(&counter, sizeof(int));
    cudaMemcpy(counter, &hcounter, sizeof(int), cudaMemcpyHostToDevice);
    alloutputs<<<1, 34>>>>(counter);
    cudaDeviceSynchronize();
    return 0;
}
```

2. [4 marks] Write a kernel in pseudo-code (or CUDA) which takes an integer parameter whose value ranges from 1..32. Accordingly, the kernel achieves amount of coalescing. Thus, a value of 32 indicates fully coalesced access, while that of 1 indicates a fully-uncoalesced access.
3. [5 marks] Write a kernel in pseudo-code (or CUDA) which takes an integer square matrix NxN size as a parameter and find the saddle point in it. A saddle point is an element which is maximum in its column and the minimum in its row. If there are multiple saddle points, print all. It is possible that there is no saddle point in a matrix. Assume that the number of threads with which the kernel is launched is equal to N.