Abbottabad Campus

Department of Computer Science

MID TERM EXAMINATION SPRING 2025

Class: BCS-8B, BCS-8C
Subject: Parallel and Distributed Computing
Time Allowed: 90-Minutes
Student Name: _____

Date: 10-May-2025
Instructor: Ehtisham Ul Haque
Max Marks: 30
Registration #_____

Q.1. **Explain** the following questions. (CLO-1, C2) [Marks 12]

a) Discuss the idea that the universe operates in parallel.
b) Summarize the granularity levels of parallelism.
c) Differentiate parallel processing and distributed computing in terms of processor coupling.
d) Summarize some modern commercial applications where parallel computing is important.

Q.2. **Code** the following questions. (CLO-2, C3) [Marks 18]

a) Convert the below matAdd function into cudaC. Your cudaC version should:
- Allocate device memory.
- Copy matrices h_A and h_B to the GPU.
- Launch a kernel to perform the addition in parallel.
- Copy the result h_C back to the host.
- Free the device memory after use.

```
void matAdd(float* h_A, float* h_B, float* h_C, int m, int n)
{
   int i, j;
   for (i = 0; i < m; i++)
      for (j = 0; j < n; j++)
         h_C[i * n + j] = h_A[i * n + j] + h_B[i * n + j];
}
```

b) Write a cudaC program to perform 1D smoothing of the input vector hA, storing the result in hC, such that:
- Allocation of device memory.
- Copying input data from host to device.
- Kernel function to compute the smoothed vector in parallel.
- Copying results back to host and freeing device memory.

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