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| Course: | **Parallel and Distributed Computing** | Date: 03/08/2024 |
| Course Code: | CEN-455 | Session: II |
| Faculty’s Name: | Dr. Muhammad Asif | Max Marks: 20 |
| Time Allowed: | 1.5 Hours | Total Pages: (1) |

**INSTRUCTIONS:**

1. This is closed book exam. Communication devices and any written material are strictly prohibited.
2. All 3 questions are compulsory.

Student’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Enroll No:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(USE CAPITAL LETTERS)

**Question # 1 (1+1+1+1= 4 Marks) (CLO-1)**

By recalling the **KNOWLEDGE** of **Parallel and Distributed Computing concepts**, differentiate by **DESCRIBING** the **following terms?**

1. Parallel **VS** Distributed system
2. SIMD **VS** MIMD
3. Shared memory **VS** Message passing model
4. High Performance Computing (HPC) **VS** Parallel Computing Significance

**Question # 2 (4+4= 8 Marks) (CLO-2)**

By **INTERPRETING** the concept of **Data-Parallel and Task-Parallel models**, do as directed?

1. Explain Data-Parallel and Task-Parallel **models with some concrete examples**.
2. Which **C# code** belongs to **Task-Parallelism and Data Parallelism**? Also explain both of the codes i.e. Code1 and Code2? What is the output of these codes block?

**Code-1: TASK Parallelism**

using System;

using System.Threading.Tasks;

class Program {

static void Main() {

Task[] tasks = new Task[10];

for (int i = 0; i < tasks.Length; i++) {

tasks[i] = Task.Factory.StartNew(() => Console.WriteLine("Task {0} running", i));

} Task.WaitAll(tasks);}}

**Code-2: DATA Parallelism**

using System;

using System.Threading.Tasks;

class Program {

static void Main() {

int[] data = new int[10000000];

Parallel.For(0, data.Length, i => {

data[i] = i \* i;});}}

**Question # 3 (4+4= 8 Marks) (CLO-3)**

**UNDERSTAND** the following problem statements and **EXPLAIN** the following in detail?

1. What is Single-Threaded and Multi-Threaded application? Explain Thread Control Block (**TCB**) and Process Control Block (P**C**B) and what are the **components** in TCB and PCB?
2. **Draw** and **Explain** the **Thread Life Cycle States? Hint: 6-7 States?**

**Best of Luck**