

Serial No:

# CS-4085 MLOps (Section A)

Saturday, February 24<sup>th</sup>, 2024

**Sessional 1**  
**Total Time: 1 Hour**  
**Total Marks: 21**

## Course Instructor(s)

Hammad Majeed

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Signature of Invigilator

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Student Name

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Roll No

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Section

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Signature

**DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.**

*After asked to commence the exam, please verify that you have **4** different printed pages excluding the cover page. There are total of **3** questions.*

- Attempt on question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
- No additional sheet will be provided for rough work.
- Calculator sharing is strictly prohibited.
- Use permanent ink pens only. Any part done using soft pencil will not be marked and cannot be claimed for rechecking.

Question:	1	2	3	Total
Points:	6	10	5	21
Score:				

**Question 1.....(6 Marks)**

- (a) **(2 Marks)** Provide an example of YAML code to trigger a GitHub Actions workflow only when a pull request is opened or updated on the main branch.

- (b) **(2 Marks)** Describe the syntax for defining multiple jobs in a GitHub Actions workflow YAML file, each responsible for different stages of the CI process, such as testing and linting.

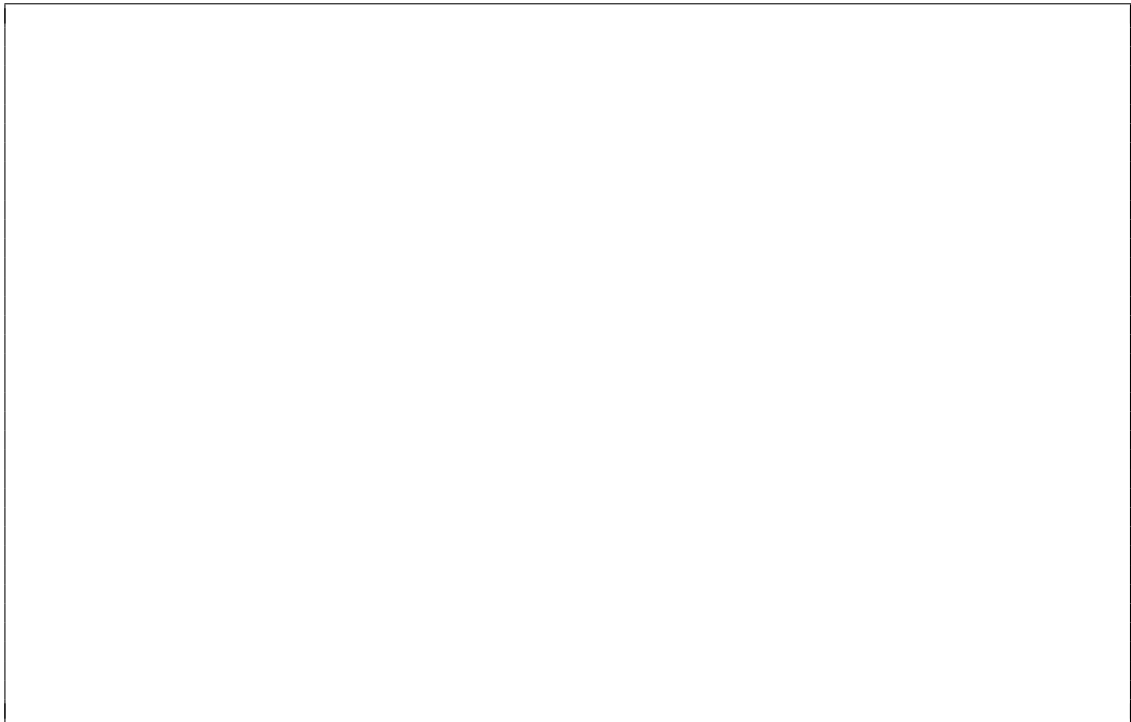
- (c) **(2 Marks)** Provide YAML code to define a GitHub Actions workflow that runs tests in parallel across multiple operating systems, such as Ubuntu, macOS, and Windows.

**Question 2** ..... (10 Marks)

- (a) **(2 Marks)** Describe the difference between Docker images and Docker containers.



- (b) **(2 Marks)** Walk through the process of creating a Dockerfile for a Python Flask application.



- (c) **(2 Marks)** Explain how Docker layers work and their implications for image size and caching during builds.

- (d) **(2 Marks)** What is the purpose of a Docker registry, and how does it differ from Docker Hub?

- (e) **(2 Marks)** Explain the concept of port mapping in Docker containers and its significance in containerized applications. Provide an example scenario where port mapping is essential and discuss how it is implemented within Docker.

**Question 3.....(5 Marks)**

You're managing a Python web application hosted on GitHub, and you want to automate its CI/CD pipeline using GitHub Actions and Docker containerization. Your goal is to build the Python web application into a Docker image and push it to Docker Hub whenever changes are pushed to the main branch. Write a GitHub Actions workflow YAML file that achieves this objective, including steps for building the Docker image, tagging it appropriately, and pushing it to Docker Hub.