UPES

End Semester Examination, May 2024

Course: Applied DevOps   Semester: VI
Program: B.Tech. CSE+ DevOps (H/NH)   Time: 03 hrs.
Course Code: CSDV3011   Max. Marks: 100

Instructions: Do as directed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Identify key roles within a DevOps team and describe their responsibilities in the development lifecycle.	4	CO1
Q 2	"Agile planning within the DevOps framework fosters collaboration between development and operations teams to attain iterative development objectives" Comment. Support your explanation with reasons for why this alignment is beneficial.	4	CO2
Q 3	Implement a Git workflow for a software development project and describe its key features.	4	CO1
Q 4	Provide examples of how IaC contributes to automation, scalability, and consistency within IT infrastructures and explain its significance in improving efficiency and reliability in software deployment processes.	4	CO3
Q 5	Differentiate DevOps transformation from traditional software development approaches, and mention key principles underpin its methodology.	4	CO2

SECTION B
(4Qx10M= 40 Marks)

Q 6	Illustrate the transformative impact of Amazon Web Services (AWS) on modern cloud computing practices, considering its role in enabling scalability, reliability, security, and cost-effectiveness in IT infrastructures.	10	CO3
Q 7	Consider the following code snippet and answer the questions:	5+5=10	CO3

Q 7:

```
# Use the official Ubuntu base image
FROM ubuntu: latest

# Set environment variables
ENV APP_HOME /app

# Set the working directory inside the container
WORKDIR $APP_HOME
```

```
# Copy the current directory contents into the container at /app
COPY . $APP_HOME

# Install dependencies
RUN apt-get update && apt-get install -y \
    python3 \
    python3-pip

# Install application dependencies
RUN pip3 install -r requirements.txt.

# Expose port 8000 to allow communication to/from the container
EXPOSE 8000

# Run the application
CMD ["python3", "app.py"]
```

	a) Give a brief about the purpose of each section in the provided Dockerfile code snippet. Describe the steps involved in building a Docker image using this Dockerfile. b) How would you modify this Dockerfile to install additional dependencies, such as **curl**, and ensure they are available within the container? Provide the necessary changes to the Dockerfile.		
Q 8	Provide examples of popular log monitoring tools and explain how they facilitate real-time log analysis, alerting, and visualization to support effective troubleshooting and proactive management of IT infrastructure.	**10**	**CO2**
Q 9	Identify and discuss common pitfalls encountered during the journey of DevOps transformation, highlighting challenges organizations may face in adopting DevOps practices effectively. Provide examples of these pitfalls and propose strategies to mitigate or overcome them. **OR** Provide examples of Software Configuration Management tools and techniques commonly used in the industry and explain how they contribute to effective software configuration management. Additionally, discuss the potential challenges and risks associated with inadequate SCM practices and propose strategies to mitigate these challenges in software development projects	**10**	**CO1**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	a) Explain the significance of establishing a center of excellence (CoE) as a crucial step in the DevOps transformation journey. Discuss the role of the CoE in providing guidance, support, and best practices to teams throughout the organization. Describe how	**10+10=20**	**CO3**

	the CoE helps foster collaboration, standardization, and continuous improvement in DevOps practices. b) Discuss the role of DevOps Subject Matter Experts (SMEs) in conducting intake workshops for Scrum Teams as a key component of the DevOps approach. Explain how these workshops facilitate knowledge sharing, collaboration, and alignment of objectives between DevOps SMEs and Scrum Teams.		
Q 11	**Read the following Case study of Google: DevOps and SRE and answer the Questions that follow:** Both DevOps and SRE advocate for bringing change to a system as necessary for improvement. Without improvisation, there is no scope for maneuvering. • The foundation for DevOps work is collaboration. Effective shared ownership or team relationships are necessary for SRE to function. Similarly, SRE shares the same beliefs and values as DevOps, which are shared across the organization. • Change should be continuously brought in small phases, and both are automatically tested and applied. There is a critical interrelation between change and reliability, making this aspect important for SRE. • Selection of the right tools is critical since it determines the scope of improvement. However, the focus should not solely be on tooling; an API-oriented approach for system management is a more enduring philosophy. • Measurement is key to how both DevOps and SRE work. SLOs dominate in determining the actions taken to improve the service in SRE. Measurement is often used in DevOps to understand the outputs of a process and the duration of feedback loops. • Managing production services means that bad things happen occasionally, and blameless postmortems are practiced by both SRE and DevOps to offset unhelpful, adrenaline-laden reactions. • Implementing DevOps or SRE is a holistic act, aiming to make the entire team, unit, or organization better through working together in a highly specific way. Better velocity should be the outcome for both DevOps and SRE. The parameters for measurement are crucial to both DevOps and SRE. SLOs prevail in determining the steps taken to improve the service in SRE, and measurement is often used in DevOps to understand the outputs of a process. The harsh reality of managing production services means that bad things occasionally happen, and blameless postmortems are necessary to avoid chaos among teams. Both DevOps and SRE need to perform these postmortems.	**7+7+6=20**	**CO4**

Conclusively, implementing DevOps and SRE is a holistic act, aiming to bring all teams together for better functioning. They need to work together in a highly specific way, and the speed at which change is happening matters for both DevOps and SRE.

a) Compare and contrast the core principles of DevOps and Site Reliability Engineering (SRE) as highlighted in the Google case study. Provide examples from the case study that illustrate how these principles are applied within Google's operations.

b) Discuss the importance of collaboration and shared ownership in both DevOps and SRE, as emphasized in the Google case study. How do these aspects contribute to the success of Google's approach to managing software development and operations?

c) Describe the significance of measurement and data orientation in both DevOps and SRE, as outlined in the Google case study. How do SLOs (Service Level Objectives) and measurement contribute to the reliability and performance of Google's services? Provide examples from the case study to illustrate this concept.

OR

a) Explain the significance of automation and continuous testing in Google's DevOps and SRE practices, as described in the case study. Provide examples of specific automation tools and testing processes used by Google to ensure reliability and efficiency in their operations.

b) Evaluate the role of blameless postmortems in Google's approach to incident management, drawing insights from the case study. How do these postmortems contribute to a culture of learning and continuous improvement within Google's teams?

c) Discuss the holistic nature of implementing DevOps and SRE within Google, as emphasized in the case study. How does Google ensure that these practices are integrated across teams and contribute to overall organizational effectiveness? Provide examples of strategies or initiatives described in the case study that support this holistic approach.