(Time: 2 ½ Hours) **[Total Marks: 75]**

N. B.: (1) **All** questions are **compulsory**.

(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.

(3) Answers to the **same question** must be **written together**.

(4) Numbers to the **right** indicate **marks**.

(5) Draw **neat labelled diagrams** wherever **necessary**.

(6) Use of **Non-programmable** calculators is **allowed**.

Q1. Attempt the three of the following. **15 Marks**

a. Explain the key elements and their relationships of a modern networking ecosystem.

b. Explain Advantages and Disadvantages of SDN.

c. Explain types of Virtualization.

d. What is the difference between QoS and QoE?

e. Write a short notes on * as a Service..

Q2**. Attempt the three of the following.** **15 Marks**

a. Explain Applications of Wi-Fi.

b. Difference between SDN and Traditional Networking.

c. Explain Logical Structure of NFVI Domains..

d. Give Definition of Quality of Experience, Definition of Quality, Definition of Experience Quality Formation Process.

e. Explain with example Cloud Deployment Models.

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Q3. Attempt three of the following. **15 marks**

a. Explain Transmission medium in Modern networking.

b. Draw and Explain SDN Architecture.

c. Write a short notes on Virtual Switches.

d. Differentiate Subjective Assessment vs Objective Assessment..

e. How an IoT System Actually Works.

Q4. Attempt three of the following. **15 marks**

a. What are the differences between 2G, 3G, 4G LTE, and 5G networks?

b. Explain Benefits of Software-Defined Networking (SDN).

c. Explain Advantages and Disadvantages of Network Virtualization.

d. Explain Applications of QoE Network Design.

e. Explain Cloud Security Risks and Countermeasures.

Q5. Attempt three of the following. **15 marks**

a. Explain types of Cloud Computing.

b. How does Software-Defined Networking (SDN) work?

c. Explain Frame Format of IEEE 802.1Q Frame.

d. Write a short notes on Glass Box Parameter-Based QoS/QoE Mapping Models.

e. Explain IoT Security and Privacy Requirements.

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Max Time: 2½ hrs **Max Marks: 75**

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(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.

(3) Answers to the **same question** must be **written together**.

(4) Numbers to the **right** indicate **marks**.

(5) Draw **neat labelled diagrams** wherever **necessary**.

(6) Use of **Non-programmable** calculators is **allowed**.

Q1) Attempt any three: (15)

A) Define big data. Why is big data required? Write a note on data warehouse environment.

B) What are the three characteristics of big data? Explain the differences between Bl and Data Science.

C) Describe the current analytical architecture for data scientists.

D) What are the key roles for the New Big Data Ecosystem?

E) What are key skill sets and behavioral characteristics of a data scientist?

Q2) Attempt any three: (15)

A) Write a short note on association rules.

B) What is the role of support in apriori algorithm? Also explain how the Apriori property works with a neat diagram.

C) Find the associative rule using Apriori algorithm; if there are four transactions – T1, T2, T3 and T4 for itemsets {A,B,C},{A,C},{A,D} and {B,E,F} respectively and minimum support and confidence are 50 %.

D) What is Linear regression? Explain in detail. Also explain any two of its applications.

E) Write a short note on linear regression model. Also apply Ordinary least Squares (OLS) technique to estimate the parameters

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Q3) Attempt any three: (15)

A) Describe additional classification methods other than decision tree and Bayes' theorem.

B) How to model a structure of observations taken over time? Explain with respect to Time series analysis. Also explain any two of its applications.

C) What are the components of time series? Explain each of them. Also write the main steps of Box-Jenkins methodology for time series analysis.

D) Explain Autoregressive Integrated Moving Average Model in detail.

E) Explain additional time series methods other than Box-Jenkins methodology and Autoregressive Integrated Moving Average Model.

Q4) Attempt any three: (15)

A) List the requirements of distributed system in order to perform computation at scale. How Hadoop addresses these requirements?

B) Write a short note on Hadoop architecture.

C) How basic interaction can be done in Hadoop distributed file system? Explain any five basic file system operations with its appropriate command.

D) What are various types of permissions in Hadoop distributed file system? What are different access levels? Write and explain commands to set various types and access levels. What is a caveat with file permissions on HDFS?

E) Explain functionality of map () function and reduce () function with a neat diagram in a MapReduce context.

Q5) Attempt any three: (15)

A) What is the functionality of the filter mapper? Explain in detail with example.

B) What is the functionality of the identity pattern? Explain in detail with example.

C) Which different types of filters can be used in HBase? Explain its entire procedure with appropriate commands.

D) Write the entire procedure with appropriate commands for importing data from MySQL to HDFS.

E) Write the entire procedure with appropriate commands for importing data from MySQL to Hive.

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