

(Data Sci)

M. Sc. IT

(2 hours)

Part-I Sem. I
[Total Marks: 50]

Feb. 2023/24

- 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 labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

1. Attempt any two of the following: 10
a. Discuss the rules of European Union General Data Protection Regulation (GDPR).
b. Enumerate the general rules for data source catalog.
c. Explain hypothesis testing, t-test and chi-square test with respect to data science.
d. Explain the organize superstep with suitable example.
2. Attempt any two of the following: 10
a. How will you use MoSCoW prioritization technique in Data Science Projects?
b. If a Data Science ecosystem does not have a proper structure for data storage, then which eco-system will be preferred, Schema-on-Write or Schema-on-Read? Give reasons.
c. Explain Cross-Industry Standard Process for Data Mining (CRISP-DM).
d. What do you mean by slowly changing dimensions? Explain different types of slowly changing dimensions with suitable examples.
3. Attempt any two of the following: 10
a. Explain the different types of watchers.
b. State and explain the five fundamental steps of the data science process.
c. Explain the retrieve superstep.
d. How will you avoid data swamps? Explain four critical steps.
4. Attempt any two of the following: 10
a. Explain local time and Universal Coordinated time.
b. What is Fishbone Diagram? Explain with example.
c. Explain Person Hub in Time-Person-Object-Location-Event Data Vault. Which are the different Person Links created?
d. Create the following Sun Models:
a. Person-to-Time
b. Person-to-Object
c. Person-to-Location
d. Person-to-Event
5. Attempt any two of the following: 10
a. How are the results of data science summarized? Explain.
b. Explain Andrews' curves with their use in data science.
c. What do you mean by Clustering? Explain any two types of Clustering?
d. Differentiate between Univariate, Bivariate and Multivariate Analysis.

(2 hours)

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1. Attempt **any two** of the following: 10

- a. Distinguish between hard computing and soft computing.
- b. What is bi-directional associative memory? List the activation functions used in bidirectional associative memory.
- c. Write a short note on Fuzzy Logic.
- d. State the advantages and limitation of genetic algorithm.

2. Attempt **any two** of the following: 10

- a. Define Soft Computing. State various type of soft computing techniques and explain any two types in details.
- b. Obtain the output of the neuron Y for the network shown in figure given below using activation functions as: (i) binary sigmoidal and (ii) bipolar sigmoidal.



- c. With suitable diagram explain the concept of linear separability with OR function.
- d. Explain the training phase of the Back-propagation algorithm.

3. Attempt **any two** of the following: 10

- a. What is spiking neural networks? Explain Izhikevich Neuron Model.
- b. Discuss the important features of Kohonen self-organizing maps.
- c. Write a short note on Optical Neural Network.
- d. What is Mexican Hat? Draw and explain its structure in detail.

4. Attempt *any two* of the following:

10

- Define convex and non-convex fuzzy set. Explain the angular fuzzy set method of fuzzification in details.
- What is fuzzy measure? State and explain the axioms of fuzzy measures & and properties of Borel field.
- What is fuzzy composition? Consider the two fuzzy relation R and S given below. Compute Max-min composition.

$$R = \begin{matrix} & x_1 & x_2 \\ \begin{matrix} y_1 \\ y_2 \end{matrix} & \begin{bmatrix} 0.6 & 0.1 \\ 0.2 & 0.9 \end{bmatrix} \end{matrix} \quad S = \begin{matrix} & z_1 & z_2 & z_3 \\ \begin{matrix} x_1 \\ x_2 \end{matrix} & \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$

- What is Lambda cut in fuzzy set? Explain strong and weak Lambda cut in detail with suitable example.

5. Attempt *any two* of the following:

10

- What is fuzzy logic controller? State and explain the components of FLC.
- Write a short note on neuro-fuzzy hybrid systems.
- With suitable example, explain one-point and two-point crossover techniques in details.
- Discuss in details the four modes of approximate reasoning.

(1 hour)

[Total Marks: 25]

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1. Attempt any two of the following:

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- a. Explain the cloud computing reference model with the help of a diagram.
- b. Explain the characteristics and benefits of cloud computing for cloud service consumers (CSCs) and cloud service providers (CSPs).
- c. Write a Short Note on
 - i) Single-instruction, single-data (SISD) systems
 - ii) Single-instruction, multiple-data (SIMD) systems
 - iii) Multiple-instruction, single-data (MISD) systems
- d. What is virtualization? What are the reasons leading to motivation of virtualization technology? Explain.

2. Attempt any two of the following:

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- a. What is cloud computing? With the help of a diagram, explain the cloud computing architecture.
- b. Explain the traffic eavesdropping and malicious intermediary techniques between cloud service consumer and a cloud service.
- c. Explain buckets, objects and metadata with respect to Amazon S3.
- d. Explain the compute services offered by Microsoft Azure.

(2 hours)

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(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. **Attempt any two of the following:** 10
a. Explain the different Design Factors for Data Center Networks.
b. ✓ How does Link Aggregation (LAG) work, and what benefits does it offer in terms of load balancing and fault tolerance?
c. ✓ Explain x86 Server Virtualization in brief.
d. What is Server Provisioning? Explain different Server Provisioning tasks.
2. **Attempt any two of the following:** 10
a. Describe the evolution of data center architectures leading up to virtualization.
b. Write Short Note on Network Logical Partitioning.
c. Explain a. Server NAT b. Dual NAT c. Port redirection d. Transparent Mode
d. Discuss the concept behind DNS server Load Balancing.
3. **Attempt any two of the following:** 10
a. What is Multiprotocol Label Switching (MPLS), and how does it enable new services in service provider and enterprise networks?
b. ✓ Describe the VNTag header structure implemented on Cisco Fabric Extenders, including its fields and their functions.
c. Explain IEEE 802.1Q Tunneling /Q-in-Q Frame Encapsulation.
d. What are the main components and features of the Small Computer Systems Interface (SCSI)?
4. **Attempt any two of the following:** 10
a. ✓ Describe the concept of Virtual Storage Area Networks (VSANs) in Fibre Channel fabrics.
b. Explain the components of the Fabric Shortest Path First (FSPF) protocol.
c. Write short note on Advanced Technology Attachment (ATA).
d. ✓ Explain Fibre Channel over Ethernet functional Model with neat diagram.
5. **Attempt any two of the following:** 10
a. Write short note on Unified Computing and Service Profiles.
b. Write Short note on Global Server Load Balancing.
c. ✓ What Is Cloud Computing? Explain different Cloud Service Models.
d. What role does Automation plays in managing virtualized data center environments?

(2 hours)

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1. Attempt any two of the following: 10
- a. Define marketing orientation and product orientation. Under which strategic orientation is there a greater need for business research and why?
 - b. Compare the advantages and disadvantages of conducting door-to-door, mall-intercept and telephone interviews.
 - c. Explain briefly about sampling techniques
 - d. What is the purpose of editing? Give some examples of questions that might need editing.
2. Attempt any two of the following: 10
- a. Define Problem Definition. Enumerate the steps of the research process.
 - b. Compare and contrast Quantitative vs Qualitative techniques.
 - c. Define ethics and explain how it applies to business research.
 - d. Discuss the advantages and disadvantages of secondary data.
3. Attempt any two of the following: 10
- a. What is a survey? List advantages of conducting survey research.
 - b. What is focus group interview? Explain its advantages in qualitative research.
 - c. Compare and contrast cross sectional study with longitudinal studies
 - d. Describe the major types of mechanical observation.
4. Attempt any two of the following: 10
- a. List three criteria for good measurement. Distinguish various levels of measurement
 - b. What is attitude measurement? Explain different scales in it.
 - c. Describe the guidelines for questions to avoid mistakes in questionnaire design.
 - d. Discuss how to choose an appropriate sample design, as well as challenges for Internet sampling.
5. Attempt any two of the following: 10
- a. Describe Type I and Type II errors.
 - b. Explain the hypothesis testing procedure.
 - c. Write a short note on multiple regression analysis.
 - d. What is a chi-squared test. Explain steps to calculate it.