Paper / Subject Code: 94729 / Information Technology : Cloud Computing (R.2019)

(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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** calculator is **allowed**.

1. Attempt *any two* of the following: 12

a. What are the benefits of cloud computing?
b. List and explain types of Parallelism.
c. How does Virtualization work in Cloud Computing.
d. Define hypervisor. Explain its functionality.

2. Attempt *any two* of the following: 12

a. Draw and explain architecture of Cloud Computing.
b. Explain how *IaaS works.*
c. What is on-demand functionality? How is it provided in cloud computing?
d. What is Google App Engine? Explain.

3. Attempt *any two* of the following: 12

a. Draw and explain the mechanism of load balancer.
b. State the two primary types of portals that are created with the remote administration system.
c. Explain how digital signature works to maintain the integrity of data in cloud?
d. What is Pay-per-use Monitor?

4. Attempt *any two* of the following: 12

a. List and explain types of dynamic scaling.
b. Write a note on Cloud Bursting Architecture.
c. How can a virtual server survive the failure of its hosting hypervisor or physical server?
d. List out the components involved in Storage Workload Management Architecture.

5. Attempt *any two* of the following: 12

a. List and explain in short, the cloud delivery models.
b. Explain Metrics for Service Agreements.
c. What are the different cost metrics need to be considered by business?
d. List and explain types of resource clusters.

---

(1)

DATA SCIENCE (Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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** calculator is **allowed**.

1. Attempt *any two* of the following: 12

a. Explain any five data processing tools in data science technology.
b. Discuss the Cross-Industry Standard Process for Data Mining (CRISP-DM).
c. Explain the maintenance and processing utilities in the utility layer
d. Describe the functional requirements in the business layer of the data science framework

2. Attempt *any two* of the following: 12

a. Explain the five fundamental steps that form the core of the data science process.
b. Write a short note on the six super steps for processing the data.
c. Explain in brief the indicators used in the Audit sub layer.
d. Explain the operational management layer.

3. Attempt *any two* of the following: 12

a. Explain Assess super step. What are the different ways to handle errors in the Assess super step.
b. State and explain the six data quality dimensions used in analysis of data
c. What are the different ways of treating missing values in data using pandas package? Explain with example.
d. Explain node, edge and directed acyclic graph.

4. Attempt *any two* of the following: 12

a. Explain the Time-Person-Object-Location-Event (T-P-O-L-E) design principle.
b. Explain hypothesis testing, t-test and chi-square test with respect to data science.
c. Explain over fitting and under fitting. Discuss the common fitting issues.
d. What is feature engineering? What are the common feature extraction techniques?

5. Attempt *any two* of the following: 12

a. Explain univariate analysis, bivariate analysis and multivariate analysis.
b. What is clustering? Explain the different clustering techniques
c. What are random forests? Explain with examples.
d. Explain the organize super step.

Paper / Subject Code: 94730 / Information Technology : Soft Computing Techniques (R.2019)

(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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** calculator is **allowed**.

1. Attempt *any two* of the following: 12

a. Discuss in detail on artificial neural network and binary sigmoidal activation function.
b. Describe genetic algorithm.
c. Write in detail on hard computing and soft computing.
d. Explain about content addressable memory.

2. Attempt *any two* of the following: 12

a. Give the details on perceptron network.
b. Write in detail about the tree neural networks.
c. Explain in detail on bidirectional associative memory.
d. Implement ANDNOT function using McCulloch - Pitts neuron. Consider binary data and the excitatory weight as 1 and inhibitory weight as -1.

3. Attempt *any two* of the following: 12

a. Describe adaptive resonance theory 1 (ART1).
b. Explain about Kohonen self-organizing feature maps.
c. Discuss about simulated annealing network.
d. Write in detail on the architecture of spiking neural networks.

4. Attempt *any two* of the following: 12

a. Explain about fuzzy equivalence and fuzzy tolerance relation in detail.
b. Define the following: (i) core (ii) support (iii) boundary (iv) normal fuzzy set (v) subnormal fuzzy set (vi) convex fuzzy set
c. What is defuzzification? List and explain any 2 methods of defuzzification.
d. Consider the two fuzzy sets

$$\tilde{A} = \left\{\frac{1}{2} + \frac{0.3}{4} + \frac{0.5}{6} + \frac{0.2}{8}\right\} \tilde{B} = \left\{\frac{0.5}{2} + \frac{0.4}{4} + \frac{0.1}{6} + \frac{1}{8}\right\}$$

Perform union, intersection, difference and complement over fuzzy sets A and B.

5. Attempt *any two* of the following: 12

a. Using a suitable example explain the single-point and two-point crossover technique.
b. Write in detail on categorical reasoning.
c. What are the classifications of neuro-fuzzy hybrid systems? Explain in detail any one of the neuro-fuzzy hybrid systems.
d. Explain the basic architecture of a fuzzy logic controller system in detail.

Paper / Subject Code: 94727 / Information Technology : Research in Computing (R.2019)

(Time: $2\frac{1}{2}$ hours)

[Total Marks: 60]

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** calculator is **allowed**.

1. Attempt *any two* of the following: 12

a. Define Business Research. Discuss the considerations while determining the need to conduct a Business Research.
b. Explain the characteristics of useful and valuable information for Business Research.
c. Define the term theory. Explain the process of theory building, stating its goals.
d. Describe the importance of Business Ethics highlighting various obligations of a Researcher with respect to confidentiality.

2. Attempt *any two* of the following: 12

a. Explain the importance of Problem Definition and briefly explain the steps of Problem-definition Process.
b. Compare the approaches of Qualitative and Quantitative Research.
c. Discuss the advantages and disadvantages of a Focus Group Interview.
d. Describe the common research objectives of secondary data study using appropriate examples.

3. Attempt *any two* of the following: 12

a. State and explain the major sources of Errors in Survey Research.
b. What are the advantages of Mail Surveys? Discuss the efforts to be made to increase the response rates for mail surveys.
c. Describe various techniques of Mechanical Observations used for measuring Physiological Reactions.
d. Explain the purpose of the following Experimental Design for research with suitable examples:
   i. Static Group Design
   ii. One-Shot Design

4. Attempt *any two* of the following: 12

a. Suppose that following is the rainfall (in centimetres) recorded in your city on a certain day:

Time during the day	Amount of Rain Fall in Centimetres
12:00 am	32
03:00 am	28
6:00 am	30
9:00 am	27
12:00 noon	28
03:00 pm	33
06:00 pm	34
09:00 pm	28

[Turn over .....

i. Calculate the mean, median and mode for the above temperatures.
ii. Prepare frequency distribution for the above data.
iii. Calculate standard deviation for the above data.
iv. Why is standard deviation rather than average deviation typically used?

b. Define Validity. Discuss various components of construct validity.
c. Discuss the types of Fixed-Alternative Questions stating their purpose. How do the Fixed-Alternative Questions differ from Open-Ended Response Questions?
d. Describe the significance of Probability Sampling. Explain any 4 techniques of Probability Sampling stating their advantages and disadvantages.

5. Attempt *any two* of the following: **12**

a. Describe the different types of hypothesis commonly tested for research. Differentiate between Type I and Type II errors.
b. Explain the purpose of Factor Analysis and give its broad classification. How does Factor Analysis help for data reduction?

c. What is Multivariate Statistical Data analysis? What are the steps of interpreting a multiple Regression Analysis results?

d. A WELLNESS health centre believes that the proportions of births in a certain country on each day of the week are equal. A random sample of 700 birth records from a recent year is selected for study. The results of the study are recorded in the following table:

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Birth Frequency	65	103	114	115	116	112	75

As a research consultant suggest if there is enough evidence to support the Health Centre's claim at a significance level of 0.01.