QP CODE: 28427

(2 ½ Hours) **[Total marks: 60**

N. B.: (1) **All questions** are **compulsory**
(2) **Figures** to the **right** indicate **full marks**.
(3) **Assume additional data if necessary** but state the same clearly.
(4) **Symbols have their usual meanings** unless stated otherwise.
(5) **Use of calculators** and **statistical tables** is **allowed**.

Q.1 Attempt **any two** of the following **(12)**

a) Briefly describe the concept of context based ubiquitous computing. What are its benefits? Also list various types of contexts. **6**
b) Write a note on types of Smart Environment Device Interaction. **6**
c) Briefly describe about Partitioning and Distribution of Service used in ubiquitous computing environment. **6**
d) Write a note on service provision life cycle. **6**

Q.2 Attempt **any two** of the following **(12)**

a) Discuss about the dimensions of mobility with reference to ubiquitous systems. **6**
b) Write a note on Smart Card Devices. **6**
c) What is implicit and explicit HCI? What are the challenges in supporting implicit interaction? **6**
d) What are gesture interfaces? How are they important in ubiquitous computing? What are its design challenges? **6**

Q.3 Attempt **any two** of the following **(12)**

a) What is tagging of a physical object? Explain the Life-cycle for tagging physical objects. **6**
b) How is RFID useful in implementing ubiquitous computing? What are its types? Explain. **6**
c) Briefly explain the concept of sensors and sensor nets. What are the challenges in designing and deploying sensors? **6**
d) Write a note on smart device form factor. Give examples. **6**

Q.4 Attempt **any two** of the following **(12)**

a) Discuss about wireless data network. **6**
b) What is audio network? Gives example and explain its characteristics. **6**
c) Highlight the importance of infrared and Bluetooth in ubiquitous environment implementation. **6**
d) Explain the design issues of ubiquitous communication. **6**

Q.5	Attempt **any two** of the following	**(12)**
a)	Write a note on Types of transparency for distributed services for reducing system complexity.	**6**
b)	Write a note on human centred design. Compare between conventional and human centered design.	**6**
c)	Compare between hard and soft RTS.	**6**
d)	Write a note on combining input and output user interfaces.	**6**

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Q.P. Code:28071

(2 ½ Hours) **[Total Marks: 60]**

N.B: (1) **All questions are compulsory.**
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(4) **Symbols have their usual meanings** and tables have their usual standard design unless stated otherwise.
(5) Use of **calculators** and statistical tables are **allowed**.

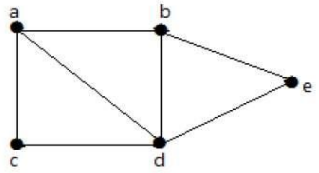
Q.1 Attempt **any two** of the following **(12)**

a) Define social network analysis. How it is represented by using graph theory. **6**
b) Write a short note on ego centric and socio centric network. **6**
c) How adjacency matrix and adjacency list are use to represent relations among actors in social network. **6**
d) List and explain different types of relations in social network analysis. **6**

Q.2 Attempt **any two** of the following **(12)**

a) The given graph represents synthetic social network, for this network compute following social network metrics: **6**

i)Density ii) Connectedness ii) Degree of nodes.



b) Write a short note on Google page rank algorithm. **6**
c) What is cliques? Explain following terms with respect to cliques: **6**

i) N-cliques ii) K-plexes iii) K-cores
d) Write a short note on following: **6**
i) F-Group ii) lambda sets and bridges

Q.3 Attempt **any two** of the following **(12)**

a) How are network roles and social roles different from network "sub-structures" as ways of describing social networks? **6**

b) Explain automorphic and regular equivalence classes. **6**

c) Explain Tabu search algorithm .How it is useful in social network analysis. **6**

d) How to measure similarity and dissimilarity in social network analysis. **6**

Q.4 Attempt **any two** of the following **(12)**

a) Explain the data structure use to store two-mode network information. **6**

b) Explain quantitative analysis using two mode Singular value decomposition (SVD) analysis. **6**

c) Explain two-mode core-periphery analysis with example. **6**

d) Why factor analysis is not recommended for binary data. **6**

Q.5 Attempt **any two** of the following **(12)**

a) Define following terms: **6**

i) Path and walks ii) Graph distance and diameter

b) What do you mean by centrality? How it is useful in social network analysis. **6**

c) Write short note on Euclidean, Manhattan, and squared distances. **6**

d) How data is represented by using two-mode network. **6**

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(2 ½ Hours) **[Total Marks: 60]**

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Q.1	Attempt **any two** of the following	**(12)**
a)	Explain different technologies used for distributed computing.	**6**
b)	Explain two reference models for achieving the communication among processes in Cloud computing.	**6**
c)	Explain reference architecture of Cloud computing Distributed system.	**6**
d)	Explain taxonomy of virtualization techniques.	**6**
Q.2	Attempt **any two** of the following	**(12)**
a)	Discuss various types of clouds along with their applications.	**6**
b)	Describe Web services and mashup architectures for integration over the Internet.	**6**
c)	What are enterprise components used in Cloud computing? Explain the component view of enterprise architecture.	**6**
d)	What is a middleware? Explain platform as a service reference model.	**6**
Q.3	Attempt **any two** of the following	**(12)**
a)	Why thread programming is necessary in developing clouds?	**6**
b)	When to use SOAP/WSDL Web service or REST Web service in Cloud based applications?	**6**
c)	Explain virtualization as a mechanism to achieve multi-tenancy at the system level.	**6**
d)	What is a task? How it is represented? Explain different categories of task computing.	**6**
Q.4	Attempt **any two** of the following	**(12)**
a)	Discuss any one cross-enterprise applications in detail.	**6**
b)	What is Dev 2.0 paradigm? What are its advantages in Cloud computing?	**6**
c)	How the layered architecture is implemented in practice? Give an example.	**6**
d)	Explain user interface patterns and basic transactions used in developing enterprise applications.	**6**

Q.5	Attempt **any two** of the following	**(12)**
a)	What is NoSQL systems? List various implementation of NoSQL. Explain any one in detail.	**6**
b)	Differentiate between computation and communication with context to Cloud computing.	**6**
c)	What is data-intensive computing? Explain different technologies used for data-intensive computing.	**6**
d)	What are the characterizing features of 'Big Data'?	**6**

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Q.P. Code:28068

(2 ½ Hours) **[Total Marks: 60**

N.B: (1) **All questions are compulsory.**
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(5) Use of **calculators** and statistical tables are **allowed**.

Q.1 Attempt any two of the following **(12)**

a) Define the term Computer Forensics. Enlist and explain the various Computer Forensics Services.

b) What are the types of business computer forensics technology? Explain.

c) Write a short note on Biometric Security Systems.

d) What are Network Disaster Recovery Systems? Explain their usage.

Q.2 Attempt any two of the following **(12)**

a) What are the various needs of Evidential Authentication?

b) State and explain the five rules of Computer Evidence.

c) Explain the different kinds of Evidence Categories.

d) Write a short note on Timekeeping.

Q.3 Attempt any two of the following **(12)**

a) What are the various sources of Network Based Evidence?

b) Discuss the various purposes of Statistical Analysis of Flow Data.

c) What is Flow Record? Explain the various components of Flow Record Processing System.

d) What are the common attacks on Wireless Networks an investigator would look for?

Q.4 Attempt any two of the following **(12)**

a) Write a short note on Mobile Phone Codes.

b) List and explain the files present in a SIM card.

c) What is Squid? List and explain the main components of Squid.

d) Enlist the factors that have led to the rise in encrypted web transactions.

Q.5 There is a suspect that some kind of fraud is being carried out in the Accounts Department of ABC Ltd, a leading MNC. The company has decided to avail your services as a Cyber Forensics Specialist to do the investigation at its Mumbai Branch. On visiting the branch office you find a network of 10 computers connected via a router to the Internet. Also 2 laptops and 3 mobile phones have been found. **(12)**

Attempt <u>any two</u> of the following

a) What procedure will you follow for collecting and analyzing evidence from the crime scene?

b) What strategy will you adapt to collect evidence from network devices?

c) What evidence will you collect from the mobile phone?

d) List the possible problems with the computer forensic evidence collected.

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Q.P. Code:28075

(2 ½ Hours) **[Total Marks: 60**

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(5) Use of **calculators** and statistical tables are **allowed**.

Q.1 Attempt **any two** of the following **(12)**

a) Explain the deficiencies of conventional system while performing database analysis. **6**

b) Explain about Analysis or Reporting. Also explain when are they used and why? **6**

c) What is Sampling Distribution? Explain how can it be used in Big data? **6**

d) List and explain in brief the basic approaches of learning in Neural Network. **6**

Q.2 Attempt **any two** of the following **(12)**

a) What is combiner? Explain its role in MapReduce. **6**

b) Explain how Map-Reduce task cope up with node failures. **6**

c) Write a short note on workflow system. **6**

d) Explain how to solve Relational Algebra operations: Union, Intersection, and Difference with MapReduce. **6**

Q.3 Attempt **any two** of the following **(12)**

a) Explain the formula to calculate Jaccard Similarity of Sets. Compute the Jaccard similarities of each pair of sets: **6**
i) A= {1, 2, 3, 4, 5}, and B= {2, 4, 6, 7}
ii) A={1,2,7,8,9} and B={1,5,6,8,9}
iii) A={1,2,3,4}, and B={3,6,7,8}

b) Consider a document D with the string *abcadabdada*. Generate 3-shingles and 2-shingles for D. **6**

c) What is the best method of comparing two documents for identifying lexical similarity between them? Explain the method with justified example. **6**

d) Compute the minhash signature for each column for hash functions: **6**
$h_1(x) = x+1 \bmod 3$; $h_2(x) = 2x+1 \bmod 3$;
for set $S_1(0,1,0)$, $S_2(1,0,1)$ and $S_3(0,1,1)$ and $S_4(1,1,0)$. Analyze the result.

Q.4 Attempt **any two** of the following **(12)**

a) State and discuss any two applications of data streaming. **6**
b) What is sampling for Data Streaming? Explain in brief the general Sampling problem. **6**
c) What is window? Explain the process of counting once in a window. **6**
d) Write a short note on Decaying Window. **6**

Q.5 Attempt **any two** of the following **(12)**

a) Describe in short about stochastic search methods. **6**
b) List and explain the characteristics of the systems which are influenced by MapReduce. **6**
c) Write a short note on Locality-Sensitive Hashing for Documents. **6**
d) Define Moments. Explain how to calculate k^{th} moments. **6**

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(2 ½ Hours) **[Total Marks: 60]**

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Q.1 Attempt **any two** of the following **(12)**

a) The marks obtained by a number of students for a certain subject are assumed to be normally distributed with mean value 65 and with a standard deviation of 5. If 3 students are taken at random from this set, what is the probability that exactly two of them will have marks over 70? (Given P (Z>1) = 0.1587). **6**

b) Explain Binomial and Bernoulli distributions. **6**

c) What are the important objectives of machine learning? Discuss different important examples of machine learning. **6**

d) Discuss in brief Expectation Maximization (EM) algorithm. **6**

Q.2 Attempt **any two** of the following **(12)**

a) Discuss Kernel and Kernel Trick **6**

b) Explain Support Vector Machine classification and any two pros and cons associated with it. **6**

c) Explain Markov Random Field with examples. **6**

d) Explain Markov Model with its applications. **6**

Q.3 Attempt **any two** of the following **(12)**

a) Explain rejection sampling and importance sampling. **6**

b) Explain Metropolis Hastings algorithm. **6**

c) Describe Gibbs Sampling and its various forms. **6**

d) Explain the concept of particle filtering in detail. **6**

Q.4 Attempt **any two** of the following **(12)**

a) Explain the concept of structure learning in detail. **6**

b) Describe directed, undirected and mixture of trees. **6**

c) Describe deep neural network with example. **6**

d) Describe learning from observational and interventional data. **6**

Q.5 Attempt **any two** of the following **(12)**

a) Explain in detail Genetic Linkage analysis. **6**

b) Explain conditional independence properties of Undirected Graphical Model (UGMs). **6**

c) What is continuous distribution? Explain any two types of continuous distributions. **6**

d) If X follows U (0, 1) , find the pdf of $-\theta \log X$ and identify the distribution. Hence find $P(-\theta \log X > 1)$. **6**
