

- N.B: (1) All questions are compulsory.
 (2) Figures to the right indicate marks.
 (3) Illustrations, in-depth answers and diagrams will be appreciated.
 (4) Mixing of sub-questions is not allowed.

Q1. Attempt the following (any Two) (12)

- (A) What is purpose of simulation? Discuss the advantages and disadvantages of simulation.
- (B) Explain time slicing approach used for modelling the progress of time.
- (C) Discuss four methods for representing the content of the conceptual model.
- (D) Explain the key elements of conceptual modelling framework.

Q2. Attempt the following (any Two) (12)

- (A) How do you compare options available to represent the model variability present in each part of the model.
- (B) What are the steps involved in Welch's method? Mention the advantages of using this method to determine warm up period.
- (C) What is simulation optimization? Discuss shortcomings in its use.
- (D) Discuss the methods of validations and verifications available to simulation modellers.

Q3. Attempt the following (any Two) (12)

- (A) What is space in agent based models?
- (B) Write short note on OO modelling in Anylogic?
- (C) Explain discrete space API for 2D modelling?
- (D) Explain the types of standard and customs networks used in Anylogic. Draw neat diagram of each?

Q4. Attempt the following (any Two) (12)

- (A) Consider a shop in a southern country. With these working hours:
 Weekdays: 9AM to 1 PM then 4 PM to 8 PM .
 Saturdays: 10 Am to 2PM Sunday closed. Draw the state chart for shop working hours and discuss the timeout transition?
- (B) What is state chart? Draw and explain the state chart of delivery truck?
- (C) Explain briefly the dynamic properties of controls for radio buttons enabled and disabled on slider.
- (D) Compare and contrast synchronous and asynchronous transitions

TURN OVER

- Q5. Attempt the following (any Two) (12)
- (A) Explain the different types of data validation.
 - (B) Explain welch model for plotting moving average.
 - (C) What are the types of models in anylogic
 - (D) Write briefly with example the application of simulation modeling
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QP CODE : 38957

(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 NIST definition of Cloud Computing. 6
- b) Explain the five major actors in the NIST Cloud Computing reference architecture. 6
- c) Write a short note on Identity and Access Management. 6
- d) Explain the concept of Hardened Virtual Server Images. 6

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

- a) Explain the concept of Cloud Usage Monitor. 6
- b) Explain the concept of Automated Scaling Listener. 6
- c) Write a short note on Multi Device Broker. 6
- d) Explain the Billing Management System in Cloud computing system. 6

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

- a) Explain the concept of Dynamic Scalability Architecture. 6
- b) Explain the concept of Cloud Bursting Architecture. 6
- c) Write a short note on Zero Downtime Architecture. 6
- d) Explain the concept of Rapid Provisioning Architecture. 6

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

- a) Explain how cloud providers equip PAAS environments. 6
- b) Describe Cloud Consumer's working with IAAS environments. 6
- c) Explain the concept of Service Availability Metrics. 6
- d) Write a short note on different Cloud Usage Cost Metrics 6

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

- a) Explain the different types of Threat Agents in Cloud Computing. 6
- b) Explain the concept of Hypervisor. 6
- c) Explain the concept of Redundant Storage Architecture. 6
- d) Explain how cloud providers optimize SAAS environments. 6

Q.P.Code: 50666

(2 ½ Hours)

[Total Marks: 60]

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

- a) State the extended Euclidean Algorithm. Express $\gcd(252, 198) = 18$ as a linear combination of 252 and 198.
- b) What is a Linear Congruence? Use the Chinese Remainder Theorem to solve the following system of congruences: $x \equiv 2 \pmod{3}$, $x \equiv 1 \pmod{4}$, and $x \equiv 3 \pmod{5}$.
- c) Define Euler ϕ -function. Hence find the following values of the Euler ϕ -function: $\phi(10)$, $\phi(13)$
- d) State and explain the application of Congruences.

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

- a) Suppose $m = 6$ and the keyword is CIPHER and the plaintext is the string
THISCRYPTOSYSTEMISNOTSECURE
Encrypt using Vigenere Cipher
- b) Explain the various Algorithm Modes.
- c) Explain the broad working of DES.
- d) Write a short note on SHA.

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

- a) State the pollard $p-1$ Algorithm.
- b) Explain the Solovay–Strassen Algorithm.
- c) Explain the following:
 - i) Legendre Symbol
 - ii) Jacobi Symbol
- d) What are the possible attacks on RSA?

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

- a) Explain the life cycle of a Certificate.
- b) Write a note on the web browser trust model.
- c) What is Station-to-station protocol?
- d) Discuss Pretty Good Privacy Services and corresponding algorithms.

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

- a) What is quadratic residue? Find the quadratic residue of 7
- b) Discuss the cryptanalysis of Affine Cipher.
- c) Explain PKIX Architectural Model.
- d) State and explain the Diffie Hellman Key Exchange Algorithm.

(2 ½ Hours)

[Total Marks: 60]

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

- a) Find K-mean clustering method using the set {4, 6, 12, 14, 5, 22, 32, 13, 27} by dividing a set into three clusters. Initially begin with three clusters having elements 5, 6 and 13. 6
- b) State and explain PAM Algorithm. 6
- c) Describe Agglomerative Algorithm. Draw a Dendrogram for following adjacency matrix using Single Link techniques 6

Item	A	B	C	D
A	0	3	4	4
B	3	0	5	5
C	4	5	0	3
D	4	5	3	0

- d) State and explain working of DBSCAN algorithm. 6

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

- a) Define DT. List out various DT algorithm. State and explain various issues faced by most of the DT algorithm. 6
- b) Explain Rule-based classifier algorithm. Explain how it is different than tree-based classifier. 6
- c) What is Confusion Matrix? Illustrate the example to explain the same. 6
- d) Explain the purpose of CART. State the characteristics of CART Algorithm. Explain How CART Algorithm deals with missing data. 6

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

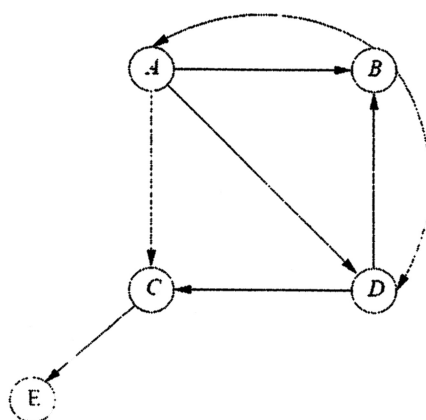
- a) What is Dimensionality Reduction? State the Need and important of the Dimensionality Reduction. 6
- b) Define Eigenvalue and Eigenvector. Find Eigen pairs for the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$. Explain the outcome of the same. 6

Turn Over

- c) Define SVD. Explain how SVD is useful in Dimensionality Reduction. 6
- d) What is CUR decomposition? State step by step implementation of CUR process. 6

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

- a) Briefly explain working of early search engine. State the issues related to these search engines. Explain how Google tries to overcome it. 6
- b) Explain following web component. 6
- SCC
 - in-component
 - out-component
 - Tendrils
 - Tubes
 - Isolated components
- c) Define PageRank. Calculate the PageRank of E for following hypothetical structure of web. 6



- d) Define Recommendation system. State and explain two basic architecture of Recommendation system. 6

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

- a) Explain the characteristics of Partitioning algorithms. Discuss the characteristics of CLARANS. 6
- b) Explain how Bayesian classification works for performing classification. 6
- c) State and explain in brief a complete UV-decomposition algorithm. 6
- d) Define Spam Farm. Are they creating their effect on Page Ranking? If yes, how to handle them? 6

Q. P. Code: 50824

(2 ½ Hours)

[Total Marks: 60]

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

- a) Explain why the threshold theta is necessary? What is the effect of theta and what will be the consequences of not having threshold? 6
- b) Define neuron. What are the main advantages of using recurrent neural networks instead of feed forward neural network? 6
- c) Explain the architecture of Radial Basis Function network. 6
- d) Describe any two factors that have an influence on the performance of supervised neural network. 6

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

- a) Write down the difference between evolutionary computation and classical optimization. 6
- b) Define genetic algorithm. Explain three main classes of crossover operators. 6
- c) Write down the steps in design of Genetic algorithm. 6
- d) What is decision tree? Explain how Genetic Programming can be used to evolve decision tree. 6

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

- a) Define Global best PSO and local best PSO. Explain global best PSO versus local best PSO. 6
- b) Describe any three social network structures for PSO. 6
- c) Write down any three applications of PSO. 6
- d) Describe Ant colony optimization and give the justification of following situation: 6
Ant A1 follows the shorter of two paths to the food source, while ant A2 follows the longer path. After A2 reached the food source, which path back to the nest has a higher probability of being selected by A2?

[Turn Over]

Q. P. Code: 50824

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

- a) Compare fuzzy set and rough set to show their similarities and differences. 6
- b) Consider the following rules 6
- 1] if x is Small then y is Big
 - 2] if x is Medium then y is Small
 - 3] if x is Big then y is Medium
- Write down the membership function for the above rules
- c) Write down the steps followed by Mamdani Fuzzy controller. 6
- d) Explain the concept of defuzzification. 6

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

- a) Write a short note on ANN. 6
- b) Write down mutation operators in genetic algorithm. 6
- c) Describe any three Particle Swarm Optimization parameters. 6
- d) Explain any two network theory models. 6