6E7101

B.Tech. VI-Sem. (Main/Back) Exam. May, 2025

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

6AID3-01 Digital Image Processing

CS, IT, AID, CAI, CDS, CCS, CIT, CSD

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1.   Discuss about contrast stretching and intensity slicing.

Q.2.   What are the types of image enhancement available?

Q.3. What are the types of edge detection operators available?

Q.4. What is the role of Hough Transform in global processing?

Q.5. Why noise is always considered to be additive, in images?

Q.6. What is the role of Fourier transform in the context of image processing?

Q.7. How do frequency domain filters contribute to image transformation?

Q.8. What is the significance of Wavelet Transforms?

Q.9. What is the concept of degradation function?

Q.10. Identify the types of redundancies in image compression.

PART-B   [5x4=20]

(Analytical/Problem-solving Questions)

Attempt any five questions

Q.1. Show the bit plane slicing of the following image :

7	6	5
4	3	2
1	1	0

Q.2 Prove whether the Fourier Transform of a discrete time signal is continuous or discrete. Explain with an example.

Q.3. Explain HIS color model with an appropriate figure. Explain the conversion procedure from RGB color space to HSI color space.

Q.4. Describe how homomorphic filtering separates illumination and reflectance components.

Q 5. Write notes on Run length encoding and Shift codes.

Q.6. Explain any two boundary representation schemes and illustrate with an example.

Q.7. Discuss image segmentation based on various thresholding techniques.

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PART-C [3x10=30]

(Descriptive/Analytical/Problem-solving/Design Question)

Attempt any three questions

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Q1. Describe histogram equalization. Obtain histogram equalization for the following image segment of size. Write the inference on the image segment before and after equalization :

<div align="center">

20 20 20 18 16
15 15 16 18 15
15 15 19 15 17
16 17 19 18 16
20 18 17 20 15

</div>

Q.2 Decode the arithmetic coded message, 0.23355 for the coding model :

Symbol	Probability
A	0.2
E	0.3
I	0.1
O	0.2
u	0.1
!	0.1

And also explain LZW coding with an example and explain Redundancies and their removal methods.

Q.3   Consider the image 'I' below and the filters 'F' and 'L'

```
    'I'                 'F'                    'L'
1   1   1              1/8                      1
1   8   1          1/8  1/2  1/8           1   -4   1
1   1   1              1/8                      1
```

(a)   Correlate the image 'I' with the filter 'F' and compute the output image.

(b)   Apply filter 'L' to the same image 'I' to produce a 3 by 3 output image.

Q.4   Explain following terms with example :

(a)   Lookup Table   (b)   Additive vs. Subtractive color system

(c)   Hue and Saturation   (d)   Hue-Max-Min-Diff (HMMD) Color Space

Q. 5.   Consider an image- Show the output of any edge detection algorithm :

1	2	5
5	5	5
5	3	2

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B.Tech. VI-Sem. (Main/Back) Exam., May-2025

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

6AID4-02 Machine Learning

CS, IT, AID, CAI, CDS, CCS, CIT, CSD

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is the significance of standard deviation in Machine Learning?

Q.2. Differentiate between overfitting and underfitting.

Q.3. What is Confusion matrix?

Q.4. What are the applications of Support Vector Machine (SVM)?

Q.5. What is the working principle of Naive Bayes Classifier?

Q.6. What are the advantages and disadvantages of hierarchical clustering?

Q.7. What is a dendrogram in hierarchical clustering?

Q.8. Calculate the variance and standard deviation of the following data :

4, 2, 5, 8, 6

Q.9. What does Mean Squared Error (MSE) tell you?

Q.10. Explain the straight line equation $y = mx + c$ with respect to Machine learning.

PART-B   [5x4=20]

(Analytical/Problem-solving Questions)

Attempt any five questions

Q.1. Explain the concept of deep learning in detail.

Q.2 What do you mean by reinforcement learning? Also explain the model based reinforcement learning.

Q.3. Explain Markov Decision Process (MDP) also explain policy iteration and value iteration.

Q.4. Explain the concept of feature selection used in Machine Learning.

Q 5. How the decision tree algorithm works? Explain it with the help of an example. What is the role of entropy and information gain in Decision tree?

Q.6. Explain the working principle of Probabilistic clustering in Machine Learning with example.

Q.7. What is the use of PCA in Machine Learning? Give the steps of PCA algorithm.

<center>PART-C [3x10=30]</center>

<center>(Descriptive/Analytical/Problem-Solving/Design Question)</center>

<center>Attempt any three questions</center>

Q1. Write short notes on the following :

(a) Perceptions

(b) Multilayer Network

(c) Back Propagation

(d) Artificial Neutral Network

Q.2 What is the role of State-Action-Reward-State-Action (SARSA) in machine learning? Differentiate between SARSA and Q-learning.

Q.3 Explain Principal Component Analysis (PCA) in machine learning? How to evaluate machine learning algorithm?

Q.4 Consider an example where five weeks sales data (in thousand) is given as shown in table :

x_i (Weeks)	y_i(Sales in thousand)
1	1.2
2	1.8
3	2.6
4	3.2
5	3.8

Apply linear regression algorithm to predit 7th and 12th week sales.

Q. 5. Consider the following dataset which shows BMI, Age, and Sugar level (0 represent "No Sugar", 1 represent "Sugar"). Assume k = 3, apply k-nearest neighbor classifier to predict the diabetic patient with the given feature BMI, Age.

Test example of BMI = 43.6, Age = 40, predict the patient has sugar or no sugar:

BMI	AGE	SUGAR
33.6	50	1
26.6	30	0
23.4	40	0
43.1	67	0
35.3	23	1
35.9	67	1
36.7	45	1
25.7	46	0
23.3	29	0
31	56	1

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6E7103

B.Tech. VI-Sem. (Main/Back) Exam., May-2025

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE & DATA SCIENCE)

6CAI4-03/Information Security Systems

CS, IT, AID, CAI, CIT, CCS, CDS

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is difference between Cryptography and Cryptanalysis?

Q.2. What is difference between stream and block ciphers?

Q.3. What are Confusion and Diffusion in Cryptography?

Q.4. What are strength of DES algorithm?

Q.5. What is difference between public key and private key cryptosystems?

Q.6. Write any two applications of public key cryptography.

Q.7. What is cryptographic hash function? Write its any two properties.

Q.8. What are the requirements of Message Authentication Codes?

Q.9. Write any four general means of authenticating a user's identity.

Q.10. What is HTTPS?

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PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

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Q.1. Encrypt the message "Code" using the Hill cipher with the key $\begin{bmatrix} 3 & 2 \\ 8 & 5 \end{bmatrix}$ and also decrypt the ciphertext to original plaintext.

Q.2 Explain AES key expansion algorithm with suitable diagram.

Q.3. Perform encryption and decryption using the elgamal algorithm for the following:

$q = 19; \alpha = 13, X_A = 5; M = 15; k = 6$

Q.4. Explain Cipher-Based Message Authentication Code (CMAC) with suitable diagram.

Q 5. Explain SSL Record Protocol with suitable diagram.

Q.6. Explain the Electronic Code Book (ECB) block cipher mode of operation.

Q.7. Explain the application of cryptographic hash function for digital signature.

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. What are security attacks? Explain different types of security attacks.

Q.2. Explain the internal structure of single round of DES algorithm.

Q.3. Explain the RSA algorithm and using this algorithm perform the encryption and decryption for the following :

$p = 5; q = 31; e = 13; M = 5$

Q.4. Explain the digital signature algorithm with the diagrams showing functions of signing and verifying.

Q. 5. Explain the Public-key certificates technique for distribution of public keys.

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6E7104

6E7104

B.Tech. VI-Sem. (Main/Back) Exam. May - 2025

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

6AID4-04 Computer Architecture and Organization

CS, IT, AID, CAI, CDS, CCS, CIT, CSD

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is a priority interrupt?

Q.2. What are the most common fields of an Instruction format?

Q.3. What is immediate addressing mode?

Q.4. What are the major characteristics of a pipeline?

Q.5. Define latency time.

Q.6. Explain fixed point representation.

Q.7. Define multi-processing.

Q.8. Represent $(70)_{10}$ in a signed magnitude format and one's complement form.

Q.9. Write a quick note on subroutine.

Q.10. Define superscalar processor.

## PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain the functional units of an architecture of computer with diagram.

Q.2 Why interprocess synchronization needed? Explain.

Q.3. What are logical microoperatios? Explain about applications of logical microoperation.

Q.4. Differentiate between hardwired and microprogrammed control unit.

Q 5. Explain about serial communication.

Q.6. Explain the need of cache memory. Also explain Hit Ratio.

Q.7. Describe the algorithm for integer division with suitable example.

(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any three questions

Q1.   Define parallel processing and explain the Flynn's classification of computer with suitable diagram.

Q.2   Explain different types of computer registers with common bus system with a neat diagram.

Q.3   Explain the Booth Algorithm with its flowchart. Perform multiplication of (-13) and (+9) using Booth Algorithm.

Q.4   What is DMA? Draw the Block diagram of DMA controller and explain it.

Q.5. (i)   How many 128×8 RAM chips are needed to provide a memory capacity of 2048 bytes?

      (ii)   How many lines of address bus must be used to access 2048 bytes of memory? How many of these lines will be common to all chips?

      (iii) How many lines must be decoded for chip select?

      (iv)   Specify the size of the decoders?

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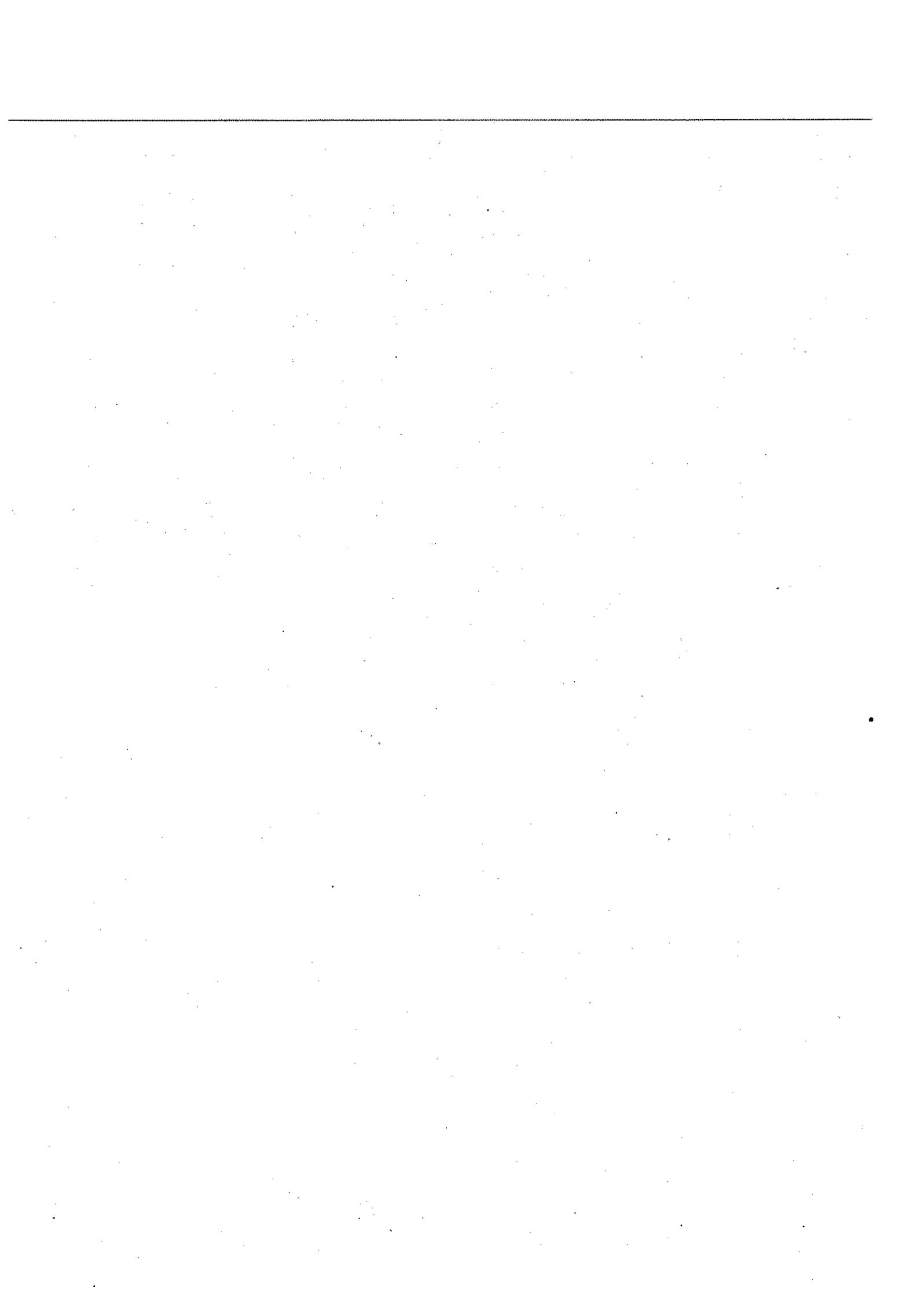
6E7105

B.Tech. VI-Sem. (Main/Back) Exam. May–2025

Artificial Intelligence and Data Science

6AID4-05 / Principles of Artificial Intelligence

CS, IT, AID, CAI

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define Rational Agent and Intelligent Agent.

Q.2. What is the role of Heuristic function in informed search?

Q.3. List the three main components of a Constraint satisfaction problem.

Q.4. What is rule based knowledge base?

Q.5. Construct a truth table for the compound proposition $(p \rightarrow q) \rightarrow (q \rightarrow p)$.

Q.6. What are support vectors in SVM?

Q.7. What are Neural Networks?

Q.8. Define Universal and Existential quantifiers in FOL with examples.

Q.9. What is initial and goal state in water jug problem?

Q.10. Define uncertainty and list the causes of uncertainty.

PART-B   [5x4=20]
(Analytical/Problem-solving Questions)
Attempt any five questions

Q.1. Explain the differences between Breadth First Search and Depth First Search algorithms with the help of an example.

Q.2. Compare forward chaining and backward chaining used in expert systems.

Q.3. State Bayes' theorem and explain its significance in probability estimation.

Q.4. What is Robotics? Mention two real-world applications of robots.

Q.5. What is Market Basket analysis and how it is used in recommendation systems?

Q.6. Explain the difference between constants, variables, predicates, and functions in FOL. Convert the following sentence into FOL : "all humans are mortal".

Q.7. Solve the following 3×3 sliding puzzle given with the initial and goal state.

Initial State   Goal State

1	2	3
8		4
7	6	5

⇒

1	2	3
4	5	6
7	8	

## PART-C   [3x10=30]

(Descriptive/Analytical/Problem-Solving/Design Questions)

Attempt any three questions

Q.1. Write the algorithm for the A* search technique. Using a suitable example, explain how A* search is more effective than the Greedy Best-First Search technique.

Q.2. Explain the concepts of Supervised Learning and Unsupervised Learning in Machine Learning. Discuss their key differences with suitable examples. Additionally, compare the advantages and limitations of both approaches.

Q.3. Given the following game tree, apply the Minimax algorithm to determine the optimal move for the maximizing player. Then, apply Alpha-Beta Pruning to the same tree and show which nodes are pruned. Compare the number of nodes evaluated in both cases. Compare time efficiency in terms of the number of nodes processed.
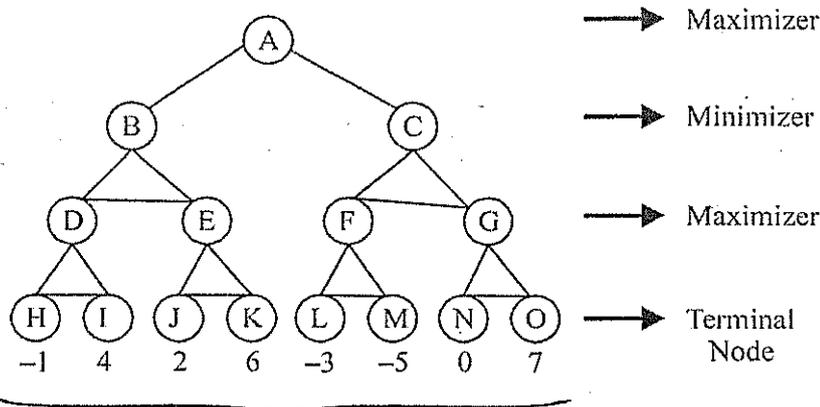
Terminal Values

Q.4.   Explain the steps involved in Natural Language Processing (NLP). Provide examples of how techniques like tokenization, part-of-speech tagging, named entity recognition (NER), and sentiment analysis are used in NLP. Discuss any one example highlighting the importance on NLP in real-world applications.

Q.5.   Consider the following knowledge base in First-Order Logic (FOL) :

$$\forall x \left(Cat(x) \rightarrow Animal(x) \right)$$

$$\forall x \left(Animal(x) \rightarrow Living(x) \right)$$

$$\forall x \left(Living(x) \wedge Friendly(x) \rightarrow Pet(x) \right)$$

Cat(Tom)

Friendly(Tom)

Task : Using Theorem Proving in First-Order Logic. Prove that Pet(Tom).

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Total No. of Questions : 22 Total No. of Pages : 04

Roll No. : ....

6E7106

B.Tech. VI-Sem. (Main/Back) Exam., May–2025

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

6AID4-06 Cloud Computing

CS, IT, AID, CAI, CCS, CIT, CSD

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in Form No. 205)

1. .... 2. ....

PART-A [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Briefly explain the historical journey of the development of Cloud Computing. [2]

Q.2. What are the ethical issues in cloud computing`? [2]

Q.3.   Briefly explain the concept of :   [2]

    (a)   Ubiquitous Cloud

    (b)   Internet of Things

Q.4.   Define virtualization techniques used in Cloud Computing. What are the advantages of virtualization in Cloud Computing?   [2]

Q.5.   What are the fundamentals of cloud information security?   [2]

Q.6.   What are the cloud security services in cloud computing?   [2]

Q.7.   What are the threats in cloud and how it can be identified?   [2]

Q.8.   What is the vision and components of cloud computing?   [2]

Q.9.   What are the enabling technologies used in cloud computing?   [2]

Q.10. Explain the layers and service models used in cloud computing.   [2]

PART-B   [5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1.   What is the role of Data Center in the Cloud Computing? What are the components required in data center architecture?   [4]

Q.2.   Explain the concept of Kernel based virtual machine used in Cloud Computing. [4]

Q.3.   What is Network support in cloud computing?   [4]

Q.4.   What are the design principles and policy implementation used for securing the cloud?   [4]

Q.5.   Explain Google App Engine.   [4]

Q.6.   What are the challenges faced in cloud computing?   [4]

Q.7.   Write short notes on the following :   [4]

    (a)   Protein Structure Prediction

    (b)   Data Analysis

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q.1. (a) What is the role of virtualization in Cloud Computing? What is hyper visor virtual machine? What are the characteristics of virtualization? [5]

(b) Write a short note on virtualization of a : [5]

(i) Server

(ii) Network

Q.2. (a) Write a short note on : [6]

(i) PasS

(ii) IaaS

(iii) Hadoop

(b) Explain the architectural design of compute and storage cloud. What is the role of Map Reduce in Hadoop? [4]

Q.3. (a) Explain Microsoft Azure Design in detail. [5]

(b) What is the role of Aneka in the integration of Public and Private Clouds? [5]

Q.4. (a) What are the challenges, Risk and approaches during migration of data into cloud? [5]

(b) Evaluate the cloud's business impart and economics. [5]

Q.5. (a) What challenges we are facing in the security of cloud computing? Explain the architecture of cloud computing security. [5]

(b) Explain Service Level Agreement (SLA) with the help of diagram and also explain how the trust management can be done in cloud computing security. [5]

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6E7138

6E7138

B.Tech. VI-Sem. (Main/Back) Exam. - 2025

Computer Science and Engineering

6CS5-13/ E-Commerce and ERP (El.-I)

CS, IT, CSD

Time : 3 Hours   Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ....NIL..........   2. ....NIL....

PART-A   [10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What do you mean by E-Commerce?

Q.2. "For carrying out B2C E-commerce, corporate network infrastructure is essential or not." Justify your answer.

Q.3. "Opening of shop for 24 hours a day is advantage of B2C commerce or not." Justify your answer.

Q.4. Electronic data interchange is necessary in B2B, B2C, C2B or C2C? Tell the correct answer and justify.

Q.5. How e-commerce helps in improving the home shopping?

Q.6. Which segment do flipkart.com belong?

Q.7. What do you mean by Metadata? Discuss with examples.

Q.8. Write in short on Internet Services.

Q.9. What do you mean by XML?

Q.10. What is a Virtual Storefront?

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PART-B   [5×4=20]

(Analytical/Problem-Solving Questions)

Attempt any five questions

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Q.1. Explain the different types of E-commerce with examples.

Q.2. Differentiate between E-business and E-commerce.

Q.3. How the man power is associated with the E-commerce activities? Explain in detail.

Q.4. "Doing the money transactions through technology is always risky." Support your opinion.

Q.5. Tell the difference between the Extranet, Intranet and Internet.

Q.6. How a threat to client computer during an e-commerce transaction can be addressed? Explain.

Q.7. Compare between the HTML and XML in detail.

PART-C [3×10=30]

(Descriptive/Analytical/Problem-Solving/Design Question)

Attempt any three questions

Q.1. Classify the e-commerce transactions with respect to B2B, B2C etc. and prove that digital signature has a vital role in such transactions by citing the examples as well.

Q.2. In a cinema ticket reservation system, where online booking of tickets can be done in any cinema hall in the country, client connects to a reservation server for signing into reservation system. This in form uses services of two or more servers for booking and payment services. Explain the issues involved in implementing and maintenance of this system.

Q.3. Discuss the Uniform Resource locators in detail with different examples. Also explain the strategic capabilities of Internet.

Q.4. Research has shown that many consumers uses the Internet to investigate purchases before actually buying, which is usually done in a physical storefront. What implications does this have for online merchants? What can they do to entire more online buying rather than pure research?

Q.5. List down different methods of Internet Marketing. Define the structure of an XML document and XHTML document. Discuss the difference between the Data Marts and operational Data Stores.

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6E1552

6E1552

B.Tech. VI-Sem. (Back) Exam. - 2025

COMPUTER SCIENCE AND ENGINEERING

6CS4-02 / Machine Learning

CS, IT

Time : 3 Hours   Maximum Marks : 120

Attempt all ten questions from Part A, five question out of seven from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Note : All questions are **compulsory** :

1.   State the assumption behind Linear regression and its mathematical form.

2.   What is the Gini index in a decision tree ?

3.   What is the role of the Sigmoid function in Logistic regression ?

4. What is the role of the support, confidence and life metrics in Association Rule Mining?

5. Differentiate between feature extraction and feature selection.

6. What is a Markov Decision Process (MDP)?

7. Differentiate between Q-learning and SARSA algorithms.

8. What is the purpose of Policy Iteration?

9. How does the Apriori algorithm generate frequent item sets?

10. What is the FP-Growth algorithm?

PART-B [5x8=40]

(Analytical/Problem solving questions)

Attempt any Five questions

Q.1. In a Spam detection model, the probability of an email being spam is 30%, and the likelihood of a keyword appearing in spam emails is 0.8, but 0.1 in non-spam. Use Bayes' theorem to calculate the probability that an email is spam if the keyword is present.

Q.2. Give these three data points : (2, 2), (4, 4), (6, 6) and initial centroids (2, 2) and (6, 6), perform one iteration of the K-means algorithm.

Q.3. KNN classifier (k = 3) predicts the class of a point (2, 2) using the following labeled data :

X	Y	Class
1	1	A
2	3	B
3	3	A
3	2	B

What is the predicted class?

Q.4. Give the data set :

X	Y
1	2
2	3
3	4

Compute the first principal component.

Q.5. A model gives the following confusion matrix :

	Predicted Positive	Predicted Negative
Actual Positive	40	10
Actual Negative	20	30

Calculate precision, recall and F1-score.

Q.6. How SARSA differs from Q-learning in terms of exploration and exploitation ? Explain.

Q.7. Explain the steps of backpropagation and compute the gradient for a single hidden layer neural network.

PART-C

[4x15=60]

(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q.1. Given a logistic regression model with the decision boundary :

$$P\left(Y = \frac{1}{X}\right) = \frac{1}{1 + e^{-(2X_1 + 3X_2 - 4)}}$$

Determine whether the point $(X_1 = 1, X_2 = 0)$ will be classified as 1 or 0.

Q.2. Given the following dataset, calculate the information gain if the root node splits on "Weather" :

Weather	Temperature	Play ?
Sunny	Hot	No
Overcast	Mild	Yes
Rainy	Cool	Yes
Sunny	Cool	No

Q.3. Solve the Bellman equation for the following policy :

$$V(s) - R(s) + \gamma \max_{\alpha} Q(s,a)$$

Given :

(i) $R(s) = 5$

(ii) $\gamma = 0.9$

(iii) $Q(s,a) = [3,4]$

Q.4. Given the following transaction :

Transaction ID	Item
1	{A, B, C}
2	{A, B}
3	{B, C}
4	{A, C}

Find frequent itemsets using Apriori algorithm with min-supoort = 2.

Q.5. Design a Convolutional Neural Network (CNN) architecture for image classication with at least two convolutional layers and a softmax output.

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6E1553

B.Tech. VI-Sem. (Back) Exam. - 2025

COMPUTER Sc. & ENGINEERING

6CS4-03 / Information Security System

CS, IT

Time :2 Hours   Maximum Marks : 80

Instruction to Candidates :

Attempt all 05 questions from Part-A, 04 questions out of 06 questions from Part-B and 02 questions out of 03 questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [5x2=10]
(Answer should be given up to 25 words only)
All questions are compulsory

Q.1.   What are stream ciphers and black ciphers? Give one example of each.

Q.2. Discuss the strength of the Data Encryption Standard (DES) algorithm.

Q.3. Explain the purpose of different block cipher modes, including Cipher Feedback (CFB) and Electronic Code Book (ECB).

Q.4. Explain the significance of message authentication codes (MACs) in cryptographic security.

Q.5. What is the role of HTTPS and SSH for web security?

PART-B [4x10=40]
(Analytical/Problem solving questions)
Attempt any four questions

Q.1. Define cryptanalysis and its significance in cryptography. Differentiate between substitution and transportation ciphers with suitable examples.

Q.2. Explain multiple encryption techniques and how Triple DES enhances security.

Q.3. Describe the Rabin and Elliptic curve cryptosystem with and example.

Q.4. Compare different digital signature schemes and discuss their advantages. How does the NIST Digital Signature Algorithm (DSA) work? Provide an overview.

Q.5. Indentify four major web security threats. Characterize Transport Layer Security (TLS) and its role in secure communications.

Q.6. Discuss the structure, transformation functions, key expansion and implementation details of the Advanced Encryption Standard (AES).

PART-C [2x15=30]
(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any two questions

Q.1. Explain the RSA cryptosystem in detail with a real-world application example. List two characteristics of the ElGamal Cryptosystem.

Q.2. Discuss Public Key Infrastructure (PKI), its advantages, and how its disadvantages are addressed by Private Key Infrastructure (PKI). Explain the structure and working of X.509 certificates in digital authentication.

Q.3. Explain the Secure Hash Algorithm (SHA) with step-by step transformations and an example. Describe the role of Cipher Block Chaining (CBC) in cryptographic hashing.

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B.Tech. VI-Sem. (Back) Exam. - 2025

COMPUTER SC. AND ENGG.

6CS4-04 / Computer Architecture and Organization

CS, IT

Maximum Marks : 120

Time : 3 Hours

Instruction to Candidates :

Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 04 questions out of 05 questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

1. ....   2. ....

PART-A   [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1.   What do you mean by Hito Ratio?

Q.2.   What is an instruction cycle?

Q.3. Describe subroutine.

Q.4. Describe the purpose of buffer gate.

Q.5. What is the purpose of virtual memory?

Q.6. What is an interrupt in computer system?

Q.7. What is the role of the accumulator in basic computer design?

Q.8. What is the difference between machine language and assembly language?

Q.9. How does pipelining improve CPU Performance?

Q.10. Define Multiprocessing.

PART-B   [5x8=40]

(Analytical/Problem Solving Questions)
Attempt any five questions

Q.1. Draw the block diagram of a dual 4 to 1 line multiplexer and explain its operation by means of a function table.

Q.2. Differentiate between hardwired and micro programmed control unit.

Q.3. Why does DMA have priority over CPU when both request a memory transfer.

Q.4. Explain set associative mapping with suitable example.

Q.5. Explain different types of computer registers with common bus system with a neat sketch.

Q.6. Draw and explain the flow chart of four segment pipelining.

Q.7. If a computer has 128 operation codes and 512k addresses, how many bits would be required for.

    (i)   Single address instruction

    (ii)   Tow address instruction

PART-C   [4x15=60]

(Descriptive/Analytical/Problem Solving/Design Questions)
Attempt any four questions

Q.1. Define parallel processing and explain the Flynn's classification of computer with suitable diagram.

Q.2. Draw the flow chart and explain about the principle behind the Booth's algorithm? multiply (+14) and (-12) using Booth's algorithm when the numbers are represented in 2's implement form.

Q.3. (a) Why interprocess synchronization needed? Explain.

    (b) Write a short note on auxiliary memory.

Q.4. (a) Explain about serial communication.

    (b) What are logical micro operations? Explain about applications of logic micro operations.

Q.5. (a) What is addressing modes? Explain different addressing modes with suitable examples.

    (b) Describe the algorithm for integer division with suitable example.

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6E1560

6E1560

B.Tech. VI-Sem. (Back) Exam. - 2025

COMPUTER SCIENCE AND ENGINEERING

6CS4-06 / Cloud Computing
CS, IT

Time : 3 Hours

Maximum Marks : 120

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.
Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.
Use of following supporting material is permitted during examination.
(Mentioned in Form No. 205)

1. ....

2. ....

PART-A

[10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What are the key characteristics and components of cloud computing?

Q.2. What are the challenges and risks of migrating to the cloud?

Q.3. What are the main layers in the Cloud Reference Model?

Q.4. Name three cloud service models.

Q.5. What is the purpose of a hypervision in virtualization?

Q.6. Mention three popular hypervisors.

Q.7. What is the role of SLA in cloud computing?

Q.8. Name two cloud security challenges.

Q.9. What is the main function of Google App Engine?

Q.10. List two popular cloud platforms used in industry.

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PART-B   [5x8=40]

(Analytical/Problem solving questions)
Attempt any five questions

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Q.1. Analyze the business impact of migrating an enterprise application to the cloud. What key factors should be evaluated before migration?

Q.2. Compare and contrast the performance and security implications of using VMware and Xen for virtualization in a data center.

Q.3. Design a secure cloud-based solution for a healthcare system. Identify key security challenges and propose mitigation strategies.

Q.4. A company is facing high latency issues with its cloud-based application. Suggest possible causes and solutions to improve performance.

Q.5. Develop a disaster recovery plan for a cloud-based data center. How would you ensure minimal downtime and data integrity?

Q.6. Explain how MapReduce and Hadoop can be used to analyze large datasets in a cloud environment. Provide a use case example.

Q.7. A startup wants to implement a hybrid cloud strategy using AWS and Microsoft Azure. Propose a design model and discuss potential integration challenges.

PART-C
[4x15=60]
(Descriptive/Analytical/Problem Solving/Design questions)
Attempt any four questions

Q.1. Explain the architecuture design of compute and storage clouds. How does the interconnection network affect the performance and scalability of a cloud-based system?

Q.2. Design a multi-layered cloud security framework for a financial institution. Identify potential threats and propose strategies to mitigate them.

Q.3. Compare different virtualization techniques (CUP, memory, and I/O devices) and analyze their impact on cloud resource management and efficiency.

Q.4. A company wants to migrate its customer relationship management (CRM) system to the cloud. Analyze the benefits, risks, and key considerations involved in this migration.

Q.5. Discuss the role of ubiquitous cloud and IoT integration in smart city development. How can cloud computing support real-time data processing and decision-making?

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