



**PART A**

**Answer ALL the questions**

**5x10=50**

- 1.(i) List out the Supervised Learning Algorithms in Machine Learning. Also explain the terms Capacity, Overfitting, Underfitting and Bias in Machine Learning Algorithms. (6)  
 ii) Outline the key steps involved in Feature Engineering for Machine Learning models. (4)

2. Find all frequent patterns and association rules from the following database by using the FP-Growth algorithm.

Take minimum support = 2.

TID	List of item IDs
1	I1, I2, I5
2	I2, I4
3	I2, I3
4	I1, I2, I4
5	I1, I3
6	I2, I3
7	I1, I3
8	I1, I2, I3, I5
9	I1, I2, I3

3. (i) Explain Information Gain, Gain Ratio, and Gini Index in the context of decision tree algorithms. (5)  
 (ii) Write the Apriori Algorithm used for mining frequent itemset in Association Rule Learning. (5)
- 4.(i) List and explain any five Pattern Evaluation Metrics used in Association Rule Mining. For each metric, provide a) Definition, b) Formula and c) Purpose in evaluating association rules. (5)

ii) Explain the method that enhances efficiency during frequent itemset mining by minimizing candidate generation, and support your answer with an example. (5)

5.i) A zoologist is studying two species of frogs like Tree Frog (T) and Ground Frog (G). The characteristics observed are Skin Color, Leg Length, Body Size, and Poisonous (Yes/No). The dataset of observed frogs is given below:

No	Skin Color	Leg Length	Body Size	Poisonous	Species
1	Green	Long	Small	Yes	T
2	Brown	Short	Large	No	T
3	Green	Long	Small	Yes	T
4	Brown	Short	Small	Yes	T
5	Green	Short	Large	No	G
6	Brown	Short	Large	No	G
7	Brown	Short	Small	No	G
8	Brown	Short	Large	Yes	G

Choose an appropriate classification approach to estimate the probability values for the new frog instance (Skin Color = Green, Leg Length = Short, Body Size = Large, Poisonous = No) and classify the frog as Tree Frog (T) or Ground Frog (G) based on the computed probabilities. (7)

ii) Convert the transaction  $\{a, c, k\}$  into the corresponding vertical data format representation using the given table. (3)

TID	Items
10	$\{a, b, c, d, e, f\}$
20	$\{b, c, e, g\}$
30	$\{a, c, d, e, f, h\}$
40	$\{b, d, f, e, j\}$
50	$\{b, c, k, f\}$



**SASTRA**  
DEEMED TO BE UNIVERSITY

(U.G.C. Act. 1956)

THINK MORAL | THINK TRANSPARENCY | THINK SASTRA  
THANJAVUR | KUMBAKONAM | CHENNAI



School of Computing  
Second CIA Exam – Sep 2025  
Course Code: CSE425  
Course Name: MACHINE LEARNING ESSENTIALS  
Duration: 90 minutes Max Mark: 50

## PART A

Answer Any FIVE the questions

**5x10=50**

1. a) Given a set of labeled training data points and a new, unlabeled data point, determine the class of the new point using a K-Nearest Neighbors approach.

**Training Data:**

- Point 1: (2, 3) -> Class A
- Point 2: (5, 4) -> Class B
- Point 3: (9, 6) -> Class B
- Point 4: (4, 7) -> Class A
- Point 5: (8, 1) -> Class B and New Data Point: (6, 3)

Using the K value as 3 and a distance metric, what is the predicted class for the new data point? (5)

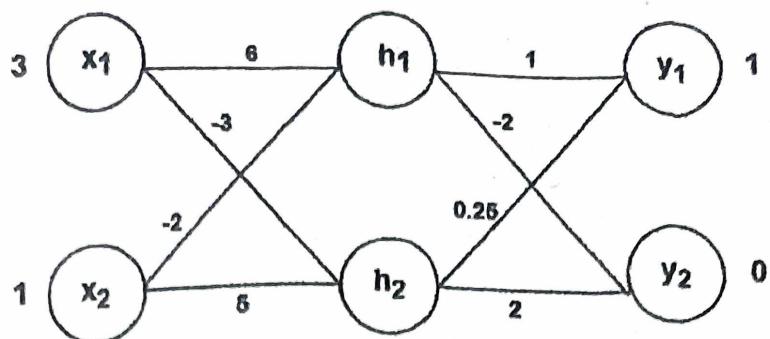
b) Write the step-by-step procedure used in the K-Nearest Neighbors (KNN) algorithm and discuss about key advantages and disadvantages of using the K-Nearest Neighbors (KNN) algorithm for machine learning tasks. (5)

2. A hidden Markov model has two states  $\{S1, S2\}$  with  $\pi(S1) = 1$ . It can emit the outputs O1 and O2. Find the probability of the output sequence O2, O1, O2 using the forward procedure.

State transition	S1	S2
S1	0.6	0.4
S2	0.7	0.3

Emission Table	O1	O2
S1	0.5	0.5
S2	0.2	0.8

3. Consider the diagram given below with (3,1) as inputs and (1,0) as targets. Perform a forward propagation by assuming sigmoid as activation function and compute the error in the network and write the chain rule for backpropagation.



The output  $y_1=0.73$  is somewhat close to 1 and the output  $y_2=0.12$  is close to 0.

4. Let X represent the amount of fertilizer used (in kilograms) for a crop field, and Y represent the crop yield (in quintals). Apply linear regression using the least squares method for one iteration using the following training set. Check the performance for the test cases where the fertilizer amount is  $x = 15 \text{ kg}$  and  $x = 22 \text{ kg}$ .

Training Data:

X (Fertilizer in kg)	5	10	12	14	18	20	25
Y (Crop yield in qtl)	12	20	24	28	36	40	50

5. a) You are building a classifier to detect early-stage cancer in patients using medical imaging data. The dataset is imbalanced (5% positive cases, 95% negative cases). The model's performance on the test set is as follows: True Positives: 120, False Positives: 150, True Negatives: 2850, False Negatives: 30. If the goal is to minimize missed cancer cases (False Negatives), which metrics should be used to evaluate the model? Calculate and interpret two relevant metrics based on the given values. (5)

b) Differentiate between Bagging & Boosting in ensemble learning. Write any four key differences and give one real-world application for each. (5)

6. a) Design a perceptron to implement the OR gate using the following parameters:  $w_1=1$ ,  $w_2=1$  and  $b=-0.5$  and verify that the perceptron produces the correct output for all input combinations of the OR function. (5)
- b) Explain the different regularization techniques used in machine learning. Write their mathematical formulations with proper equations. (5)



## PART A

Answer Any FOUR questions

**4x10=40**

1. Apply the Apriori Algorithm to find the frequent itemsets and association rules with a minimum support of 40% and minimum confidence of 70%.

Consider the following set of transactions:

Transaction ID	Items Bought
1	{Bread, Butter, Milk}
2	{Bread, Butter}
3	{Beer, Cookies, Diapers}
4	{Milk, Diapers, Bread, Butter}
5	{Beer, Diapers}

2. a) Write the Decision Tree algorithm and explain each step in detail with a suitable example. (8)  
 b) Discuss the different types of kernel functions used in Support Vector Machines (SVM). (2)

3. Consider a simple weather-based drink choice scenario with the following emission probabilities (probability of choosing a drink given the weather state):

State	cola	iced tea (ice_t)	lemonade (lem)
CP	0.6	0.1	0.3
IP	0.1	0.7	0.2

Assume the state transition probabilities are:

From \ To	CP	IP
CP	0.7	0.3
IP	0.4	0.6

Assume the initial state probabilities are:  $P(CP) = 0.6$ ,  $P(IP) = 0.4$

You observe the following sequence of drinks over three consecutive days:

observation = [cola, iced tea, lemonade]

1. Write the Viterbi algorithm. (5)
2. Use the Viterbi algorithm to determine the most probable sequence of states that generated the observed drink sequence. (5)

4. A data analyst is studying the spatial distribution of customer locations to identify natural groupings for targeted delivery zones. The analyst collects the following six 2D coordinates representing customer positions: **P1 (2,4), P2 (4,4), P3 (4,6), P4 (5,6), P5 (6,5) and P6 (8,2)**. As a data scientist, you are asked to help the analyst group these customers based on proximity using Hierarchical Agglomerative Clustering (HAC) with the Euclidean distance metric and Single-Linkage criterion and construct the dendrogram and explain the sequence of cluster merges.

5. List and explain the different types of points and methods used in the DBSCAN clustering algorithm.

## **PART B**

**Answer All the questions**

**1x10=10**

6. a) A company wants to cluster customer locations based on their coordinates in a 2D plane. They have collected the following 5 customer locations (x, y):

Customer	x	y
C1	2	3
C2	3	5
C3	5	8
C4	8	8
C5	7	5

Using the BIRCH (Balanced Iterative Reducing and Clustering using Hierarchies) algorithm, compute the Clustering Feature (CF) for the cluster containing all 5 customers. (5)

b) Explain how representative points help in clustering in the CURE (Clustering Using REpresentatives) algorithm. Draw a block diagram illustrating the detailed steps of the CURE algorithm. (5)



**PART - A**

**Answer All the Questions**

**5X10 =50 Marks**

1. A dataset contains two features  $X_1$  and  $X_2$ , recorded for four entities:

Features	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>
X <sub>1</sub>	2	3	4	5
X <sub>2</sub>	4	6	8	10

Perform a Principal Component Analysis to reduce the dataset from two dimensions to one dimension.

2. A database has 10 transactions with min\_support=40% and min\_confidence=70%

TID	Items Purchased
T1	{Milk, Bread, Eggs}
T2	{Milk, Bread, Butter}
T3	{Bread, Butter, Jam}
T4	{Milk, Bread, Butter, Eggs}
T5	{Bread, Butter}
T6	{Milk, Eggs}
T7	{Milk, Bread, Butter, Jam}
T8	{Bread, Butter, Eggs}
T9	{Milk, Bread, Jam}
T10	{Bread, Butter, Eggs, Jam}

- a) Find all frequent item set using Apriori Algorithm (5)  
b) List all the strong association rules (5)

3. Generate the frequent pattern from the following data set using FP growth, where minimum support = 3.

TID	Items Bought
100	f, a, c, d, g, i, m, p
200	a, b, c, f, l, m, o
300	b, f, h, j, o
400	b, c, k, s, p
500	a, f, c, e, l, p, m, n

4. (i) The dataset below shows three numerical attributes for 5 products:

Product	Weight (kg)	Price (\$)	Rating (1-5)
P1	5	500	4.5
P2	12	1500	3.8
P3	8	1000	4.2
P4	20	3000	2.5
P5	15	2000	3

a) Apply Min-Max normalization to transform the Weight value 20 in the range [0.2, 0.8]. (2)

b) Apply Z-score normalization to transform the Price value 1000. (3)

(ii) Explain the steps involved in KDD Process (5)

5. You are provided with a dataset of patient medical records that contains missing values, duplicate records, and noisy data. Explain the preprocessing steps you would implement to prepare the dataset for predictive modeling.



**PART A**

**Answer any FIVE of the following questions**

**5x10=50**

1. Find the naïve bayes probability computation on the given data for the test instance  $X = \{\text{Weather: "rainy"}, \text{Road condition: "Good"}, \text{Traffic: "Normal"}, \text{Engine Issue: No}\}$ .

Weather	Road Condition	Traffic	Engine Issue	Accident
Rainy	Bad	High	No	Yes
Cloudy	Average	Normal	Yes	Yes
Clear	Bad	Light	No	No
Clear	Good	Light	Yes	Yes
Cloudy	Good	Normal	No	No
Rainy	Average	Light	No	No
Rainy	Good	Normal	No	No
Cloudy	Bad	High	No	Yes
Clear	Good	High	Yes	No
Clear	Bad	High	Yes	Yes

2. We have two features of the following data points:

$X_1: (2.5, 1.5, 1.7, 1.9, 2.9, 2.3, 2.8, 1.6)$

$X_2: (545, 438, 489, 429, 528, 503, 563, 445)$

the corresponding target values:  $(1, 0, 0, 0, 1, 1, 1, 0)$ , using the K-Nearest Neighbors algorithm with  $k=5$ , determine the target value for the new data point  $A = (1.8, 415)$  by calculating the Euclidean distances between  $A$  and each of the given data points.

3. Dr. Bob is developing a model to predict whether patients have cancer based on their medical data. After training the model, the results for a group of 3895 patients are summarized. Out of the 3895 patients, 368 were diagnosed with cancer, and 3527 were healthy. The model correctly identified 266 patients with cancer and 3419 healthy patients. However, 102 patients with cancer were misclassified as healthy, and 108 healthy

patients were incorrectly predicted to have cancer. Plot the confusion matrix and infer the performance measures of the model.

4. Describe the Generalized Linear Model (GLM) framework and explain the commonly used link functions for the following probability distributions:

- i) Poisson
- ii) Binomial
- iii) Inverse Binomial
- iv) Gamma.

5. Find the Root node of the decision tree for the following Dataset

Age	Cough	Fever	Cold	Viral Infection
Youth	High	No	No	No
Youth	High	No	Yes	No
Adult	High	No	No	Yes
Senior	Medium	No	No	Yes
Senior	Low	Yes	No	Yes
Senior	Low	Yes	Yes	No
Adult	Low	Yes	Yes	Yes
Youth	Medium	No	No	No
Youth	Low	Yes	No	Yes
Senior	Medium	Yes	No	Yes
Youth	Medium	Yes	Yes	Yes
Adult	Medium	No	Yes	Yes
Adult	High	Yes	No	Yes
Senior	Medium	No	Yes	No

6. Describe the iterative methods used in Nonlinear Least Squares (NLS) estimation, specifically:

- i) Grid Search
- ii) Newton-Raphson Method
- iii) Steepest Descent Method
- iv) Marquardt's Method.



LTC -318 /DMA-18

**PART A**

$4 \times 10 = 40$

**Answer any FOUR of the following questions**

1. Create the distance matrix between the following data points such as O1, O2, O3 and O4.

O1	12	23	12	23
O2	45	12	45	87
O3	12	45	21	45
O4	24	54	28	37

2. A database has five transactions. Let min sup = 60% and min.conf=80%.

Transaction id	Items
T100	{N, P, O, L, F, Z}
T200	{E, P, O, L, F, Z}
T300	{N, B, L, F}
T400	{N, V, D, L, F, Z}
T500	{D, P, L, J, F}

- (a) Find all frequent item sets using Apriori algorithm  
 (b) List all the strong association rules.

3. Compare Linear and Logistic regression. Derive the equation for sigmoid function in logistic regression.

4. Describe with suitable equations and diagrams, how ARIMA models overcome the limitations of ARMA models when applied to non-stationary time series data.

5. Create the dissimilarity matrix between the items using a simple distance measure based on the various forms of data. The ordinal traits are ranked as follows Excellent - 1, Average - 2, and Bad - 3.

Object	Attribute 1 (Nominal)	Attribute 2 (Ordinal)	Attribute 3 (Numerical)
O <sub>1</sub>	B1	Excellent	40
O <sub>2</sub>	B2	Average	55
O <sub>3</sub>	B1	Bad	72
O <sub>4</sub>	B3	Excellent	48

6. A bakery sells muffins at different prices each week. The baker records the price per muffin (x pence) and the number of muffins sold (y) during six consecutive weeks:

x(pence)	12	18	24	30	36	42
y (sold)	95	82	70	58	45	38

- i Calculate the least square regression line y on x.
- ii Predict the number of muffins when he sells for 50
- iii Calculate the coefficient of determination R<sup>2</sup>

### PART-B

Answer the following question

1x10=10

7. Find the covariance and correlation between the Stock Prices of Company A and Company B over a 6-month period:

Month	Company A stock price	Company B stock Price
Jan	320	340
Feb	350	360
Mar	370	380
Apr	390	400
May	410	420
Jun	430	440



**PART A**

**Answer ALL the questions**

**5x10=50**

1. What are the major types of financial decisions that a business firm makes? How do they involve risk –return trade off.
2. In what respect is the objective of wealth maximization superior to profit maximization objective?
- 3."What are the key functions of financial management, and why is it important for an organization's success?"
4. Calculate the maturity amount of Rs. 2, 00,000 invested for 2 years at 12% compounded a) annually, b) semi-annually, c) quarterly, and d) monthly.
- 5.a)Alex Industries Ltd. offers 14% interest on fixed deposits. What is the effective rate of interest if compounding is done a) half-yearly, b) quarterly, and c) monthly? **(6Marks)**  
b) Ms. Illakiyaa has deposited Rs. 5, 00,000 in IOB. Interest is compounded at 6% p.a. for 3 years. Compute the amount of maturity.  
**(4 Marks)**



### PART A

**Answer any FIVE of the following questions**

**5x10=50**

- Define portfolio analysis and state its main objectives.
- Mr.A is evaluating alternative investment opportunities to make Investment bonds. The details are as follow:

Particulars	Bond Price Rs.	Coupon Rate (%)	Life of Bond (Years)	Redemption value	Frequency of Interest	Rate of Return (%)
Option-I	1,000	8	5	At par	Annually	10
Option-2	1,000	10	5	At par	Annually	8
Option-3	1,000	8	5	At par	Bi-annual	10
Option-4	1,000	10	5	At par	Bi-annual	8
Option-5	1,000	8	8	At par	Annual	10
Option-6	1000	8	5	At 10% Premium	Annual	10

**Observe and Comment**

- A firm has sales of Rs. 10, 00,000, variable cost of Rs. 7, 00,000 and fixed costs of Rs. 2, 00,000 and debt of Rs. 5, 00,000 at 10% rate of interest. What are the operating, financial and combined leverages? If the firm wants to double its Earnings before interest and tax (EBIT), how much of a rise in sales would be needed on a percentage basis?
- A Limited company has the following capital structure:

Particulars	Rs.
Equity share capital (2,00,000 shares)	40,00,000
6% Preference shares	10,00,000
8% Debentures	30,00,000
<b>Total</b>	<b>80,00,000</b>

The market price of the company's equity share is Rs. 20. It is expected that company will pay a current dividend of Rs. 2 per share, which will grow at 7% forever. The tax rate may be presumed at 50%. You are required to compute the following:

- a) A weighted average cost of capital based on existing capital structure.
  - b) The new weighted average cost of capital if the company raises an additional Rs. 20, 00,000 debt by issuing 10% debentures. This would result in increasing the expected dividend to Rs. 3 and leave the growth rate unchanged but the, price of the share will fall to Rs. 15 per share.
5. Discuss the various methods of capital budgeting decisions.

\*\*\* ALL THE BEST^^



### **PART A**

**Answer any FOUR of the following questions**

**4x10=40**

1. Discuss the functions of a Chief Financial Officer.
2. The following are the cash inflows and outflows of a certain project.

<b>Year</b>	<b>Outflows (Rs.)</b>	<b>Inflows (Rs.)</b>
0	1,50,000	
1	30,000	30,000
2		30,000
3		50,000
4		60,000
5		40,000

The salvage value at the end of 5<sup>th</sup> year is Rs. 40,000, Taking the out of rate of 10%. Calculate NPV.

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
NPV @10%	0.909	0.826	0.751	0.683	0.621

3. Discuss briefly the different approaches to the computation of the Cost of equity capital.
4. Explain briefly the concept of working capital and mention the important objectives of working capital management.
5. Explain various factors influencing working capital.

## PART B

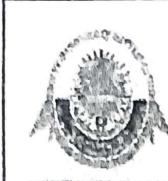
**1x10=10**

### Answer the following question

6. From the following information from the books of Ajay manufacturers, compute the operating cycle in number of days and the working capital requirement.

Period covered	365 days
Average period of credit allowed by suppliers	16 days
	(Rs in '000s)
Average total of debtors outstanding	480
Raw material consumption	4,400
Total production cost	10,000
Total cost of sales	10,500
Sales for the year	16,000
Value of average stock maintained:	
Raw material	320
Work in progress	350
Finished goods	260

**\*\*\*ALLTHE BEST\*\*\***



**PART A**

**Answer ALL the questions**

**$5 \times 10 = 50$**

1. Define Human Resource Management. Examine the operational functions of HRM.
2. Appraise the role and qualities of an HR manager.
3. Explain the steps in the process of SHRM.
4. Criticize the various sources of recruitment.
5. Analyse the different phases in the selection process.

\*\*\*\*\*



**SASTRA**  
DEEMED TO BE UNIVERSITY  
ESTD. 1984

THINK MERIT THINK TRANSPARENCY THINK STILE  
TIRUCHANOOR KUMARAKONAM CHENNAI



**School of Computing  
Second CIA Exam – Sep 2025**

Course Code: MGT211

Course Name: Fundamentals of  
Human Resource Management

Duration: 90 minutes Max Mark: 50

**PART A**

**Answer ALL the questions**

**$5 \times 10 = 50$**

1. Define Recruitment. Explain the various sources of recruitment.
2. What do you understand by the term “Training” ? Examine the various types of training.
3. Evaluate the different methods of performance appraisal.
4. Describe the objectives of succession planning.
5. Recall the term wage. Appraise the various factors to be considered for WASA.

\*\*\*\*\*



ANNA  
UNIVERSITY  
DEemed TO BE UNIVERSITY

THINK NINETY THINK TWENTY FIVE  
THANJAVUR KUMBAKONAM CHENNAI

School of Computing

Third CIA Exam – Nov 2025

Course Code: MGT211

Course Name: Fundamentals of  
Human Resource Management

Duration: 90 minutes Max Mark: 50

PART A

LTC309  
PHRM-18

Answer any FOUR of the following questions

$4 \times 10 = 40$

1. Define Human resource management. Discuss the operational functions of HRM.
2. Appraise the different steps in the selection process.
3. Write a short note on Recruitment. Describe the various sources of recruitment.
4. Evaluate the various methods of performance appraisal mechanism.
5. Critically analyze the components of executive compensation and fringe benefits.

PART B

$1 \times 10 = 10$

Answer the following questions

6. As a leading HR consultant, suggest / recommend a set of retention strategies to prevent and address the employee attrition & absenteeism for a mid-age insurance company.

\*\*\*



**SASTRA**

DEEMED TO BE UNIVERSITY

ESTD 1964 AACREDITED

INTEGRITY | THINK TRANSPARENCY | THINK SASTRA

THANJAVUR | KUMBAKONAM | CHENNAI



School of Computing  
First CIA Exam – Aug 2025

Course Code: INT318

Course Name: IT WORKSHOP

SCILAB/MATLAB

Duration: 90 minutes Max Mark: 50

## PART A

**10x2=20**

**Answer ALL the questions**

1. Generate a vector v of 10 random integers between 1 and 50.
2. Write a MATLAB function to solve the liner equations.
3. How can you record everything that appears in the Command Window?
4. Read an image size of 224 x 224 and slice the image into four equal parts.
5. Consider  $5 \times 5$  matrix of integers, find the largest value from each row and store them in a vector.
6. Create a  $4 \times 4$  matrix whose elements are multiples of 5.
7. Create a  $6 \times 6$  block matrix with: Top-left:  $3 \times 3$  identity, top-right:  $3 \times 3$  zeros, bottom-left:  $3 \times 3$  ones, bottom-right:  $3 \times 3$  random numbers between 0 and 1.
8. Write a MATLAB program to compute  $S = \sin(1)/1 + \dots + \sin(n)/n$  for a given n.
9. List out the formatting commands to display the variables.
10. Consider an image of size 224 x 224 and create an output image by deleting the even rows.

## **PART-B**

**3 x 10=30**

**Answer ALL the questions**

- 11.a) Design and develop an app using App Designer to browse an image file, display the selected image, width, height, minimum, maximum, and average pixel values of the image. b) Write a MATLAB program that performs binary and multilevel thresholding on a grayscale image.
12. Outline the user-defined, built-in function and commands in MATLAB that are used for matrix manipulations.
13. Write a program to read 10 elements in an array. Ask search element from the user and then find the square root of a search element. Return the index of the square root of a search element. If element is not present in an array, display message as element is not present in an array. b) Describe the commands for the vector manipulations.



# SASTRA

ENGINEERING MANAGEMENT FOR SCIENCE HUMANITIES EDUCATION

DEEMED TO BE UNIVERSITY

U.S. 3,131,476 D.G.C. Reg. 1935

THINK MERIT | THINK TRANSPARENCY | THINK SASTRA

School of Computing  
Second CIA Exam – Sep 2025

Course Code: INT318

Course Name: IT WORKSHOP

SCILAB/MATLAB

Duration: 90 minutes Max Marks: 50

## PART- A

**10 x 2 =20 Marks**

### Answer all the questions

1. State the advantages of using function handles in MATLAB.
2. Write MATLAB code to invert colors of the binary image.
3. Write a command extract the center 100x100 region from a 512x512 image.
4. How do you convert a grayscale image to a binary image using thresholding?
5. Write a user-defined function to reverse an array.
6. Create a function that takes an array and returns an array with all 0's removed.
7. Differentiate between `length()` and `size()` functions in MATLAB.
8. Write a MATLAB program to find the sum of numbers until the user enters a negative number using a do...while loop.
9. Write a MATLAB program to validate an e-mail Id.
10. Create a matlab script to display only positive numbers in a vector using the `continue` statement.

## PART-B

**3 x 10=30 Marks**

### Answer any THREE questions

11. Write a MATLAB program to visualize datasets by showing the frequency of digits (0–9), the share of different transport modes, the relation between hours of exercise and calories burned, the sales of the products across five regions, and the most frequent words in a paragraph of text.
12. Outline the string functions with matlab input command and output.
13. a) Write a MATLAB function that accepts the height (in mm) and diameter (in mm) of a battery, compares the measurements with the nominal dimensions of standard types—AAA (44.5, 10.5), AA (50.5, 14.5), C (50.0, 26.2), D (61.5, 34.2), and 9V (48.5, 26.5). Find the battery type and return the result as output.  
b) Develop a MATLAB script that checks whether a given vector is already sorted. If the vector is not sorted, rearrange its elements in ascending order.
14. Illustrate the various types of user defined functions such nested, recursive and m-file to compute the following series:  $1^1 + 2^2 + 3^3 + 4^4 + \dots + n^n$ .



**SASTRA**

DEEMED TO BE UNIVERSITY

ESTD. 1981 AS PER THE JGC ACT 1980

THINK VERITAS | THINK TRANSPARENCY | THINK SASTRA



**School of Computing  
Third CIA Exam – Nov 2025**

Course Code: INT318

Course Name: IT WORKSHOP  
SCILAB/MATLAB

Duration: 90 minutes Max Marks: 50

**PART- A**

**Answer all the questions**

**10 x 2 =20 Marks**

1. List out the commands used in the command window.
2. Brief note on matlab app dropdown component properties.
3. Write a user defined function to check if the array is sorted or not.
4. Mention any two methods to solve a system of linear equations.
5. Write a user-defined function to generate OTP() that returns a 4-digit random OTP each time it is called.
6. State the steps involved in the debugging process.
7. A teacher stores all student marks in an array. Write a MATLAB script to visualize the highest, lowest, and average (mean) scores using the suitable plot function.
8. Differentiate between nested functions and local functions in MATLAB.
9. Define a user defined function to convert the RGB image into binary image.
10. Write a short note on the different types of breakpoints and their purposes.

**PART- B Answer any Two questions**

**2 x 10 =20 Marks**

11. Implement a MATLAB script that demonstrates the use of switch-case to produce different types of matrices (such as identity, zero, and random) using both predefined and custom functions.
12. Illustrate file handling operations to read and write different data format such as tables, text, and numerical values.
13. Design a MATLAB GUI application for:
  - a) A scientific calculator
  - b) A currency converter using combo box selection and callback functions

**PART- C Answer the question**

**1 x 10 =10 Marks**

14. Design a MATLAB GUI that allows users to browse an image, train a deep learning transfer learning model, and predict the category of a new image among five predefined classes.



## **PART A**

**Answer ALL the questions**

**$5 \times 4 = 20$**

1. A team is designing a mobile banking app for senior citizens. A software tester asks, "What is interaction design and why is it so important for our savings dashboard?". Frame interaction design for this context.
2. As you are developing a prototype of the claim's submission portal on an insurance website, your manager says to you, "This page needs to satisfy 2 basic usability goals". List any two usability goals of an interactive product.
3. Your team is comparing a new mobile heart-health monitoring application for cardiac patients. You are comparing the patient report download flow in your AI tool against the same feature in a competing tool. Yours is fast and clear, but the competitor tool takes several confusing steps. Identify which is the good design and which is the poor design, and why.
4. In redesigning an ATM interface that requires a long series of steps before a transaction is authorized, why might recognition-based signals be more useful than recall in this context?
5. A new web-based tax-filing system shows dozens of advanced options on the home page. Many new users are abandoning it halfway. Which "training-wheels" style design could be a good approach?

Answer ALL the questions

6. In terms of usability within interaction design, particularly in the context of Air Ticket Booking Software, several fundamental design principles are essential for achieving user satisfaction and operational efficiency.

Discuss the primary design principles for usability in interaction design, which include Visibility, Feedback, Constraints, Mapping, Consistency, and Affordances. Illustrate each principle with examples from well-designed and poorly designed booking interfaces.

7. As the team Leader, you are leading the design of the mortgage approvals dashboard for a national bank. In the context of UX (User Experience) design principles, the Head of Product asks you: *"Can you explain and contrast usability goals and user experience goals for our platform?"*

- i. Describe those two sets of goals in banking (speed and accuracy for usability, customer confidence and satisfaction for UX).
- ii. Discuss some trade-offs (safety confirmation processes can cause a slowdown in workflow processes but minimize errors).

8. Your bank is seeking to redesign its Phone Banking Security Process. Currently, customers are required to remember multiple personal details and identify specific letters from their passwords during random questioning, which many find stressful and difficult. As the designer:

- i. Identify areas of cognitive load (memory load, difference between recognition and recall, and attention).
- ii. Suggest design changes in this task that will still provide security while reducing cognitive demand on memory.
- iii. Justify your suggestions using some principles of attention, perception, and memory.



## PART A

Answer any Five Questions

5x4=20

1. Analyze this interaction in terms of sequence organization and preference:

Sara: "Hey Tom, about the last instruction for the essay on 'synthesizing interdisciplinary perspectives' -- what does that mean?"

Tom: "Oh, that part? I think it just means we need to bring in ideas from different subjects, not focus on just one. So, if it's a history essay, we could include some sociology or economics, but in a way that connects them."

2. Explore two fascinating ways in which coordinating systems utilize nonverbal communication to convey messages effectively.

3. How does the university's design team enhance its student site by utilizing multiple data gathering techniques, categorizing user feedback, and applying analysis tools to prioritize improvements?

4. Illustrate the key characteristics of the interaction design process.

5. You are on the phone with your friend, having a conversation. Due to the increased likelihood of mobile network failures, you suddenly run into a breakdown in the conversion. What mechanism do you apply to repair the breakdown?

6. A company is designing a self-service kiosk for customers to place food orders in a busy restaurant. They break down the ordering process into steps such as selecting items, customizing

orders, reviewing the bill, and making payments. They also note the time taken for each step and common user errors. How do task descriptions and task analysis help in designing a user-friendly interface?

## PART B

### Answer any Three Questions

$3 \times 10 = 30$

7. A global corporation is developing a platform for cross-time zone collaboration for hybrid teams. The design team, which includes shadowing team members, participates in online meetings and engages in casual exchanges, such as chats and shared documents. How the ethnographic studies and social mechanisms are essential for designing effective collaborative systems.
8. Explain with suitable examples the three types of classification for Computer Mediated Communication (CMC), with their distinct characteristics, benefits and drawbacks.
9. Design a conceptual framework for creating a mobile banking application for customers of varying levels of digital competence. To help clients connect with the system, they use metaphors such as "virtual teller" and "digital wallet." Also established core user functions, including examining transaction history, transferring money, and checking balances.
10. Show how various lifecycle models influence product development. Assume you are a member of a startup building a new mobile app to assist customers in measuring their daily water intake and establishing hydration targets. Your team must decide which life cycle model will best lead the development process, taking into account the iterative nature of user feedback and the need for detailed human-computer interaction (HCI).



**PART A**

**Answer any Four Questions**

**4x5=20**

1. A hospital IT team is creating a digital communication device for non-verbal patients. Describe how scenario-based prototyping contributes to ensuring this device addresses the requirements of patients, and explain why low-fidelity prototypes are preferred during the early phases of design.
2. In-vehicle navigation system, during initial user evaluations, two situations are investigated. Examine how the positive and negative scenarios can impact physical and conceptual design choices, and explain the importance of utilizing scenario feedback for iterative enhancements.
3. A government agency is modernizing its service request management system through digitization. Provide PICTIVE and CARD methods to maximize user contribution and meaningful engagement during participatory design workshops.
4. A retail business creates a prototype for a new self-service checkout kiosk. Identify one usability challenge revealed by this situation, and recommend two methods the design team could implement user-centred principles to enhance the kiosk for all users.
5. A mobile banking application has launched a feature that allows users to establish spending limits and get alerts. How can the team effectively implement strategies to reconcile user needs based on feedback from analysing differing design scenarios?

**PART B**

**Answer any Two Questions**

**2x10=20**

6. A start-up is designing a wearable device for older adults to track medication and provide reminders. The team creates basic screens and a cardboard prototype, then tests it with seniors through role-play. Participants express uncertainty about button icons, suggest larger displays, and explore custom reminders for irregular prescriptions. As the lead interaction designer, analyse how you would use user-generated scenarios and low-fidelity prototypes to iteratively refine both conceptual and physical design. Identify challenges likely to occur at both the prototyping and implementation phases.

7. You are redesigning the interface of a city-wide bike rental system due to user frustrations with unclear menus, system errors, and difficulty in locating bikes. To address these issues, you organize a participatory design workshop with stakeholders like students, tourists, and urban planners. Evaluate how scenario-based participatory design uncovers issues not identified by conventional requirements gathering. Describe a method for prototyping, testing, and iteratively improving kiosk and app interfaces through scenario walkthroughs and stakeholder feedback.
8. A financial services company is developing a user-centred internal communication and task management system. While some users suggest innovative workflow solutions, others are hesitant to move beyond familiar practices and worry about losing established communication shortcuts. They observe employees in their work environment and conduct contextual interviews. How does combining ethnographic observation, contextual design, and workshops using methods like PICTIVE and CARD help in system development?

## **PART C**

### **Compulsory Question**

**1x10=10**

9. A university is designing a new digital platform to support both students and faculty in organizing coursework, submitting assignments, and accessing real-time feedback. After initial requirement gathering and low-fidelity sketches, the team builds a high-fidelity clickable prototype with realistic interactions and visual design. They commit to a user-centred approach—actively involving students and faculty in all design stages. To plan the evaluation of this prototype, the team decides to use the DECIDE framework.
  - i. How would you conduct a thorough evaluation of the high-fidelity prototype using the DECIDE framework?
  - ii. Describe how you would determine appropriate evaluation goals and stakeholder questions.
  - iii. Identify key practical and ethical issues.
  - iv. Explain your approach to collecting, interpreting, and presenting the evaluation data.
  - v. And provide at least two concrete examples of how user involvement at each stage can improve the final product.