



**PART A (10\*2=20) Answer ALL**

1. Malathy plans to create an interactive media “face\_app” for connecting people with similar interests from different parts of the world. The app includes social media, web design, UIX, multimedia journalism, digital video, digital audio, pod casting, video games and more. The interaction design of the app necessitates, the involvement of people from multiple disciplines. Identify the people who could work with Malathy to design this aesthetic interactive media.
2. Ragavan, develops an app “View in your room”, that allows users see how a furniture would fit inside user’s room in virtual reality. The app also has features to pair-up the colors and materials with user room’s décor. Having decided to bring user-centred approach to design, how does Ragavan ensure user’s involvement in the design of the app?
3. Match the following:

Late 1970's	-	Speech Recognition
Mid 1980's	-	Radio Frequency Tags
1990's	-	Virtual Display
2000's	-	Infrared Sensing
4. Arun comes with the proposal to build a software that provide drivers with better navigation and traffic information using Augmented Reality (AR). The software combines physical and virtual words. What types of functionalities the AR software can provide to the user.
5. Recall the set of questions that provide a useful framework to begin thinking through the problem space of an existing product.
6. Identify a problem space in chocolate vending machine, make an assumption of the problem space, and create number of reasons to support the assumption.
7. Illustrate any four interface metaphors used in Microsoft paint and compare the metaphor with real-world.
8. Distinguish the general modes of cognition with examples.
9. How does our memory process information?
10. Neatly sketch GOMS for opening a new document Microsoft word document.

**PART B (3\*10=30) Answer ALL**

11. You are asked to create an online CD shopping software that enables customers to buy CDs online. List the functionalities of the software. Design the software with common principles of interaction design.
12. Explain the activity based conceptual models with suitable examples.
13. Demonstrate the conceptual frameworks for cognition in detail with appropriate examples.



School of Computing  
Second CIA Exam – October 2023  
Course Code: CSE332  
Course Name: Usability Design of Software Applications  
Duration: 90mins Max.Marks:50

**PART A (10\*2=20)**

UFC NO 6  
DSA (18)

**Answer ALL**

1. State the nature of formal communication with an example.
2. You are creating a chatting app that facilitates users to express themselves in ways not possible in face-to-face settings. Analyze the problems incurred with this facility.
3. Neatly sketch the ‘conversation for action framework’ for paying money through Unified Payment Interface.
4. Prepare interaction design of an electronic calendar.
5. Distinguish conceptual design with physical design in terms of developing alternative designs.
6. Recall the different techniques used to build interactive versions of the design.
7. Describe the lifecycle model for interaction design with a neat diagram.
8. The activity of understanding what a product should do has been given various labels. Name them and identify the best one among them.
9. Identify the environmental requirements of an ‘ATM’ Machine.
10. Draw sequence diagram for flight ticket booking app.

**PART B (3\*10=30)**

**Answer any Three**

11. Explain awareness mechanism in detail with examples, new functionalities, benefits and problems.
12. Describe waterfall, spiral and RAD applications with suitable example.
13. Design any one of the requirements of smart fridge using Volere Template.
14. Discuss the various techniques should you use to gather the requirements of an interactive product.



# SASTRA

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DIS 3 of the JGC Act 1956

THINK MERIT THINK TRANSPARENCY THINK SASTRA



School of Computing

Third CIA Exam – Nov 2024

Course Code: CSE332

Course Name: Usability Design of  
Software Applications

Duration: 90 minutes Max Marks: 50

## PART A

**Answer ALL**

**10x2=20**

1. We have learnt that the use of interface metaphors in the interactive product is helpful in easy understanding and learning of the product by novices. Do you think it does have any limitations? If so, mention them.
2. Differentiate High-fidelity prototyping and Low-fidelity prototyping in interactive design.
3. Brief the four-evaluation paradigms that can be used to evaluate the performance of an interactive product.
4. Summarize the benefits of ‘training wheels’-based learning of an interactive product.
5. Briefly mention the key principles of the user-centered interactive design approach.
6. List the functional requirements and non-functional requirements for the flight booking applications
7. Compare an asynchronous product, with a synchronous product, by focusing on their key differences and illustrate with suitable examples
8. How do the cognitive processes- Attention and Memory are related to each other?
9. Draw conversation for Action (CfA) framework that depicts buying a laptop in DELL showroom.
10. Explain the techniques used to describe the tasks of an interactive product with perfect examples



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THINK BETTER | THINK TRANSPARENT | THINK SASTRA



School of Computing

First CIA Examination – Sep 2023

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**

1. What are significant features of the MATLAB?
2. List out the tool boxes in MATLAB.
3. Differentiate between workspace and command window.
- ④ 4. Read an image in the size of 600 x 400 pixels and then write the command to slice the image into 2 and 4 equal sub images.
5. Consider a matrix  $A=[2\ 4; 8\ 10]$ , write a command to generate a concatenated matrix  $B=[4\ 8\ -2\ -4\ 1\ 3; 16\ 20\ -8\ -10\ 7\ 9; 2\ 4\ 0\ 0\ 6\ 12; 8\ 10\ 0\ 0\ 24\ 30]$
- ⑥ 6. How to manage the work space and error message?
- ⑦ 7. Write a command to get help and keep track of MATLAB session.
8. State the rules for variable names.
9. Generate a random number in the range from 1 to 10 ,20 to 35.
10. Find the output of the following command:  
 $y=(6<10)+(7>8)+(5*3=60/4)$  and write a command to solve the following equations : $\frac{7^2}{3} - 4^3 - 18 - \frac{6^7}{(9^3 - 652)}$

## PART B

Answer all the questions

**3 x 10 =30**

11. Explain the following built-in functions
  - a) Matrix generation b) Solving linear equations
12. Outline the various types of plots with numerical example.
13. Design a MATLAB GUI for the a) Scitific calculator b)  
Currency conveter using combobox callback event



**SASTRA**  
UNIVERSITY OF SOUTHERN PEARL RIVER DISTRICT  
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THINK BIG | THINK TRANSFORM | THINK SASTRA

**School of Computing**  
**First CIA Examination – Sep 2023**  
Course Code: INT318  
Course Name: IT WORKSHOP SCILAB  
/ MATLAB  
Duration: 90 minutes      Max Marks: 50

### **PART A**

#### **Answer all the questions**

**$10 \times 2 = 20$**

1. What are significant features of the MATLAB?
2. List out the tool boxes in MATLAB.
3. Differentiate between workspace and command window.
4. Read an image in the size of  $600 \times 400$  pixels and then write the command to slice the image into 2 and 4 equal sub images.
5. Consider a matrix  $A = [2 \ 4; 8 \ 10]$ , write a command to generate a concatenated matrix  $B = [4 \ 8 \ -2 \ -4 \ 1 \ 3; 16 \ 20 \ -8 \ -10 \ 7 \ 9; 2 \ 4 \ 0 \ 0 \ 6 \ 12; 8 \ 10 \ 0 \ 0 \ 24 \ 30]$
6. How to manage the work space and error message?
7. Write a command to get help and keep track of MATLAB session.
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9. Generate a random number in the range from 1 to 10 ,20 to 35.
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 $y = (6 < 10) + (7 > 8) + (5 * 3 == 60 / 4)$  and write a command to solve the following equations :  
$$\frac{7^2}{3} - 4^3 - 18 - \frac{6^7}{(9^3 - 652)}$$

### **PART B**

#### **Answer all the questions**

**$3 \times 10 = 30$**

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Currency conveter using combobox callback event



# SASTRA

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School of Computing  
First CIA Exam – Aug 2024

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. Differentiate between M-files and MAT files.
2. How to manage the matlab session and command window?
3. Write a program to print the following series without conditional statements : [2 2 4 4 6 6 8 8]
4. List out the matlab commands to get help for particular topics.
5. Write a matlab command to generate 6 digits OTP.
6. Brief note on commands relate to variables.
7. How to control the appearance of the floating point numbers?
8. What are the types of plotting methods used to visualize the numeric data set?
9. Write a program to compute the following

$$\text{sum} = 1 + \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^3} + \dots + \frac{1}{n^n}$$

10. Consider a matrix  $A = [1 2 3; 4 5 6; 7 8 9]$ . Write a command to get the matrix  $B=[7 \quad 8 \quad 1 \quad 0; 4 \quad 5 \quad 0 \quad 1]$ .

## PART-B

**3 x 10=30 Marks**

### Answer all the questions

11. Design an app to demonstrate the operators supported in matlab.
12. Describe the built-in functions for matrix and vector operations.
13. a) Solve the linear equations using the matrix methods

$$2x+y+z=2, -x+y-z=3, x+2y+3z=-10$$

- b) Read an image in the size of  $800 \times 600$  pixels, convert the gray scale image into binary image and then slice the image into three equal parts in both vertically and horizontally.



**SASTRA**

ENGINEERING MANAGEMENT LAW SCIENCE HUMANITIES EDUCATION

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[JS 4 of the JGC Act 1956]

THINK MERIT | THINK TRANSPARENCY | THINK SASTRA



**School of Computing**

**Second CIA Examination – Oct 2023**

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**

1. State the features of function and M-file.
2. Differentiate between while and do while with example.
3. How to read numbers and text from the user?
4. List out the function to extract statistical measures.
5. Write a code to create a 4 x 3 matrix. Each element of the matrix is displayed as row\*column index.
6. Create an M-file to search if an element is present in an array or not.
7. Differentiate between recursion and nested function.
8. Write a code to display the meaning of each grade(A+-Excellent, A-Very Good, B+-Good, B-Average) using a switch case.
9. Find the discriminant of a quadratic equation using a nested function.
10. Write a code to find prime number using nested if and built-in function.

### **PART B**

**Answer any THREE questions**

**3 x 10 =30**

11. Write matlab code to segment the image using user defined and built-in functions
  - a) Binary thresholding b) Multilevel thresholding
12. Create an M-file to sort the vector in ascending and descending order using functions.
13. Write a function to print the following series
  - a) 1,4,3,16,5,36,7,64,9,100
  - b)  $\text{sum} = \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \dots + \frac{1}{n!}$
14. Discuss the jump statements with suitable example programs.



School of Computing  
Second CIA Exam – Sep 2024  
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 features of matlab files and functions.
2. List out the input and output functions.
3. Create a lower-right sub image of 200 x 200 using the image 512x512.
4. How to turn black background of the image m x n into white background?
5. Write a user defined function to find and replace element in an array.
6. Differentiate between while and do while in matlab.
7. Write a program to find factorial of a given number using recursion.
8. Create a user defined function to return the maximum number when three numbers are given as arguments.
9. Find the sum of numbers divisible by 5 from 1 to 100 using continue statement.
10. How to read and write a text file?

## PART-B

**3 x 10=30 Marks**

### Answer any THREE questions

11. Design an app to extract the various texture features from the images.
12. Illustrate the various types of plotting methods.
13. a) Create a user defined functions for binary and multi thresholding.

(5)

- b) Write a program to compute the following using nested function

$$\text{sum} = 1 + 1 + \frac{3}{6} + \frac{4}{24} + \frac{5}{120} + \dots \quad (5)$$

14. a) Write a program to remove duplicate elements in an array. (5)
- b) Outline the convolution and pooling operations with example. (5)



School of Computing  
Third CIA Exam – Nov 2024  
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. What are the commands used to control the matlab workspace, session and command window?
2. Create a matlab script to generate random numbers.
3. Write a command to solve the linear equations.
4. Create a function to validate the name and register number of the student.
5. Write a user defined function to find the maximum pixel value in the gray scale image.
6. List out the built-in functions to extract the texture features from the images.
7. Consider an image of size 256 x 256. Create a user-defined function to extract the sub image of 25 x 25 in the specified point.
8. List out the commands to visualize the numeric dataset.
9. Write a function to check if the elements in the array are sorted or not.
10. Brief note on functions to read the contents of the file.

## PART-B

**3 x 10=30 Marks**

### Answer any THREE questions

- 11.a) Write a matlab script to read array elements from the text file. Write the sorted array elements in sorted.txt.
- b) Create a nested function to find the square root of a search element is present in an array or not.
- 12.Design a matlab app to classify the images using machine learning techniques.
- 13.Write a matlab script to perform 1-D and 2-D array manipulations.
14. Outline the following
  - a) Debugging process b) Matlab app components



PART A

FHRM - 3

10 x 2 = 20 Marks

1. Identify the process of gathering relevant information about various aspects of a job, including its content, context and the job performer's skill requirements – explain content, context and the job performer's skill requirements.

2. Outline Ulrich's four-role model.

3. Explain in brief, how does an organization's HR philosophy influence and shape its organizational culture with an example.

4. Compare Job Description and Job Specification.

Match the following:

HR practices	automated system for gathering, storing, retrieving, analyzing and disseminating HR-related data
HR policies	Building critical organizational capabilities
HR Philosophy	define how the company will deal with stakeholders
HRIS	revolves around management's beliefs and assumption

6. Give examples of successful diversity management strategies that have enhanced workplace culture and business outcomes.

7. Explain what you understand by HR audit.

8. Identify which type of HRIS is primarily used at the operational levels of the organization and explain.

9. Summarize the challenges of HRM.

10. Differentiate between policies and procedures.

PART B 3 x 10 = 30 Marks

11. Elaborate on notable HR practices that have contributed to organization's success of your choice.

12. Discuss on the key reasons why HR planning is considered a critical function for organizations, and how does effective HR planning contribute to achieving organizational goals.

13. Explain how HR functions be strategically aligned with the principles of Strategic Human Resource Management (SHRM) to not only support the organization's growth but also drive sustainable performance improvements? Share examples of successful SHRM practices and their impact on organizational outcomes.



### PART A

- 1 Define HRM
- 2 What is Strategic Human Resource Management
- 3 State the meaning for the following terms
  - a) HR Score card
  - b) HR Audit
  - c) Job Specification
  - d) Synergic effect
  - e) Job Description
  - f) Job analysis
  - g) HRIS
  - h) Human Resource Planning

### PART B

Answer all the Questions  $3 \times 10 = 30$  Marks

- 11 Classify the various changing roles of HR manager.
- 12 Describe the various methods involved in Human Resource Planning.
- 13 Explain Strategic Human Resource Model in detail



**PART A**

**10 x 2 = 20 Marks**

1. Illustrate the key elements to include in an effective recruiting ad.
2. Infer the significance of person-environment fit in the selection and placement process.
3. Discuss any two types of training for Global strategies.
4. Compare the effectiveness of training programs within an organization using training metrics and evaluate how different training initiatives contribute to overall organizational performance and employee development.
5. Connect the goals of job analysis with various HR functions, illustrating how a comprehensive job analysis strategy enhances recruitment, training, performance management, and compensation practices within an organization.
6. Extend the analysis of the significance of the Position Analysis Questionnaire (PAQ) model by identifying specific job roles where its application proves most beneficial.
7. Apply two contemporary methods of management development programs in the current business landscape, examining how these methods address evolving leadership challenges and contribute to enhancing organizational effectiveness.
8. Identify the various types of career paths available and critically analyze the factors that influence your choice.
9. List the key components that contribute to an effective performance management system and explain how each component enhances employee productivity and organizational success.
10. Outline Job evaluation process

**PART B** **$3 \times 10 = 30$  Marks**

11. Design an innovative step-by-step selection process for a globally reputed organization, incorporating contemporary methods and best practices in talent acquisition. Elaborate on each step, explaining how the integration of modern techniques enhances the efficiency, fairness, and effectiveness of the selection process. Discuss potential challenges and propose solutions for a seamless implementation.
12. Discuss the components of wage and salary administration, delving into the intricacies of pay structures, underlying principles, and the diverse factors that determine wages and salaries in modern workplaces. Explore the various types of wages prevalent today, analyzing their applicability in different industries.
13. Evaluate the effectiveness of both on-the-job and off-the-job training methods, considering their respective advantages and limitations. Discuss how these methods align with different learning styles and organizational objectives.

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School of Computing  
II CIA Exam - SEP 2024  
Course Code: MGT211  
Course Name: Fundamentals of  
Human Resource Management  
Duration: 90 minutes Max Marks: 50

### PART A

- 1 Define Recruitment
- 2 What is Performance Appraisal
- 3 State the meaning for the following terms
  - a) "Thematic Appreciation Test"
  - b) Assessment Centre
  - c) Transactional Analysis
  - d) Induction Training
  - e) Succession Planning
  - f) Management Development Program
  - g) Performance Management
- 10 Compare Training and Development

### PART B

Answer all the Questions  $3 \times 10 = 30$  Marks

- 11 Elaborately discuss the methodologies employed in the evaluative assessment of Employees
- 12 Explain the various Training methods in detail *(repeated 3rd CIA)*
- 13 Describe the Selection process in an organization

Policy  
Comm  
know  
Define



### School of Computing

Third CIA Test – November 2023

Course Code:MGT211

Course Name: Fundamentals of HRM

Duration: 90 minutes Max Marks: 50

### PART A

**10 x 2 = 20 Marks**

1. List the essential features of service.
2. Explain the elements of service culture.
3. Contrast how relationship marketing differs from the traditional marketing
4. Cite specific strategies for managing emotional labor.
5. Infer the role of Frontline employees as 'Boundary Spanners'.
6. Outline 'Service Triangle'.
7. Compare Abstract Questioning and Situational Vignette.
8. Classify the issues faced by Front Line Employees in Service sector.
9. Explain any two types of Service encounters.
10. Express your views on the significance of empowering service workers in the context of employee empowerment.

### PART B      3 x 10 = 30 Marks

11. Discuss the Service-Gap Model, exploring the reasons for gaps in service delivery and proposing effective strategies to address and fill these gaps.
12. Explain the concept of attrition in the service sector, delineate the reasons behind attrition, and elaborate on the cycles of failure, mediocrity, and success in the context of employee retention.
13. Analyze the recruitment process in the service sector, focusing on the importance of recruiting the right people, examining existing recruitment procedures and criteria, and addressing the challenges associated with recruitment in the service industry.



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School of Computing  
First CIA Exam - Sep 2023

Course Code: MGT212  
Course Name: Introduction to Financial  
Management  
Duration: 90 minutes Max Marks. 50

### PART - A

Answer all the questions

**5 X 2 = 10 Marks**

1. What is financial management?
2. What is meant by time preference or time value of money?
3. Under what condition does the effective annual rate of interest (EAR), differ from the nominal interest rate?
4. Calculate the present value of Rs. 1000 received in perpetuity for an infinite period. Taking the discount rate of 10%.
5. Mr. Raja deposited Rs. 5,000 today at a 6% rate of interest, in how many years will this amount double?  
compute by using the Rules 72 & Rule 69

### PART - B

Answer Any two out of three **2 X 12 = 24 Marks**

6. Elucidate the objectives of financial Management.
7. Compute present value for the following cases
  - a) Mr. X is to receive Rs. 5,000 after 5 years from now. His time preference of money is 10 % p.a. Calculate the present value by using the discount factor table (3 Marks)
  - b) Calculate present value of the following cash flows assuming a discount rate of 10%. Year -Rs, 5000; Rs. 10,000; Rs. 10,000; Rs. 3,000; Rs.2,000 (3 Marks)
  - c) Mr.X has rented out a portion of his house for 4 years at an annual rent of Rs. 6,000 with the stipulation that rent will increase by 10% every year. If the required rate of return is 15%, what is the present value of the expected series of rent? (3 Marks) *(Ans)*
  - d) A Company has raised a loan of Rs. 5,00,000 from a financial institution at 8% p.a rate of interest. The amount has to be paid back in 5 equal annual installments. What shall be the size of installment? (3 Marks)
8. Consider a loan of \$1 million that is paid off quarterly over a period of nine years. Calculate the dollar amount of interest and

loan principle repaid corresponding to each payment if the interest rate is 6% per year, compounded quarterly.

PART C  
Answer the following  
**CASE STUDY**

1 x 16 :: 16 Marks

9.a) Suppose you wish to retire forty years from today. You determine that you need \$50,000 per year once you retire, with the first retirement funds withdrawn one year from the day you retire. You estimate that you will earn 6% per year on your retirement funds and that you will need funds up to and include your 25<sup>th</sup> birthday after retirement

- ❖ How much you deposit each year in an account, starting one year from today, so that you have enough funds for retirement? (6 marks)

b). Imagine you're a key decision-maker in your organization and two projects are proposed:

- Project A is predicted to bring in \$2 million in one year.
- Project B is predicted to bring in \$2 million in two years.

Before running the calculation, you know that the time value of money states the \$2 million brought in by Project A is worth more than the \$2 million brought in by Project B, simply because Project A's earnings are predicted to happen sooner.

To prove compare the present value of both projects' predicted earnings, using an Assumed four percent discount rate (10 marks)

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**PART - A**

**Answer all the questions**

**10 X 2 = 20 Marks**

1. Write a note on CAPM.
2. Mr.A Considering the purchase of a 7% preference shares of Rs. 1000 redeemable after 5 years at par. What should he be willing to pay now to purchase the share assuming that the required rate of return is 8%.
3. The equity share of a company is currently selling at Rs. 80 it is expected that the company will pay a dividend of Rs. 4 and the share at the end of one year and the share can be sold at a price of Rs. 88. Calculate the return on share. Should an investor buy it, if his capitalization rate is 12 %?
4. Mr X subscribed shares in ABC Co., Ltd., at a price of Rs. 100 each, the company paid a dividend of Rs. 20 after one year. Compute return on investment. What would be your opinion if Mr. X paid a premium of Rs. 10 on the subscription of these shares and the shares were fully paid up?
5. An asset has 1.5 times the systematic risk as the market portfolio risk-free return is 5% and the market return is 13%. What is the stock's expected return according to CAPM?
6. Find the Beta of risky assets with 21 %, risk-free rate of 4 % , and market portfolio return is 12 %.
7. What is Financial Leverage? How is it measured?
8. What do you understand by EBIT-EPS analysis?
9. A Company has sales of Rs. 5,00,000, variable cost Rs. 3,00,000 and fixed cost Rs. 1,00,000 and long-term loans of Rs. 4,00,000 at 10% rate of interest. Calculate the Composite leverage.
10. Find out the degree of operating leverage from the following data  
EBIT (2015) – Rs. 40,000; (2016) – Rs. 50,000  
Sales (2015) – 20,000 units; (2016) – 28000 units

PART – B

Answer Any three out of five questions

3X10 =30 Marks

11. A Company is currently paying a dividend of Rs. 4.24 per share. The dividend is expected to grow at 18% annual rate for five years and then at 12 % forever. What is the present value of the share, if the capitalization rate is 14%?

12. Star Computer system limited has forecasted returns on its share with the following probability distribution

Return	-20	-10	-5	5	10	18	20	30
Probability	0.05	0.05	0.10	0.10	0.15	0.25	0.25	0.05

Calculate the expected return, Variance and Standard Deviation of returns of Star.

13. The return of individual security  $R_i$  & market Return  $R_m$  is given below. Calculate Systematic Risk (Beta)

Ri	10	15	18	14	16	16	18	4	-9	14	15	14	6	7	-8
Rm	12	14	13	10	9	13	14	7	1	12	-11	16	8	7	10

14. A firm has sales of Rs. 15,00,000, variable cost of Rs. 9,00,000; fixed cost of Rs.3,00,000 and the debt of Rs. 8,00,000 at 8%.

- (i) Calculate its operating, financial and combined leverage.
- (ii) If the firm decides to double its EBIT, how much of raise in sales would be needed on a percentage basis?

15. ABC Company has currently an all-equity capital structure consisting of 15,000 equity shares of Rs. 100 each. The management is planning to raise another Rs. 25 lakhs to finance a major programme of expansion and is considering three alternative methods of financing.

- (i) To issue 25000 equity shares of Rs. 100 each.
- (ii) To issue 25,000, 8% debentures of Rs. 100 each
- (iii) To issue 25,000, 8% Preference shares of Rs. 100 each.

The company's expected earnings before interest and taxes will be Rs. 8 lakhs. Assuming a corporate tax rate of 50 per cent, determine the earnings per share (EPS) in each alternative and comment which alternative is best and Why?

**PART – A**

Answer all the questions

**10 X2 = 20 Marks**

- Maya Limited issued 60,000 15% irredeemable preference shares of Rs. 100 each. The issue expenses were Rs. 60,000 Determine the cost of preference capital of shares issued at a premium of 10%.
- Your Company share is quoted in the market at Rs. 20 currently. The company pays a dividend of Re.1 per share and the investors expect a growth rate of 5% per year. Compute the company's cost of equity capital.
- A project has an initial investment of Rs. 2,00,000. It will produce cash flows after tax of Rs. 50,000 per annum for six years. Compute the payback period for the project.
- Compute ARR from the following data: Cost of Asset Rs. 4,00,000; Useful life: 5 years; Cash flow after tax- Rs. 1,72,000 p.a. *Ans*
- Give the meaning of the profitability index.
- Define the term working capital.
- What is an Operating cycle? Explain its significance.
- Brown Lt., has a total sales revenue of Rs. 120 lakh a year, of which 75% are credit sales. The firm has an investment opportunity in the money market to earn a return of 18% p.a if the firm could reduce its float by 3 days, what would be the annual savings for it?
- Calculate the optimum cash balance under the Baumol model from the particulars given below: Annual cash requirement- Rs. 1,50,000; Fixed cost per transaction – Rs. 15; Interest rate on Marketable securities – 18%.
- The following data has been extracted from the books of a company for the last two years :

Particulars	2008	2009
Net sales	4,00,000	7,50,000
Receivables	1,00,000	1,50,000

Calculate receivables turnover for the given two years.

**PART – B**

Answer Any three out of five questions **3X10 =30Marks**

- Kanishka Ltd., wants to raise Rs. 30,00,000 by issue of new equity shares. The relevant information is given below:  
No. of existing equity shares – 50,000  
Profit after taxes – Rs. 3,00,000  
Market value of existing equity shares – Rs. 20,00,000  
(a) Computation of cost of existing equity capital.  
(b) Compute the cost of new equity capital if the shares are issued at a price of Rs. 35 per share and the floatation cost is Rs. 5 per share.

- 12.** The following information is available with regard to the capital structure of Edwards Ltd.,

Particulars	Amount (Rs)	After-Tax cost of capital (%)
Debentures	12,00,000	5%
Preference share capital	4,00,000	10%
Equity share capital	8,00,000	15%
Retained Earnings	16,00,000	12%

You are required to calculate the Weighted average cost of capital (WACC)

- 13.** Lissa Metals Ltd., is considering two different investment proposals, X and Y. The details are as under:

Particulars	Proposal X	Proposal Y
Investment Cost	1,90,000	4,00,000
CFAT (Cash inflow before dep and after tax)		
Year 1	80,000	1,60,000
Year 2	80,000	1,60,000
Year 3	90,000	2,40,000

Suggest the most attractive proposal on the basis of NPV method considering that the future incomes are discounted at 12 %.

- 14.** The cost sheet of a company provides the following particulars:

Elements of Cost : Raw material – 40%; labour-10%; Overheads – 30%

The following particulars are also available

- Raw materials remain in stock for 6 weeks
- Processing time : 4 weeks
- Finished goods are in stock for 5 weeks
- Period of credit allowed to debtors: 10 weeks

Lag in payment of wages : 2 weeks

Period of credit allowed by creditors: 4 weeks

Selling price Rs. 50 per unit

Production in units: 13,000 p.a

Prepare an estimate of Working capital.

- 15.** A firm is considering pushing up its sales by extending credit facilities to the following categories of customers:

(X) customers with a 15% risk of non payment, and

(Y) customers with a 30% risk of non payment

The incremental sales expected in the case of category (X) and Rs. 60,000, while in case of category (Y), they are Rs. 75,000. The variable cost is 60% (X) and 10% of sales in the case of Category (Y).

You are required to advise the firm about extending credit facilities to each of the above categories of customers.



**PART - A**

**Answer All the Questions**

**3X10 =30 Marks**

- A)** Here, the data set holds two types of attributes. One is buys\_computer and another one is Age. Examine the correlation between two attributes using  $\chi^2$  test. Observed frequencies are shown in following table. The probability level of  $\alpha$  is 0.05 and the critical value is 3.84. (7 Marks)

buys_computer / Age	Middle_age	Senior
Yes	120	3020
No	4600	13784

- B)** Explain the different methods to handle the missing data. (3 Marks)

- 2.** A database has 8 transactions with min\_sup=25% and min\_cof=60%

Transaction id	Items
T1	{A, B, C, D}
T2	{A, C, D, F}
T3	{C, D, E, G, A}
T4	{A, D, F, B}
T5	{B, C, G}
T6	{D, F, G}
T7	{A, B, G}
T8	{C, D, F, G}

- i. Find all frequent itemset using Apriori Algorithm  
ii. List all the strong association rule  
iii. Analyze misleading association rule which is obtained from ii

3) Write down the steps involved in the FP-GROWTH algorithm. List the advantages and disadvantages of the FP-GROWTH algorithm. For the following data, find frequent item sets using the FP-GROWTH algorithm. Consider the minimum threshold for support = 50%, Confidence= 60%.

Transaction	List of items
T1	I1, I2, I3
T2	I2, I3, I4
T3	I4, I5
T4	I1, I2, I4
T5	I1, I2, I3, I5
T6	I1, I2, I3, I4

## PART-B

Answer All the Questions

1X20 =20 Marks

4) A) Create the distance matrix between the following data points such as O1,O2, O3 and O4. (10 Marks)

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

B) Consider the following data (in increasing order) for the attribute age: 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 36, 40, 45, 46, 52, 70. Using the data for age, answer the following:

(a) Use min-max normalization to transform the value 35 for age onto the range [0.0,1.0]. (4 Marks)

(b) Use z-Score normalization to transform the value 35 for age, where the standard deviation of age is 12.94 years. (3 Marks)

(c) Use normalization by decimal scaling to transform the value 35 for age. (3 Marks)



### PART A

Answer any four of the following questions

4x10=40

- Consider the given training data and apply Naïve Bayes algorithm to test the data, {Age<=30, Income=Medium, Student=yes, Credit Rating=fair} and predict the Buy Computer is yes or no.

Age	Income	Student	Credit Rating	Buy Computer
<=30	High	No	Fair	No
<=30	High	No	Excellent	No
31...40	High	No	Fair	Yes
>40	Medium	No	Fair	Yes
>40	Low	Yes	Fair	Yes
>40	Low	Yes	Excellent	No
31...40	Low	Yes	Excellent	Yes
<=30	Medium	No	Fair	No
<=30	Low	Yes	Fair	Yes
>40	Medium	Yes	Fair	Yes
<=30	Medium	Yes	Excellent	Yes
31...40	Medium	No	Excellent	Yes
31...40	High	Yes	Fair	Yes
>40	Medium	No	Excellent	No

- Write a pseudo code for KNN classification also classify for the new patient=5 using KNN with k=3, using both Euclidean distance and Manhattan distance. How does the choice of distance metric impact the classification?

Patient	Age	Glucose level	Diabetes(Yes/No)
1	45	85	No

2	50	90	No
3	65	150	Yes
4	70	160	Yes
5	60	130	?

3. A market trader sells ball-point pens on his stall. He sells the pens for a different fixed price,  $x$  pence, in each of six weeks. He notes the number of pens,  $y$ , that he sells in each of these six weeks. The results shown in the following table

X	10	15	20	25	30	35
y	68	60	55	48	38	32

- i. Calculate the least square regression line  $y$  on  $x$ .
  - ii. Predict the number of pens when he sells for 45
  - iii. Calculate the coefficient of determination  $R^2$
4. Compare linear and logistic regression. Derive the equation for sigmoid function in logistic regression.
5. Explain the following:
- i. Multiple Logistic Regression Forward and backward method
  - ii. Generalized Linear Model

## PART B

Answer all the Questions

**1\*10=10**

1. The following data consists of training data from the Car Company database. Find the root node of the decision tree.

Age Group	Income Level	Credit Rating	Buy Car
Young	Low	Fair	No
Young	Medium	Fair	Yes
Young	Medium	Good	Yes
Middle	Medium	Good	Yes
Old	High	Fair	Yes
Old	Low	Fair	No
Middle	High	Good	Yes
Middle	Low	Good	No
Young	Low	Good	No
Old	High	Good	Yes
Old	Medium	Fair	Yes



**SASTRA**  
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THINK MERIT | THINK TRANSPARENCY | THINK SASTRA



School of Computing  
Third CIA Exam – Nov 2024

Course Code: INT 317

Course Name: Data Mining and  
Analytics

Duration: 90 minutes Max Marks: 50

### PART A

**Answer any four of the following questions**

**4x10=40**

1. 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: Perfect - 1, Good - 2, and Poor - 3.

Object 1	Attribute 1 (nominal)	Attribute 2 (ordinal)	Attribute 3 (Numerical)
1	A1	Perfect	23
2	A2	Good	45
3	A1	Poor	78
4	A3	Perfect	31

2. Mention the steps for estimating AR parameters Using MLE and Yule Walker.

3. An environmental scientist is studying the relationship between population growth and pollution levels in a city over a 5-year period. The data is as follows:

Year	Population Growth (%)	Population index
1	2.0	50
2	1.5	45
3	2.2	55
4	1.8	48
5	2.5	60

- i. Calculate the covariance between population growth and pollution levels.
- ii. Calculate the correlation coefficient between population growth and pollution levels.

4. The annual salaries (in thousands of dollars) of 8 men in middle management at a given company are: 55.5, 64.8, 68.2, 70.2, 52.4, 56.8, 60.6, 72.5 while those for 6 women are: 56.2, 48.8, 58.4, 50.9, 60.2, 54.5. Let X and Y denote the salaries of the men and women respectively. Assuming normal distribution and equal standard deviation, test the null hypothesis  $\mu_x = \mu_y$  against the alternative hypothesis  $\mu_x > \mu_y$  at 5 percent level of significance and the critical value at 5% significance is 1.78.

5. Explain the following:

- i. Semiparametric regression model
- ii. Non-Parametric regression methods

### **PART B**

**Answer the following**

**1x10=10**

6 Generate the strong association rules for the following transactions using Apriori algorithm. Min\_sup=30% and min\_conf =65%

Transactions	List of Items
T1	Paneer, Cheese, garlic, Ginger, Butter
T2	Bread, Butter, Cheese, Milk, Sugar
T3	Milk, Tea Powder, Sugar, Bread
T4	Noodles, Pasta, Butter, Cheese
T5	Paneer, Peas, Baby corn, Butter
T6	Bread, Jam, Butter, eggs
T7	Bread, Cheese, Butter, Milk
T8	Paneer, Butter, eggs, sugar



### PART-I $2*5 = 10$ (Answer any 2)

1. Explain any one of the hierarchical clustering methods using a dendrogram.
2. Non-uniform data can be clustered to find useful patterns. Explain (i) how cluster size can be determined and (ii) the quality of the clusters can be evaluated. (you may explain any one of the metrics used, for example: silhouette score, precision, or recall)
3. Given a  $N*M$  dataset (where  $N$  is the number of instances and  $M$  is the number of features), explain how you will use non-parametric methods to detect the outliers. For example, say, using histogram analysis or any other method.

### PART-II $4*10= 40$ (Answer any 4)

4. Explain the working principles of density based clustering techniques with illustration.
5. Explain the working principles of density based outlier detection technique using the local outlier factor method.
6. Explain the working principles of distance based outlier detection method using the nested loop concept.
7. Explain the strengths and weaknesses of any ten (10) Machine Learning models.
8. It has two parts
  - a. Frequent dataset mining based problems. Checkout figure. It has a simple  $2 \times 2$  contingency matrix and a comparison of the six pattern evaluation methods for six different dataset. What inferences can you make from this observation?
  - b. ANN based problems:
    - i. Implement any one of AND, OR, NOT gate using single layer perceptron.
    - ii. Implement XOR gate using multi layer perceptron. (use hidden layers)

### BONUS (10 mark)

9. Either (a) or (b)
  - a. Explain the math behind PCA analysis. Work out the math in a systematic way.  
For multivariate data (or)
  - b. Explain the math behind any of the 40 ML models studied in the class and solve for a given multivariate dataset.

### $2 \times 2$ Contingency Table for Two Items

	milk	$\bar{milk}$	$\Sigma_{row}$
coffee	mc	$\bar{mc}$	c
$\bar{coffee}$	$\bar{mc}$	$\bar{\bar{mc}}$	$\bar{c}$
$\Sigma_{col}$	m	$\bar{m}$	$\Sigma$

### Comparison of Six Pattern Evaluation Measures Using Contingency Tables for a Variety of Data Sets

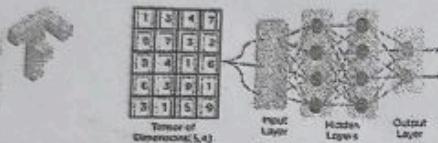
#### Data

Set	mc	$\bar{mc}$	$m\bar{c}$	$\bar{m}\bar{c}$	$\chi^2$	lift	all_conf.	max_conf.	Kulc.	cosine
D <sub>1</sub>	10,000	1000	1000	100,000	90557	9.26	0.91	0.91	0.91	0.91
D <sub>2</sub>	10,000	1000	1000	100	0	1	0.91	0.91	0.91	0.91
D <sub>3</sub>	100	1000	1000	100,000	670	8.44	0.09	0.09	0.09	0.09
D <sub>4</sub>	1000	1000	1000	100,000	24740	25.75	0.5	0.5	0.5	0.5
D <sub>5</sub>	1000	100	10,000	100,000	8173	9.18	0.09	0.91	0.5	0.29
D <sub>6</sub>	1000	10	100,000	100,000	965	1.97	0.01	0.99	0.5	0.10



**PART-I 2\*5 = 10 (Answer any 2)**

1. Explain the K-Nearest Neighbor Algorithm.
2. Explain the regularization concept in Regression.
3. Tensorflow is a popular framework for deep learning and ML applications.



A tensor is a mathematical object represented as arrays of higher dimensions. These arrays of data with different dimensions and ranks fed as input to the neural network are called "Tensors." Explain your experiences building an artificial neural network using tensor flow and how was the performance compared to using scikit-learn or any other ML library?

**PART-II 4\*10= 40 (Answer any 4)**

4. Explain different hidden markov model Inference methods using dishonest casino example
5. Explain Forward Backward Hidden Markov Model algorithm
6. Explain Sequence Classification using Viterbi Algorithm
7. Explain parts of Speech Tagging using a hidden markov model or conditional random field.
8. Explain Naive Bayes theorem, pros and cons using the Spam Filtering, and the need to switch to Bayesian Network

How does classification differ from using Naive Bayes and Bayesian Network.

**BONUS (5 points)**

9. Match the following

Classifier	Description
A. Bayesian Network, Naive Bayes Classification	(i) Classifies based on the majority class among the k-nearest neighbors.
B. Decision Tree Classification	(ii) Find the hyperplane that best separates classes.
C. Random Forest Classification	(iii) Combines multiple decision trees to improve accuracy.
D. K-Nearest Neighbour Classification	(iv) Splits data into branches based on feature values.
E. Support Vector Machine	(v) Features are independent given the class.

Give examples of applications that can benefit from using these 5 different classification models. Example: Spam Filtering for Bayes. Why should someone select a particular model for a given application?