

**Final Assessment Test - June 2023**

Course: ITA5004 - Object Oriented Programming using JAVA

Class NBR(s): 0239 / 0268 / 0294

Slot: A2

Time: Three Hours

Max. Marks: 100

Faculty Name : Prof. BIMAL KUMAR RAY / Prof. SHYNU P G /
Prof. THANGA MARIAPPAN L**KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE****Answer ALL Questions****(10 X 10 = 100 Marks)**

1. Implement a class for a "Book". Book contains a title (a String), a list of authors (array of authors), number of pages (an integer), price (floating point number), publisher (a String) etc. Write suitable constructor and accessor/modifier methods. Implement a class for "Library". A library contains a list of books (array of Book). Write add (to add a book) and remove (to delete a book) methods for library. Write a main () function to create a "Library" and add five "Book" to library. Print the total price of all books.
2. Design and develop inheritance for a given case study, identify objects and relationships and implement inheritance wherever applicable. Employee class has Emp_name, Emp_id, Address, Mail_id, and Mobile_no as members. Inherit the classes: Programmer, Team Lead, Assistant Project Manager and Project Manager from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
3. Explain the following object oriented concepts with proper example.
 - a) Abstract classes and Interfaces [5]
 - b) Package [5]
4. A student portal provides option for user to register their profile. During the Registration process your program needs to validate that the user should reside in India. If not the system should throw an exception.

Step 1: Create a user defined exception class named "InvalidCountryException".

Step 2: Overload the respective constructors.

Step 3: Create a main class "UserRegistration", add the following method, registerUser— The parameters are String username, String userCountry and add the following logic.

- if userCountry is not equal to "India" throw a InvalidCountryException with the message "User Outside India cannot be registered"
- if userCountry is equal to "India", print the message "User registration done successfully"

Invoke the method registerUser from the main method with the data specified and see how the program behaves,

Name Country Expected Output

Mickey US InvalidCountryException should be thrown.

The message should be "User Outside India cannot be registered"

Mini India The message should be "User registration done successfully"

5. There is one queue of 'n' capacity. This queue is shared between producer and consumer. 'n' is the capacity and for this blog, I will take n = 5.

Producer adds a block to the queue when queue size is less than its capacity.

Consumer will consume from the same queue when queue size is greater than

0. Write a multithreaded Java program with Thread synchronization to implement the above scenario.

6. Create an application that draws a simple stick figure person that looks something like the following figure:



- You should have three buttons: Dress, Hair and Shoes. Associated with the Dress button is a window that has four buttons, one for each of the colors red, green, blue and orange. Pressing one of these buttons will change the color of the dress.
- Similarly, the Hair button is associated with a window that has three buttons, one for each of the colors black, gray and pink.
- And the Shoes button is associated with a window that has three buttons, one for each of the colors red, yellow and blue.

When the application starts, create the windows for the Dress, Hair and Shoes buttons and make these windows invisible. Pressing a button will make the correct window visible. If the window is closed, just make it invisible.

7. Implement a program for maintaining a database of student records using Files. Student has Student_id, name, Roll_no, Class, marks and address. Display the data for few students.
- a) Create Database
 - b) Display Database
 - c) Delete Records
 - d) Update Record
 - e) Search Record
8. Write a program to insert 20 random integers from the range between 20 and 200 in order into a LinkedList object, next create a second LinkedList object containing a copy of the first list but in sorted order, then calculate the sum of the elements and the floating-point average of the elements.
9. Write a Java interface that accepts a set of numbers and sorts it. Write a server program to implement it. Now create a client process that sends a set of numbers to the server process through Java RMI technology. Server process in turn sorts the numbers. Client process then prints the set of numbers in sorted order.
10. Develop basic attendance management system using GUI with all possible concepts to help the students manage their attendance and provide the following features:
- a) Tracking total lectures and days missed.
 - b) Calculating the attendance in percentage.
 - c) Display warning message if attendance doesn't fulfil attendance criteria.
 - d) Calculate and display number of classes to be attended to fulfil attendance criteria.





VIT[®]

Vellore Institute of Technology
(Approved by the University Grants Commission of India)

Final Assessment Test - June 2023

Course: MAT5010 - Foundations of Data Science

Class NBR(s): 0506

Time: Three Hours

Slot: A1+TA1

Max. Marks: 100

Faculty Name : Prof. SHASHIKIRAN V

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. a) Define Big Data. What does "volume", "veracity", "variety", and "velocity" for [6]
Big Data mean?

b) What are the types of Data integral to Big Data? [4]

2. Explain briefly different phases of Data Analytics Life Cycle.

3. Calculate the Mean, Median and the mode for the Interval scaled data.

Marks of the students are grouped and the number of students under each group are given below:

Marks class	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	10	24	48	30	9	4

4. Discuss the significance of first Moment, second moment, third moment and fourth moment in estimating skewness. Derive expression for the same.

5. Find the correlation – coefficient for the following data:

X: 62 64 65 69 70 71 72 74

Y: 126 125 139 145 165 152 181 208

6. Find the partial correlation coefficient $r_{AB,C}$ for the following data.

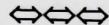
A	15	18	13	14	19	11	17	20	10	16
B	6	3	8	6	2	3	4	4	5	7
C	25	29	27	24	30	21	26	30	20	25

7. During a country wide investigation, the incidence of T.B was found to be 1%. In a college of 40000 strong 1000 were affected, whereas in another, 120000 strong, 800 were affected. Does this indicate any significance difference?

8. Find the eigenvalues and associated eigenvectors of the matrix

$$\begin{matrix} 7 & 0 & -3 \\ -9 & -2 & 3 \\ 18 & 0 & -8 \end{matrix}$$

9. Given a decision tree, you have the option of (a) converting the decision tree to rules and then pruning the resulting rules, or (b) pruning the decision tree and then converting the pruned tree to rules. What advantage does (a) have over (b)?
10. How does Support vector machine classify given set of data tuples ? SVM classifiers suffer from slow processing when training with a large set of data tuples. Discuss how to overcome this difficulty and develop a scalable SVM algorithm for efficient SVM classification in large data sets.



Final Assessment Test – June 2023

Course: ITA5006 - Distributed Operating Systems

Class NBR(s): 0243 / 0270 / 0524

Slot: B2

Time: Three Hours

Max. Marks: 100

Faculty Name : Prof. KARTHIKEYAN D / Prof. RAJKUMAR M /
Prof. SENTHILKUMAR T

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN “OFF” POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. a) Experiment the Dining Philosopher problem using synchronization tool and check the critical section requirements for the above problem with the help of pseudocode. [6]
- b) Examine the data structure tools used to handle process execution and demonstrate with process state diagram. [4]
2. a) Justify the need for synchronization between two processes. Provide a solution using mutex and semaphore. Which is better, mutex or semaphore? [5]
- b) With a pseudo code enumerate the necessary condition to be satisfied for the Peterson's solution to the critical - section problem. [5]
3. a) Demonstrate the functionalities of Token bus protocol used in communication network topologies. [5]
- b) Examine the design issues of Remote Procedure Call (RPC) with respect to structure, binding and parameter passing. [5]
4. Three computers A, B and C communicate based on Lamport logical clock (they include timestamp in their messages).

At the beginning of time, all three computers begin with their logical clock set to zero (0). Later, the following sequence of events occurs:

- A sends message M1 to B
- After receiving M1, B sends message M2 to C
- After receiving M2, C sends message M3 to A

- a) Represent the timestamp for the events specified above, [4]
 - Send (M1)
 - Send (M2)
 - Send (M3)

b) In addition to the above transitions, the following messages are sent.

[4]

- After receiving M3, A sends message M4 to B
- After receiving M4, B sends message M5 to A
- A receives message M5

After all of these messages have been sent and received, identify the timestamp for each event.

c) Is this a relatively or totally ordered system?

[2]

5. a) Compare and contrast Local and global state.

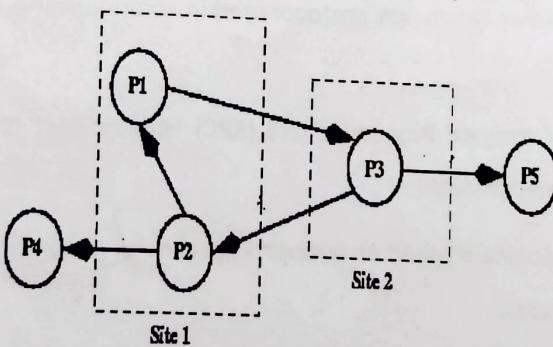
[4]

b) Propose a distributed algorithm to capture a consistent global state in distributed networks.

[6]

6. Demonstrate how Completely Centralized Algorithm will detect the deadlock in distributed systems and elaborate how the limitations are overcome by other Centralized Algorithms.

7. Consider the below global state transition diagram, detect the deadlock cycle using Chandy-Misra-Hass's algorithm. Evaluate the probe values at each process and justify how it detects the deadlocks in distributed systems.



8. Examine the consistency models in Distributed Shared Memory and elaborate the write-update coherence protocol with relevant diagram.

9. What are the factors influenced for selecting load distribution algorithm? Differentiate symmetric & adaptive load distribution algorithms with performance.

10. Demonstrate the functionalities of two-phase commit protocol for fault tolerance handling and also examine the limitations of this protocol.





VIT

Vellore Institute of Technology
(Approved by University Grants Commission, Act 1956)

Final Assessment Test - June 2023

Course: ITA5007 - Data Mining and Business Intelligence

Class NBR(s): 0296 / 0528 / 0530

Slot: C2+TC2

Time: Three Hours

Max. Marks: 100

Faculty Name : Prof. EPHZIBAH E.P/ Prof. HARSHITA PATEL/
Prof. JAGADEESAN S

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE
Answer ALL Questions

(10 X 10 = 100 Marks)

1. We have studied that data mining is the result of the evolution of database technology. Do you think that data mining is also the result of the evolution of machine learning research? Can you present such views based on the historical progress of this discipline? Address the same for the fields of statistics and pattern recognition.

2. In real-world data, tuples with missing values for some attributes are a common occurrence. Describe various methods for handling this problem.

3. Suppose we have the following dataset that represents the number of hours studied and the corresponding test scores for a group of students. You have to build a linear regression model to predict the test score based on the number of hours studied.

Hours Studied	Test Score
1	60
2	70
3	80
4	90
5	100
6	110
7	120
8	130
9	140
10	150

4. Outline the major steps of decision tree classification.

5. A database has 5 transactions. Let min support = 60% and min confidence = 80%.

TID	ITEM IDs
1	{M, O, N, K, E, Y}
2	{D, O, N, K, E, Y}
3	{M, A, K, E}
4	{M, U, C, K, Y}
5	{C, O, O, K, I, E}

Find all frequent itemsets using FP-growth algorithm.

6. Suppose that the data mining task is to cluster points (with (x, y) representing location) into three clusters, where the points are:

$A_1(2,10), A_2(2,5), A_3(8,4), B_1(5,8), B_2(7,5), B_3(6,4), C_1(1,2), C_2(4,9)$.

The distance function is Euclidean distance. Suppose initially we assign A_1 , B_1 , and C_1 as the center of each cluster, respectively. Use the k-means algorithm for three clusters and show all the steps.

7. Apply complete-link agglomerative clustering to cluster the following data points and draw the dendrogram.

$A_1 = (1, 2), A_2 = (2, 1), A_3 = (2, 3), A_4 = (3, 2), A_5 = (8, 9), A_6 = (9, 8), A_7 = (9, 10)$

8. Forecasting is a technique that uses historical data as inputs to make informed estimates that are predictive in determining the direction of future trends and help businesses to plan their strategies. Explain the methods of business forecasting in detail.

9. Differentiate between Explanatory versus Predictive modelling with appropriate examples.

10. Consider the given data:

Brightness	Saturation	Class
40	20	Red
50	50	Blue
60	90	Blue
10	25	Red
70	70	Blue
60	10	Red
25	80	Blue

Find out the class labels for following data using K nearest neighbor classifier for $K=3$ and $K=5$.

Brightness	Saturation	Class
20	35	?





VIT®

Vellore Institute of Technology

(Chartered by the Government under section 2 of the UGC Act, 1956)

Final Assessment Test - June 2023

Course: ITA6009 - Cloud Computing

Class NBR(s): 0276 / 0300 / 0534

Slot: E2+TE2

Time: Three Hours

Max. Marks: 100

Faculty Name : Prof. BENJULA ANBU MALAR M B / Prof. KRISHNAMOORTHY N
Prof. ARUNKUMAR A

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. Netflix has been one of the biggest success stories in movies and television. It has revolutionized how people watch TV and the company has been hugely successful at it. In fact, Netflix is now worth more than \$100 billion! But how did Netflix get to this point? How cloud computing changed the face of Netflix and give its uses of cloud services?
2. Summarize about the NIST Cloud Computing Reference Architecture with a suitable diagram with an example.
3. Elucidate on the storage virtualization in the Banking sector. Diagrammatically list the various services in the storage virtualization with a suitable example.
4. Explain the various Layered Cloud Architectural Development design for effective cloud computing environment and elucidate on the design challenges of inter clouds.
5. State the Cloud Differences in Perspectives of Providers, Vendors, and Users. Illustrate on the extended services in cloud computing. List the vendors of the each services.
6. Multiple people can store money in the one same bank. But every customer asset is totally different like one customer cannot have access to the other customer's money and account and different customers are not aware about each other's account balance and details etc. Help them out in provisioning server model, database model, application model etc in a multi-tenant deployment model.
7. List any five security issues in cloud computing. What are the baseline security practices for the SaaS environment and explain any two with the real time examples.
8. Explain the step by step Map Reduce working model for counting the number of words for the following tongue twister.

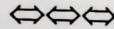
DEER BEAR RIVER.CAR CAR RIVER.

DEER CAR BEAR.

DEER BEAR RIVER.CAR CAR RIVER.

DEER CAR BEAR

9. Suppose the Indian government has assigned you the task to count the population of India. You can demand all the resources you want, but you have to do this task in 4 months. Calculating the population of such a large country is not an easy task for a single person (you). So what will be your approach? Explain with a suitable diagram on a Mapper and Reducer scalable model.
10. In what way the cloud based high performance computing is involved in the AWS and Google cloud's. Give its use-cases and components.
11. Which particular service model defines the boundary between the responsibilities of service provider and customer and show how different functional units are related to each other in cloud security alliances(CSA) stack model. Illustrate on it?
12. Create a successful Google Application and deploy it in Google App Engine along with Google's Cloud data storage facility for App Engine Developers.





VIT

Vellore Institute of Technology
Established by the Government of Tamil Nadu, India

Final Assessment Test – June 2023

Course: ITA6017 - Python Programming

Class NBR(s): 0251 / 0489 / 0538

Slot: F2

Time: Three Hours

Max. Marks: 100

Faculty Name: Prof. ARUNKUMAR A / Prof. BALASUBRAMANI M /
Prof. NIVEDHITHA M

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. a) Explain the basic principles of python language and how is it advantageous [4] than other languages.
- b) Describe the list of python operators and their expression along with their [6] description. Write a python program using Bitwise/operators.
2. Explain the basic structure of Loops and their types. Represent the conditions in steps and structure it in the form of flowchart. Write a python program using the looping constructs and represent the output.
3. Write a Python Program to Convert Integer to Roman numeral using function.
Use the following symbols to represent Roman numerals: I, V, X, L, C, D and M.

Value	Symbol
1	I
5	V
10	X
50	L
100	C
500	D
1000	M

Test Case:

Input: 58

Output: "LVIII"

Explanation: L = 50, V = 5, III = 3.

4. Define Dictionaries. State the difference between Dictionaries and tuples in table format. Explain in detail about indexing, sorting, object storage (adding and deleting) elements in dictionary with syntax and example. List out various methods and functions in dictionaries along with their description and syntax.

5. Write a program to check whether digits in a number appear more than once using List.

Test Case:

Enter the Digit:12341

Enter the Number to Search:1

Appears More than Once in a List

6. Write a short note on pandas dataframe object. Create your own dataframe object, discuss four Pandas functions that can be applied on Dataframes.

7. Explain in detail about pattern matching in python with Regular Expressions (RegEx).

i) Write a program to extract the protocol and hostname from the given URL: <https://www.vit.ac.in> using RegEx using meta characters.

ii) Write a program to perform the validation of an e-mail address using string methods. Write the necessary steps required for validation.

8. Consider the following matrix:

$$\begin{bmatrix} 12 & 11 & 10 & 9 \\ 10 & 9 & 8 & 7 \\ 8 & 7 & 6 & 5 \\ 6 & 5 & 4 & 3 \\ 4 & 3 & 2 & 1 \end{bmatrix}$$

(i) Convert the above list into a NumPy array

(ii) Using appropriate slicing techniques, extract the subarrays

$$U = \begin{bmatrix} 12 & 11 \\ 10 & 9 \\ 8 & 7 \end{bmatrix} \quad V = \begin{bmatrix} 10 & 9 & 8 \\ 8 & 7 & 6 \end{bmatrix}$$

(iii) Find the matrix product $B = UV$

(iv) Determine the shape of B.

(v) Is it possible to broadcast the row [1 2] with B? Justify your answer.

9. What is an Exception? State three features of exception handling and assertions in table format. List the types of standard exceptions with the description. Explain in detail about two forms of handling an exception using try statement along with their syntax and an example program.
10. a) Explain briefly about the modules available for the python integration with MySQL and list their advantages. Describe the benefits of python for database programming. [4]
- b) What is MySQL Connector Python? Write the steps required for connecting MySQL database in python using MySQL Connector Python. Write a python program for creating the Tips table given below by importing MySQL. [6]

	total_bill	tip	sex	smoker	day	time	size
0	16.99	1.01	Female	No	Sun	Dinner	2
1	10.34	1.66	Male	No	Sun	Dinner	3
2	21.01	3.50	Male	No	Sun	Dinner	3
3	23.68	3.31	Male	No	Sun	Dinner	2
4	24.59	3.61	Female	No	Sun	Dinner	4
5	25.29	4.71	Male	No	Sun	Dinner	4
6	8.77	2.00	Male	No	Sun	Dinner	2
7	26.88	3.12	Male	No	Sun	Dinner	4
8	15.04	1.96	Male	No	Sun	Dinner	2
9	14.78	3.23	Male	No	Sun	Dinner	2

11. Define embedded python and its principles. List out the functions for getting information from within C/C++ along with the syntax and an example program. Also state the five - stage process for getting the return values from a function call.
12. Describe the Application development with python using Rapid Application Development (RAD) tool. State the various RAD requirements and its solutions using standard libraries.



**Answer ALL Questions
(10 X 10 = 100 Marks)**

1. a) Suppose you have a file that contains sensitive information that only certain users should be able to access. How can you ensure that unauthorized users while still maintaining its confidentiality do not maliciously alter the file? Discuss the relevant concepts for the situation in detail. [5]
2. a) Explain about active attacks and passive attacks in detail. [5]
- a) State the difference between Denial of Service (DoS) and Distributed Denial of Service (DDoS). [5]
- b) An attacker floods a target system or network with traffic or requests in order to consume its resources, such as bandwidth, CPU cycles, or memory, and prevent legitimate users from accessing it. Explain the various types of DoS attacks and Organizations how can implement several measures to prevent from DoS attacks. [5]
- a) Illustrate the following access control structures:
Role Based Access control with its benefits and example. [5]
- b) An ABC Organization wants to restrict access to a particular file containing sensitive information, and the grant or restrict object access via an access policy determined by an object's owner group and/or subjects. Illustrate this situation with the features available in Discretionary Access Control mechanism. [5]
4. Explain why identity access management is important, as safety threats rise and users need to be protected. There are several kinds of password controls in place for banking transaction management and access to critical applications. Some of these controls include implementing strict controls for system-level and shared service account passwords, using one-time passwords (OTP) sent to the user's phone after successfully authenticating using a username and password. It helps ensure that only authorized users have access to specific resources or data. Justify the answer for the same. [5]
5. a) Explain Data Encryption Standard (DES) in detail. How is Substitution operation handle in DES algorithm? Explain the concept in detail for the input 0 1 1 0 1 0 with the help of S1 Box given below. [5]

S1															
12	3	11	1	2	17	11	8	3	10	6	12	5	9	0	4
2	15	0	4	14	2	13	1	10	6	12	11	9	5	3	8
4	1	19	8	13	6	2	11	15	12	9	7	3	10	5	5
13	12	6	2	4	9	1	7	5	11	3	14	10	0	6	11

b) Describe the RSA algorithm and express the steps involved in the key generation. Perform decryption and encryption using RSA algorithm with $p=3$, $q=11$, $e=7$ and $M=8$.

[5]

- i) Calculate the value of $n = p \times q$, where p and q are prime numbers
- ii) Calculate $\phi(n) = (p-1) \times (q-1)$
- iii) Consider d as public key such that $\phi(n)$ and d has no common factors
- iv) Consider e as private key such that $(e \times d) \bmod \phi(n) = 1$
- v) Cipher text $c = \text{message i.e. } m^e \bmod n$
- vi) Message $m = \text{cipher text i.e. } c^d \bmod n$

6. The cyber-criminal emailing you while pretending to be your relative. In the email, they may try to get you to divulge personal information such as your address, birthday, login credentials, or more. Identify the attack with your answer in detail for given scenario.
7. The attacks such as 'Browser Attack' and 'Man-in-the-Middle Attack' disturbs the web security. Discuss how the efficiency of SSL features would counter all these attacks, in detail.
8. Intrusion Detection and Prevention (IDP) systems used to identify potential incidents, log information about them, attempt to prevent them and alert the administrators responsible for security. IDP systems use numerous incident detection techniques. Summarize the three primary classes of detection methodologies are signature-based, anomaly-based and stateful protocol analysis in detail.
9. In an Organization, Security departments must actively monitor networks to prevent from malware before it can cause extensive damage. Therefore, here prevention of malware and understanding what kind of malware attack is very critical. Discuss your answer with possible malware attacks that are applicable to above scenario.
10. As many organizations are adopting cloud computing, attackers exploit the cloud to obtain unauthorized control on the valuable data stored in it. Evolution of traditional computing to cloud has led to many security challenges for both customers and service providers. Discuss about different types of services are providing by trusted cloud providers over the Internet by using many technologies, which arises different security threats. Explain about cloud security issues, threats and related attacks in detail.

