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**Roll No.** 2194026 .....

**TCS—408**

**B. TECH. (CSE)**

**(FOURTH SEMESTER)**

**END SEMESTER EXAMINATION,**

**June, 2023**

**JAVA PROGRAMMING LANGUAGE**

**Time : Three Hours**

**Maximum Marks : 100**

**Note :** (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among  
(a), (b) and (c) in each main question.

(iii) Total marks in each main question are  
**twenty.**

(iv) Each sub-question carries 10 marks.

1. (a) Discuss the importance of String literals with the help of examples. Also, compare StringBuffer and StringBuilder. (CO1)

**P. T. O.**

- (b) The Employee has the following attributes :

ID, Name, Department, City and Salary

Write a program that uses concept of constructor chaining to construct the objects. Also discuss importance of using constructor chaining in a class. (CO1)

- (c) International Standard Book Number (ISBN) is a unique numeric book identifier which is printed on every book. The ISBN is based up on 10-digit code.

The ISBN is legal, if :

$$\begin{aligned} &1 \times \text{digit}_1 + 2 \times \text{digit}_2 + 3 \times \text{digit}_3 + \\ &4 \times \text{digit}_4 + 5 \times \text{digit}_5 + 6 \times \text{digit}_6 + \\ &7 \times \text{digit}_7 + 8 \times \text{digit}_8 + 9 \times \text{digit}_9 + \\ &10 \times \text{digit}_{10} \text{ is divisible by } 11. \end{aligned}$$

Example :

Input : 1401601499

$$\begin{aligned} \text{Sum} &= 1 \times 1 + 2 \times 4 + 3 \times 0 + 4 \times 1 + 5 \times \\ &6 + 6 \times 0 + 7 \times 1 + 8 \times 4 + 9 \times 9 + 10 \times 9 \\ &= 253 \end{aligned}$$

which is divisible by 11.

Write a Java program to check whether the entered ISBN number is valid or not using following conditions :

- (i) If the ISBN is not a 10-digit integer, output the message, "Illegal ISBN" and terminate the program.
- (ii) If the number is 10-digit, extract the digits of the number and compute the sum as explained.

If the sum is divisible by 11, output the message, "Legal ISBN" otherwise "Illegal ISBN".

2. (a) A programmer wants to keep all similar classes and interfaces in same package. So programmer has created a package "package1" having one class "C1", one Interface "I1" and one subpackage "package2". The "package2" contains class "C2". The details of members are given below :

Class "C1" contains mt sum (int, int) method to calculate sum of two numbers.

Interface I1 contains an abstract method  
mt sub (int, int) to subtract two numbers.

The programmer wants to reuse “C1” and  
“I1” in class “C2” which is placed inside  
subpackage “package2” for sum and  
subtraction. Write a program to implement  
the given scenario. (CO2)

- (b) Why is multiple inheritance using classes  
not allowed in Java ? Discuss with an  
example. Also discuss various ways of  
abstraction with codes. (CO2)
- (c) Discuss the importance of the super  
keyword in Java. A superclass “Worker”  
has been defined to store the details of a  
worker, having name and basic wage of  
the worker. A constructor is used to  
initialize the values of the class, and the  
method display() is used to display the  
name and basic wage.

Another subclass, “Wages” is defined to  
compute the monthly wages for the  
worker. If a worker works for ‘h’ hours  
overtime, then he/she is paid ‘r’ rupees per

hour. Calculate the monthly wage he receives at the month's end (assuming a month has 30 days). (CO3)

3. (a) A bank's client has the following attributes and methods : (CO3)

**Instance variables :** name, account\_no, amount

**Instance methods :** void withdraw(int) to withdraw some amount from the account.

A user wants to withdraw some money from his account. Create a LowBalanceException that occurs when the user tries to withdraw an amount that is greater than his current bank balance. This exception will print "Your account has a low balance ....."

Example: name="xyz"

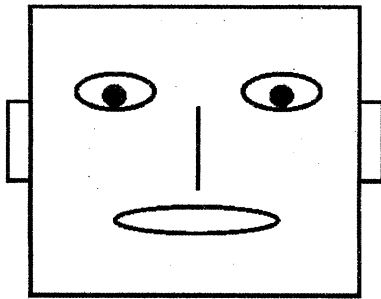
account\_no=101

amount=1 000

If client will try to withdraw 5000 INR, then output is :

"Your account has a low balance....."

- (b) Discuss the life cycle of a thread with a neat and clean diagram. Also, write a program to demonstrate the producer consumer problem. (CO3)
- (c) Write a program that reads data character by character from a file and writes into another file. (CO3)
4. (a) Compare AWT and Swing in detail. Also, write a swing program to create the following share : (CO4)



- (b) Discuss the importance of Collection and Generic Framework in Java. Write a Java code to insert 90, 15 at the end and 45 at index 2 of an `ArrayList<Integer>` having elements 10, 22, 43, 64, 95. (CO4)

- (c) Write a Java program to design the following output : (CO4)

First Name: Second Name: State:  Qualification: ☒ 10th ☐ 12th ☐ B.Tech

ID	NAME	SALARY
1	Pst	1000
2	Pst	2000

Department: ☐ ME ☐ CSE ☒ ECE Proficiency Level:  100 Employee Details

Submit

5. (a) Discuss JDBC drivers with neat and clean diagrams. Also discuss the various steps and corresponding lines of code when you want to use JDBC in your program. (CO5)
- (b) Create the given application using AWT/Swing, in which you create a converter which has two functionalities [feet to cm and cm to feet]. Frame must include information about the conversion as shown in fig. below. Order of the buttons and fields must be in given

sequence only. The final result will be replaced at Result label : (CO5)

cm to feet and feet to cm Converter  
 [1 cm = 0.0328 feet and 1 feet = 30.48 cm]  
 ☐ feet to cm ☐ cm to feet

- (c) Write a Java program in which data of employees has to be inserted in Employee table in EmployeeDatabase database. Also explain the use of JDBC-MySQL connection in this program. Make sure to display the details of the employee inserted into the database : (CO5)

**Table**      Employee (id int, name varchar (255), department varchar (255), salary varchar (255))

**Database**      Employee Database

**User**      Root

**Password**      Root

**Connector**      jdbc:mysql