Darshan UNIVERSITY
योग: कर्मसु कौशलम्

Program	Bachelor of Technology (BTech)	Semester - 2
Type of Course	-	
Prerequisite		
Course Objective	Learn Object-Oriented programming concepts and techniques using the Java programming language.	

Teaching Scheme (Contact Hours)				Examination Scheme				
Lecture	**Tutorial**	**Practical**	**Credit**	Theory Marks		Practical Marks		**Total Marks**
				SEE	**CIA**	**SEE**	**CIA**	
4	0	2	5	40	30	20	10	100

SEE - Semester End Examination, *CIA* - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content		**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to JAVA**	10	20
	Evolution of Java, Features of JAVA, JDK, JRE, JVM, Byte Code, Installing and configuring JAVA, Basic Structure of Java program, Compiling and Running Java files, Primitive data types, String, Variables, Type casting, Command line arguments, Operators, Operator precedence. Single and Multidimensional Array, Control Statements Ťif, else, nested if, if-else ladder, switch, while, dowhile, for, for-each, break and continue statement.		
2	**Object Oriented Concepts**	15	20
	Thinking of Class, Object and its relationships, Object Oriented Programming Concepts - encapsulation, inheritance, polymorphism, abstraction. Class, object, object reference, method, method overloading, constructor, constructor overloading, recursion, passing and returning object, this and static keyword, access control, nested class, String, StringBuffer, Math Class, Wrapper classes.		
3	**Inheritance and Abstraction**	12	20
	Use of inheritance, inheriting data members, types of inheritance, overriding methods and contructor, super keyword, final keyword, finalize method, abstract class, interface, Dynamic Method Dispatch.		
4	**Package, Exception Handling and Multithreading**	13	20
	Use of package, CLASSPATH, import statement, static import, access control. Use of multithreading programming, Thread class, Runnable Interface, Executor Framework, Thread priority, Thread synchronization, Exception and Error, try, catch, throw, thorws and finally. Bulit in exception, Custom exception.		
5	**IO Programming and Collection Framework**	10	20
	File Class, Byte Stream, Character Stream, exploring classes/interfaces from the java.io package. Collection, Iterator, List, comparator interface, Vector and Stack class, Queues, Sets, Maps, exploring classes from the java.util package.		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	50	40	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes

At the end of this course, students will be able to:

CO1	**describe** features, datatypes and array.
CO2	**apply** Object Oriented Concepts.
CO3	**demonstrate** inheritance and abstraction concepts
CO4	**implement** packages, exception handling and threads
CO5	**perform** and use file IO and collection framework.

Reference Books

1.	**Java Fundamentals** By Herbert Schildt, Dale Skrien | McGraw Hill
2.	**Programming in Java** By Sachin Malhotra & Saurabh Chaudhary | Oxford University Press India
3.	**Java Programming** By D. S. Malik | Cengage Learning
4.	**Introduction to Java programming** By Y.Daniel Liang | Pearson

List of Practical

1.	**Installing Java Development Kit and perform hello world program.**
	
	    1. Install Java Development Kit (JDK).
	    2. Configure Path Variable.
	    3. Hello World Program using Java.
	    4. Taking user input through Command Line Argument.
	    5. Taking user input through Scanner class.
	    6. Write a java program to do sum of command line argument passed as two Double numbers.

2.	**Perform programs using operators and data types**
	
	    1. Write a program to get 2 numbers from the user and print the sum of two numbers using command line and Scanner class.
	    2. Demonstrate the Operator precedence.
	          i. 10 + 20 * 30
	         ii. 100 / 10 * 100
	       iii. 5 * 4 / 4 % 3
	       iv. 100 + 200 / 10 − 3 * 10
	    3. Write a program to create basic calculator by getting 2 numbers and 1 string (operation) from the user and apply the operation given in a string on the given numbers.
	    4. Write a program to calculate the area of circle.
	    5. Write a program to convert temperature from Fahrenheit to Celsius. (Formula : c = f-32*5/9)

3.	**Perform programs using if-else ladders, conditional and branching statement**
	
	    1. The marks obtained by a student in 5 different subjects are input through the keyboard.
	The student gets a division as per the following rules:
	    I. Percentage above or equals to 60-first division
	    II. Percentage between 50 to 59-second division
	    III. Percentage between 40 and 49-Third division
	    IV. Percentage less than 40-fail
	Write a program to calculate the division obtained by the student.
	    1. Write a program to find that given number or string is palindrome or not.
	    2. Write a program to find maximum no from given 3 no.
	    3. Write a program to check that the given number is prime or not.

4.	Perform programs using array and string

1. Write a java program to do sum of command line argument passed as two Double numbers.
2. Write a program to accept a line and check how many consonants and vowels are there in line.
3. Write a program that creates and initializes a four integer element array. Calculate and display the average of its values.
4. Write a program to print given array in reverse order.
5. Write a program to find length of string and print second half of the string.
6. Write an application that searches through its command-line argument. If an argument is found that does not begin with and upper case letter, display error message and terminate.
7. Write an interactive program to print a string entered in a pyramid form. For instance, the string "stream" has to be displayed as follows:

s
st
str
stre
strea
stream

1. Write an interactive program to print a diamond shape. For example, if user enters the number 3, the diamond will be as follows:

*
* *
* * *
* *
*

5.	Perform programs using object oriented concepts

1. Write a program to create circle class with area function to find area of circle.
2. Define Time class with constructor to initialize hour and minute. Also define addition method to add two time objects.
3. Create a class which ask the user to enter a sentence, and it should display count of each vowel type in the sentence. The program should continue till user enters a word "quit". Display the total count of each vowel for all sentences.
4. Create a class named Bank_Account with data memebers accountNo, userName, email, accountType and accountBalance, Also create methods getAccountDetails() and displayAccountDetails().
5. Define class for Complex number with real and imaginary as data members. Create its contructor, overload the constructors. Also define addition method to add two complex objects.
6. WAP that counts the number of objects created using static.
7. Write a program in Java to demonstrate use of this keyword. Check whether this can access the Static variables of the class or not.

6.	Perform programs using inheritance

1. Declare a class called student having following data members:id_no, no_of_subjects_registered, subject_code, subject_credits, grade_obtained and spi. Define constructor and calculate_spi methods.Define main to instantiate an array for objects of class student to process data of n students to be given as command line arguments.
2. Declare a class called book having author_name as private data member. Extend book class to have two sub classes called book_publication & paper_publication. Each of these classes have private member called title. Write a complete program to show usage of dynamic method dispatch (dynamic polymorphism) to display book or paper publications of given author.Use command line arguments for inputting data.
3. Create a class named 'Member' having the following members:
4.
   i. Name
   ii. Age
   iii. Phone number
   iv. Address
   v. Salary

It also has a method named 'printSalary' which prints the salary of the members.
Two classes 'Employee' and Manager' inherits the 'Member' class. The 'Employee' and 'Manager' classes have data members

'specialization' and 'department' respectively. Now assign name, age, phone number address and salary to an employee and a manager by making an object of both of these classes and print the same along with specialization and department respectively.

1. Design a class named MyPoint to represent a point with x and y-coordinates. The class contains:

    -
        i.   The data fields x and y that represent the coordinates with getter methods.
        ii. A no-arg constructor that creates a point (0, 0).
        iii. A constructor that constructs a point with specified coordinates.
        iv. A method named distance that returns the distance from this point to a specified point of the MyPoint type.
        v.   A method named distance that returns the distance from this point to another point with specified x- and y-coordinates.

1. Create a class named ThreeDPoint to model a point in a three-dimensional space. Let ThreeDPoint be derived from MyPoint with following additional features:

    -
        i.   A data fields named z that represents the z-coordinate.
        ii. A no-arg constructor that creates a point (0, 0, 0).
        iii. A constructor that constructs a point with three specified coordinates.
        iv. A get method that returns the z value.
        v.   Override the distance method to return the distance between two points in the three-dimensional space.
        vi. Write a program that creates two points (0, 0, 0) and (10, 30, 25.5) and display the distance between the two points.

1. Demonstrate the use of Super Keyword.
2. Demonstrate the use of Final Keyword.

7.	**Perform programs using abstract class and interface**

1. The abstract vegetable class has three subclasses named Potato, Brinjal and Tomato. Write a java program that demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Crete and display instances of these objects. Override the toString() method of object to return a string with the name of vegetable and its color.
2. Write a program that illustrates interface inheritance. Interface A is extended by A1 and A2. Interface A12 inherits from both P1 and P2.Each interface declares one constant and one method. Class B implements A12.Instantiate B and invoke each of its methods. Each method displays one of the constants
3. The Transport interface declares a deliver () method. The abstract class Animal is the super class of the Tiger, Camel, Deer and Donkey classes. The Transport interface is implemented by the Camel and Donkey classes. Write a test program that initialize an array of four Animal objects. If the object implements the Transport interface, the deliver () method is invoked.
4. Create interface EventListener with performEvent() method. Create MouseListener interface which inherits EventListener along with mouseClicked(), mousePressed(), mouseReleased(), mouseMoved(), mouseDragged() methods. Also create KeyListener interface which inherits EventListener along with keyPressed(), keyReleased() methods. WAP to create EventDemo class which implements MouseListener and KeyListener and demonstrate all the methods of the interfaces.
5. The Transport interface declares a deliver () method. The abstract class Animal is the super class of the Tiger, Camel, Deer and Donkey classes. The Transport interface is implemented by the Camel and Donkey classes. Write a test program that initialize an array of four Animal objects. If the object implements the Transport interface, the deliver () method is invoked.

8.	**Perform programs using exception handling**

1. Write a method for computing xy doing repetitive multiplication. X and y are of type integer and are to be given as command line arguments. Raise and handle exception(s) for invalid values of x and y.
2. Write a complete program to accept N integer numbers from the command line. Raise and handle exceptions for following cases :
    i.   - when a number is –ve
    ii. - when a number is evenly divisible by 10
    iii. - when a number is greater than 1000 and less than 2000
    iv. - when a number is greater than 7000
    Skip the number if an exception is raised for it, otherwise add it to find total sum.
1. WAP to create Account class, which is representing a bank account where we can deposit and withdraw money. if we want to withdraw money which exceed our bank balance? We will not be allowed, create InSufficientFundException to handle above situation and display proper error message.

9.	**Perform programs using multithreading**

1. Write an application that executes two threads. One thread displays "Good Morning" every 1000 milliseconds & another thread displays "Good Afternoon" every 3000 milliseconds. Create the threads by implementing the Runnable interface.
2. Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers.
3. Write a complete multi-threaded program to meet following requirements:
    i. Read matrix [A] m x n
    ii. Create m number of threads
    iii. Each thread computes summation of elements of one row, i.e. ith row of the matrix is processed by ith thread. Where 0 <= i< m.
    iv. Print the results.
4. It is required to have total two threads, both capable of acting as a produce as well as a consumer. If first thread acts as a producer then, the second thread becomes the consumer and vice-versa. They communicate with each other through a buffer, storing one integer number. One of the threads initiates the communication by sending 1 to the other thread. The second thread, on receiving 1 sends 2 to the first thread. On receiving 2, the first thread sends three integer numbers, one by one to the second thread. The second thread consumes the numbers by displaying them. Both threads terminate after that. Note that both threads must be capable of initiating the communication. Write complete multi-threaded program to meet above requirements.

10.	**Perform programs to manipulate Files**

1. Write a program that counts number of characters, words, and lines in a file. Use exceptions to check whether the file that is read exists or not.
2. Write a program to replace all "word1" by "word2" from a file1, and output is written to file2 file and display the no. of replacement.
3. Write an application that reads a file and counts the number of occurrences of digit 5. Supply the file name as a command-line argument.
4. Create a class called Student. Write a student manager program to manipulate the student information from files by using FileInputStream and FileOutputStream.

11.	**Perform advanced programs using IO programming**

1. Refine the student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter.
2. Write a program to check that whether the name given from command line is file or not? If it is a file then print the size of file and if it is directory then it should display the name of all files in it.
3. Write a program of writing binary file using multithreading. Demonstrate use of join() and yield() interrupt().
4. Refine the student manager program to manipulate the student information from files by using the DataInputStream and DataOutputStream. Assume suitable data.

12.	**Demonstrate the use of Collection Framework in Java.**

Demonstrate the use of Collection Framework in Java.