B.M.S COLLEGE OF ENGINEERING BENGALURU

Autonomous Institute, Affiliated to VTU



LAB REPORT

23CS3PCOOJ

Submitted in partial fulfilment of the requirements for Lab Bachelor of Engineering

in

Computer Science and Engineering

Submitted by:

PIYUSH BELLUBBI (1BM22CS192)

Department of Computer Science and Engineering, B.M.S

College of Engineering,

Bull Temple Road, Basavanagudi, Bangalore, 560 019 2023-2024.

INDEX

Sl.No.	Title	Date
1	Complete scanned Observation Book	12/12/2023 - 20/02/2024
2	Lab 1	12/12/2023
3	Lab 2	19/12/2023
4	Lab 3	26/12/2023
5	Lab 4	02/01/2024
6	Lab 5	09/01/2024
7	Lab 6	16/01/2024
8	Lab 7	23/01/2024
9	Lab 8	30/01/2024
10	Lab 9	06/02/2024
11	Lab 10	20/02/2024

```
» Parse Int method

→ Write a program in Java to find the area of a rectangle and verify the same with various inputs (length, breadth).

(ode: class Rectangle Area (String args[]) &

int length, breadth;
```

int length; breadth;

length = Integer. parseint (args (07);

loreaeth = Integer. parseint (args (13);

int area = length + breacth;

System. out. println ("length of orestangle = " + length);

System out println (" wreadth of rectangle =" + lireadth);
System out println (" Name = PETUSHBELLUBBE USN = IBM 22 (\$ 192 ^);

· Scanner

import java . util . Scanner;

class thelloworld h

public static void main (String args (3))

int a; float b; String s;

Scanner in = new String Scanner (System.in);

System.out. println ("Ender a string");

s = in.nextline();

System.out. println ("You excluded a string" 150;

System.out. println ("You entered as integer "ta);

a = in.nextline();

a = in.nextline();

System.out. println ("Ender a float value");

```
system. Out. prindle ("Your intered string is ".+ 5);
   System . out . println ("Entu an integer");
    a = ind. nextInt();
   System. Out. println (" You entired an integer "+ a);
   system. out. println ("Entir a float value");
   b = in. nextfloat();
   System.out.println("Your float value is "+b);
or Array
   class AutoArray &
   public static void main (String Args []) &
   int month_days [] = {31,28,31,30,31,30,31,31,30,31,30,31};
  System. out. println ("April has" + month_days (3) + " days. "); }
of Fautorial
   class factorial &
       public Static void main (String args [3)
            int fac = L;
            System. Out. println ("Ender a number: ");
             int n = sc. next int ();
             for (int i=L; ik=n; i++) {
                    fac = jac * i;
```

System. out. posinten ("She factorial: " + fac);

```
"> Palindrome -> WAP to find the given 5 digits int is a
    palindrome or not.
-> class palindrome h
   public static void main (String args (3){
    int n, t, tem, rev=0;
   Scanner sc= new Scanner (System.in);
   System. out. println ("Entu a 5 digit number:");
   n = sc. nextint ();
    t=n;
   rubile (t >0) 9
           rem= + 7,10;
            rev = rev 10+ rem;
            t = t/10;
          M (rev == n) {
         System. Out. porintln (" Palindrome");
         else f
         System. out. println (" not palindrome ");
```

```
·> Sum of digits: was to find the sum of digits in a 5 digit number.
     class sum of digits h
        public static void main (String args (3) h
            long number, sum:
            Scanner. Sc = new Scanner (System. in);
            System. out. println ("Enter a 5 digit number: ")",
            number = sc. next long ();
            for (sum=0; sumbur=0; number= number 110) {
                 sum = sum + numuur % 10;
           System. out. posintln ("sum of digits: "I sum);
   Convossion
    class conversion (
    public static vold main (String args ()) {
    byte b= L; short SL = 1000, S2;
    ind 11 = 100000 , id;
    long 11: 1000000 , 12)
    chan 0= 1+1;
    Most &L= 25.69f, $2;
    double dl = 536987.125, di;
    System. out. parintln (b+" "+ sl+" "+ il+" "+ll+" "+c+" "+fl+"
    5x= b;
    12 = SL;
    System one printle (32+""+12+" "+12):
```

```
Develop a Java program that prints all real solutions to
      the quadratic equation axet bxtc=0. Read in a,b,c and
       use the quadratic formula. If the disoriminate bd-4ac is
      regative, display a musiage stating that there are no real
      solutions.
      import java wil. scanner:
wde:
      class avadratic f
      int a,b,c;
      double 11,12, d;
       void getd()
                   Scanner S = new Scanner (System. in);
                   System out printle ("Enter the coefficients of a, b, c"):
                   a= s. nutlnt();
                   b = s. nextInt();
                   c = s. nextint();
         void compute ()
              while (a==0)
                   System.out. println(" Not a Quadratic equation ");
                  System. out. println ( " Enter a non zoro value for a: "):
                   Scanner s = new Scanner (System. in);
                  a = s, next [nd ():
               d= b*b-42*c;
               4 (d==0)
```

rt= (-b)/(2*a);

```
system out println("Roots are real & equal ");
                      System out. parintle ("Root 1 = Root 2 = "+ +1);
               else if ( d> 0)
                   rl= ((-b) + (Math. sgrt (d))) / (double) (2*a);
                    ra= ((-6)- (math.sgrt (d)))/(downle) (2*a);
                   System. out. println ("Roots are real & distinct");
                   System. out. println("RootL=" +rL+" Root2=" +r2)
               else if (d<0)
                  System . Out . println ( "Roots are imagin ary ");
                  rl= (-b)/(2 a);
                  rd = Math. sgrt (-d)/(2*a);
                  System. out. pountln ("Root L="+r1+"+i"+r2);
                  System .out. prindle ("Roota="+ra+"-i"+ra);
     y
      auadratic main
class
     public static void main (string args[])
         Quadratic q = new Quadratic ();
         2. getall);
         q. computes);
```

```
or output:
```

it Enter the coefficients of a, b, c

3

4

5

Roots are imaginary

Root 1 = 0.0+ 11. 1055415967

Root 2 = 0.04-10. 1055415967

ii7 Enter the coefficients of a,b,c

2

4

d

Roots are real and equal

Root L = Root 2 = -1.0

in Enter the coefficients of a, b, c

2

6

2

Roots are real and distinct

Root L = -0.381966

Root 2 = -2.61803

127 Ends the coefficients of a,b, cs

C

4

01

Not a quadratic equation

Spl

public void gustraint Details () h system. Out. printlal "Ender Student name } nance = S. nextline();

System. Out. println (" Erotu student ton); USN = S. next line(); 3

public void getmanks () & int i;

for (i=0; i < 8; i+) { System. Out. println ("Enter Marks of subjects "+ (1H)+"

LAB:2

class student &

student ()

int;

saligate (13 subject marks = s. next ln t();

	L Date Page
	it Subjects [i] . Subject marks >= 40 se subject marks <=
	Suljut Ci3. grade = Calculate grade
	(Subject Cis. Subject Marks); 3
	else s
	System. Out. println (" Invalid Marks. Marks should be letimen 40 & 100");
	3
	System. Out., println ("Enter Oudits "):
	subjects (i). Ordots = 8. next IAt();
)
	3
	pullic fort calculate grade (int marks) &
	1+ (marks > =90)
	return 10;
	elle 17 (marks >= 70 22 marks <=80)
	return 9;
	else if (marks >=60 12 marks 2=70)
	xetz130 8.
	else if (months >= 50 22 months < =60)
	return 7;
	else
	return 6;
	3
	\$1.0A() B
	pullic void compute 54PA() &
	int total score -0,
_	ind total ored = 0;
_	for Cint 1=0; ic8; itt) & sudjust Ei] =
_	total score + = surgees [1]. grace = 0
_	oudits;

total and t = subjects [1]. Oredits; SYPA = (downle) total score / Edounde) total ords 3 pullic class stud & public static voted main (String args (3) Student SL= num Student (3) SI. get Student Details (1); \$1. gutMarks (); SL . Compute SGPA(); System, out, println ("student name: "+81. name); System.out. printle (" student USN "+ SL USN); System. out. println ("student SGPA-, "+SL. SGPA); er Output: Entir student name: Payy Manya Entri Student USN: 109283 Enter Marks of subjustit 83 Entro Credits: 8 enter marks of buliquet 2; 78 Entu oudit Enter Marks of Assignts;

Date	
Page	2.0

	(1990
ente credity;	
9	147
Enter Marks of subject 4:	The second
78	
enter bredits:	
7	
Enter marks of sulgers 5:	
8-8	41.
Epous credity:	
8	
Enter marks of subject 6;	
67 magne 57	
Enter Credits:	
7	
Enter Marks of rulyest 7:	The state of the s
78	
Exten Credit :	
7	
Enter marker of muyuts 8:	
78	
Entu Greder:	
7	
Studend name: Phanusa manya	
3 fudent NSN: 109283	
Student SUPA F.62	

```
Enter student name:
manya
Enter Student USN:
109283
Enter marks of subject1:
88
enter credits:
Enter marks of subject2:
78
enter credits:
Enter marks of subject3:
enter credits:
9
Enter marks of subject4:
78
enter credits:
Enter marks of subject5:
88
enter credits:
Enter marks of subjects:
enter credits:
Enter marks of subject7:
78
enter credits:
Enter marks of subject8:
78
enter credits:
Student name: manya
Student usn:109283
```

Student sgpa:7.627118644967797

int n = s. nextint();

Book [] books = new Book[n];

for link i=0; i <n; i++)f system.out. perlottle ("Entry details for Book" +

String System : out . println ("Name: "); String System : out name = s, next();

System .out. print ("Author: ");

String authors s. next(); Syctum.out.point ("Prices: ");

int price . s. not Int ();

System. Out. print ("Number of pages: "):

int numPagus = sinextEnt();

books [i] = nun Book (name, author, porter, numfagus);

System. out. println (" In Details of the books:"):

for (int i=0; icn; it)

Syrum.out. println ("Book"+(i+1)+":\n"+

books (i). tostning());

i) Output: Enter the number of deades: 2 Enter details for Books L Name: loding Author: pp Pria: 998 Number of pages: 260 Enter details for Book a Name: Cooking Author: KP Price: 798 Number of Pages: 300 Details of the books 1: Book L: Book name: Coding Author name: pp Price: 798 Number of page: 260 Book 2; Book name: looking Author name: Ke Price: 798 Number of pages: 300

```
Enter the number of books: 2
Enter details for Book 1
Name:
kumar
Author:
hsqdy
Price:
124
Number of pages:
500
Enter details for Book 2
Name:
345
Author:
lkis
Price:
1234
Number of pages:
7000
Details of the books:
Book 1:
Book name: kumar
Author name: hsgdy
Price: 124
Number of pages: 500
Book 2:
Book name: 345
Author name: lkis
Price: 1234
Number of pages: 7000
```

import java. wil . scanner; class Enput Granner Scannu s = new Scanner (system: in); double getInput (string prompt) & System. out . println (prompt) Tetrorn 6. nextDouble (); 3 abstract class Shape extends Inputscannel double sidel, side2: allstract void areal); class Rectangle entends shape E Rectangle () sidel = getsuput ("Enter leagets of rectorige "); Side 2 = get I rout (" Ender breadth of rectangle: "); void area () dowle area = side 1 + side 2; System. out. printle ("Abrea of Irutangle="+area): class Triangle extends image { Triangle () "Side L = get I neut (" Enter Leux of the triangle: ");
side 2 = get I neut (" Enter height of the triangle: ");

void area () dowle, area = side 1 * side 2 / 2; syllem. out. println (" Aska of the Triangle. "take class circle extends shape h arde () sidel = get input (" Enter the radius of the arcle: "); void areal) double area = Math. PI + side 1 + side 1; System out printles " Area of the circle . 4 + are class main th E public static void main (String Args []) Rectangle rectangle: new Rectangle (); triangle Triangle = new triangle (); circle (ircle = new circle (); reitangle assal); Triungly areals: circle area ();

Date	
Page	

1 Output:

Enter the lingth of restangle: 20
Enter the lineadth of restangle: 40
Enter the height of triangle: 8
Enter the liase of triangle: 6
Enter the radius of circle: 4

Area of the Redanger = 800.0

Nove of the Trianger = 24.0

Nove of the Circle = 50.2654

02/01/24

```
Enter length of rectangle:
20
Enter breadth of rectangle:
40
Enter base of the triangle:
6
Enter height of the triangle:
8
Enter the radius of the circle:
4
Area of the Rectangle =800.0
Area of the circle=50.26548245743669
```

import java . util. Scanner;

class Account 9

private string customerName;
private string accountNumber;
private string accountType;
protected double balance;

public Account (String automurName, String automurNumby

String automurNype, double balance) &

this, austomus Name = austo mer Name;

this. and account Number = account Number.

this. balance - balance;

public void deposit (double amount) & balance + amount;

System out print in (" Amount deposited smurphille current halance; "+ balance);

.

pullic void display Balance () {

System out printle ("Account Type: "+ account Type)
System out printle ("Custome Name: "+ account Type)

System. out. println ("Account Number: " + account Num

System.out. println (" current Balance: "+ balance);

3

	Date Page
	chais Savings Account extends Account A
_	private double interest Rate;
_	
_	public Salangs Account (String outtomer Name, String
	accountNumber, double balance, double interes Rate) {
	super (unto mu Name, account Number, "Sourings", belance);
	this interest Rate = interest Rate;
	3
	public void compute And Deposit (ntwest () h
	double interest = balance + interest Rede /100;
	deposit Lintoust?
	System out point in l'Interest computed and deposited.
	avoient federal: "+ balance);
	3
	public vold mitheram (double amount) &
	if (balance >= amount) &
	balanu -= amount;
	System. out. pointln ("Insufficient junds . withdrawl
	gailed. "); (" Amount withdrawn successfully.
	(current belance: + balance); 3
	else f
	System out private ("Insufficient funds. Withdrawl failed.");
	1
	1
	1 2
	- 3
_	class Coorunt Account extends Account (
_	private Static final double Servict_CHARGE = 250;
	private double minimum Balance;
	pois at downer marriage

public burrent Account (actually Account of String untomerName, String account Number, double balance, double minimumBalance) { this minimum ! super (customer Name, account Number, "current balanu); this, minimumBalance = minimumBalance; 3 public void withdraw (double amount) & if (balance - amount >= minimum Balance) { balance -= amount; System. out. printer l'Amount withdrawn 3 else (" + balance); System out printer (" withdraw failed, Below minimum balance. "): impose Service Charge (); private void impose Service charge () f if (balance < minimum balance) { system. out. println ("Service charge of" + : SERVILE - CHARGE + " imposed. balance = SERVILE CHARGE; 3ystem. OW. println (* Service Charge not Imposed. Balanu is still above the minimum. "); public chars Bank (public static void main (String [Jangs & h Scanner scanner = new Scurner (System in)i

Date	١
Page	

System. out. println("Enter customer name: "); string witomis Name = scanner. newline();

system. out. println (" Enter account number: "); string account Number = scounter-resettine ();

System. out. println (" Enter initial belance: "); double initial Balance = scanny, nort Double ();

Savings Account savings Account = new Savings -Account Coustomy Name, account Number, initial Baland,

7.5);

Constant Account (worth Account = new Worth-Account Coustonius Name, aucuntoumlus, initial Balance, 800)

into choice;

dol

System, out, portalla ("In Select an option: "); 3ystem. out. prirdln ("1. Deposit to savings account"); System. Out, prinkln ("2. Compute and Deposit Interest

for Savings account "); System.out.println("3. withdraw from savings

account ");

System out printeln ("4. Suposit to current Account ") 3 years out printed "5. Withdraw from Current

Account"); System. out. perintled 6. Display Balance ");

System. Out. porintle ("O. Exit");

3 yearn . Out . paintle ("Enter your choice: "); choice = scannel. neutInt();

switch (choice) & System. Out. println ("Enter the amount to deposit to sowings Account : "); double soulness Deposit Amount = Scanner. next Double eavings Account, deposit (savings Deposit Amount); break; case 2: savings Account. Compute And Deposit Interest (); breaks case 3: system. out, println ("Enter the amount of to mithdram from Savings Account: "); doutile savings Withdraw Amourd = Scanner. next Double (); Sawing Account. with draw (savings Withdraw Amount); break; Case 4: bystum.out.pointln("Enter the amount to deposit to cooperat Account: "); double account Deposit Amount = 3 canno. next Bubb 1); Cooperat Account. deposit (cooperat Deposit A mount) beeak; cares: System. Out. priatin (" Enter the amount to withdraw from (worth Aubunt: "); acountalithouseuramount . scannar. nextrouble ()) (wount Account, withdraw (wount N; the draw Amount); water

	Date Page
	can 6:
	System. out, println ("In Savinge Account Details: ");
	savings Account. display Balance (1;
	System. Out. prinkln ("In Civorent Account Details:");
	wount Auount . display Balana ();
	boreak;
	case 0:
	System. out. println ("Exiting the program. Goodbye 1)
	bouak;
	default:
	System. out, printin ("Invalid choice. Please entua
	valid chola ");
	3
	Juhile (choice!=0);
	3
	3
·)	Output:-
	Enter customer name:
	Piyueh
	Enter account number:
	1
	Entu Enrial balance:
	45000
	solut an option:
	1. Deposit to sawings Account
	2. Compute and Dypesik Inturest for Sawings Account

3. With draw from Sawings Account 4. Deposit to current Account 5. Withdraw from World Account 6. Display Balances O. Exit Enter your choice: 2 Amount deposited successfully. Current Balance , 48375.0 Interest computed and deposited. Current Balance: 483750 Selut an option: 1. Deposit to sowings Account 2. Compute and deposit Interest for Savings Account 3. Withdraw from lawings Account. 4. Deposit to Coverent Account 6. Withdraw from Wount Account -6. Dieplay Balance Enter your choice: 3 Ently the amount to withourself from lawings Account: 45000 Amount withdrawn wullfully. Current Balance: 3375.0 Solut an option: 1. Deposit to Sawines Account 2. Compute and apposit Anterest for Savings Account 3. Withdraw from bowings Account 4. Duposit to current August. 5. Withdraw from wovent Account 6. Display Balonu.

O. Pait Enter your choice: 5 CA

Date		
Page		
	-	

Sawings Account Autails:

Account Type: Savings Customer Name: Piyush

Account Number: L

Current Balance: 30375.0

Current Account Details:

Account Type: coverent

automer Name: Prywsh Account Number: L

current Balance: 45000.0

	-WEEK-6 Strings 161011ay
4,	Extracted Substring: Brosce
2.	String L: Hello World!
	String L: Itello World! Kength of String 1:13
	String 2: Java
	String 3: Hello
	String 4: Java!
	String 4: Java! Concated String: Hello Java!
3.	Original string: Hello, tostring!
	string Representation wing to String (): Hello, to String
	The state of the s
5.	Experted Output:
~4	
	Original String: Hellot GetBytel!
	Byte Array: 72, 101 108 108 111 44 32 71 10
	116 66 121 116 101 NS 33
	Original String: Hello, To Chartmay!
	cheracter Array: Ho He I lo , To Enar Array
6.	Brosce equals Brosce -> True
	Emace equals BMSEE - False
	Brisce equal (ollege -> False
	Brosce equalifymre (asi Brosce → True
3.	salutring in matched!

Date	
Page	

8.	
	Does the string start with "Java"? false
q.	Does the string and with 'World' ? true
	Does the string and with 'Java'? false
	V .
10-	using equals (): true, & true
	Using ==: true, false
H.	Sorned Words:
	apple unionila
	ball van
	cat Watch
	dog Xmaj
	ant yetch
	free zee
	gun
	hen
	1a
	jug
	kix
	H
	man
	nut
	Orange
	porot
	quere
	ring
	star bree

12	Sorted Number (10 to 1):
la +	10 9 8 7 6 5 4 3 21
13 -	Modified String: It is a beautiful day. It is
15	and it is the
	This is a test. This is, too.
yr.	
14.	concatinated string: hilloworld
15.	original itting: Welcome to college.
	original string: Welcome to college. modified string: Welcome to commage
16.	Original string: "Hello friend"
	Trimmed string: 'thato Friends'
	V
17.	Enter details for students:
	Registration Number: 101
	Entu name: Piyush
	Semestu: 3°
	CGPA : 8.9
	Enter details for students
	Regulation Number: 102
	Name lan
	hemisty: 3
	CGPA: 7.8
	Eratu oldail for Hudent 3:
	Regulation Number: 103
	Entu nanu: Jay
_	CUPA: 9-3

-	
	Date Page
	Apter settlength (s): Hello
18.	chan At (1): After setchan (1, 'a')
	Halloget chars (0, 5, char Armay, of : Hallo after append:
	Hello world: After Insert (6, "Java");
	Hello, Jana World!
	After reverse: ! dirowavaj, olle 4
	April delete: (3,11): !dlro, o'lleH
	After delete char All (): 2100, 011eH
	After neplace (7,12," world"):
	Hello world Substring (7,12): world
	C soli: Foods Nich Park to the show Early
19.	E agle: Eagle flies high in the skay, Eagle screaters louelly.
	noticulas follows.
	Hawk:
	Hawk soars gracefully through the air,
) 0
20 .	Grde:
	Area = 78, 53981633 97448
	Revimeter . 31. 41592653589783
	Triangle:
	Aorea: 6.0
	Perimetu: 12:0
1	
Air	012024
0161	
_	
_	

	Page Page
1	Exteriols java
-	
	and the same of th
_	smport cie Struct;
	import java. util. scanner;
	public class Externals Extends Students (
	public int marks () = ruw Int (5);
	public void Input marks () {
	Scannul st = new Scannul (System. 10);
	for(int 1 = 0; 1 < 8; in) {
	System, out, privaln ("Egetu sulijut"+(i+1)+
	"marks");
	marks [i] = sc.next[nt())
	3
	4
	V. Committee of the com
	public void display marks () h
	tor(int 1=0: 1<5; 1+1) 2
	System, out, println ("Sulyet" + 61+1) + "make
	System, out println ("Sulged" T 61+1) + "march + march (13);
	7
	3
	3
-	
-	
-	
-	

main, java import de. Student; import ele. intunals; import cle. externals; import java util . Scanner; class Main (public static void main (String args (3) [ind no=2; Extunals final marks () = new. Externals (100); Internals int marks CJ = new Internals (100); for (fint 1=0; 1<100; irt) (final months [1] - new Editmals (); int marks [1] - new Intunals(); final marks (1] * input marks []; ind marks (i). [naut marks (); for (int 1=0;1 < 100; it+) { System , out , printle ("(ie:"); int manus [i] . display manus (); System . Out. privaten ("Set : ") Knal marks [1] display marks (1)

	Date Page
output:	
Enter subject 1 Marks: 30	
Enter subject 2 Marks: 50	
Ente subject 3 Marks: 40	+
Enter subject 4 Marks: 20	1
enon subject 5 Marks: 10	
Enter subject & Marks: 30	
Entu subject 2 Marts: 70	
Estu mulyet 3 Marks: 60	
Enter ruliyut 4 Mantes: 80	
enter rulijut 5 Martis: 90	
100	
cit	
Julijus 1 Marks: 30	
Suget 2 marks: 50	
hubjet 3 Marks: 40	
Julyut 4 Marks: 20	
Julyet 5 Marks: 10	1
SEE .	
Subject 1 Marks: 30	
hotyut a Marks: 70	
subject 3 Marks: 60	
Subject 4 Marks: 80	
bulyed 5 Marst. 90	

-

import java wil . Scarrer; dass Wrong Age extends Runtime Exception (
public Wrong Age () (
super ("Age cannot be negative");
3 public wrong Age (String message) (
super (message); Joseph Mark Description Ling Ave class InputScanne (protected Scanner scanner; public Inputscarrer () { scarrier = new Scarrier (System.in); public int nextent () (return scanner inextint (); class Father extends Inputscancer & protected int Fatherage; puller Father () ? System out printer l'enter father's age: "). father Age = super. newtint ();

```
if (fatherAge (0) &
                throw new wrong Age ( "Age cannot be nego
      son attends Father E
        private int sonAge:
        public Son () {
              supur ();
              System . out. printeln ("Entu Son's age: "):
                son Age = super. Nextent ();
              if (sonAge) fathuAge) f
                thoron new wrong Agel & Son's age connot be
                       greater than father's ages,
             else if (sonAge LO) {
                  throw new wrong Age ("Age cannot be negat
public void display () 5
         supu. display ();
          System out preattr ( 500 % rge: " + son Age);
```

public class Inheritance Exception & public Static void main (String (Jongs) (Son son = new Son (); son. display (); catch (WrongAgue) { System. Out. println ("Exception: " + e. getMasage)) THE WHILE A WARREN WE CA Output: Enter Fathers Age: 50 Enter Fathers Age: 50 Enter pons Age: 55 Enter Son's Age: 45 Exception: Son't Age Fathur's Age: 50 cannot be greated their Son's Age: 45 Fathers Age. enter Father's Age : -45 Exception: Age cannot be regarine

06102124	Week-8
	Creating two threads
	V
	class Display Tweed extends Threads &
	ASSUME SUMMY THORSE
	acivate int interval
	adjusts boolian running = crue
	public Display I willad Lacing manage, in interes
	this message = message
	the. interval = interval;
	3
	public void non () h
	(soignound) (
	System. out. println (musage);
	tru 6
	Thread, steep (mirvae);
	3
	catch (Inturupted Exception) h
	e. printetacktrace ();
	3
	3
	"}
	public void stopThorasel () fi
	runing. galle;
	3
	3
	public class Thouad 24
	public static soid main (String [] augs) {
	Displays wend bout toward = new Display Trough ("Bons college of Engineering"
	Trough ("Bons college of Engentlung"
	1000);

sms tollege of Engineering (se (se (se sms coulde of Engineering (se (se (se (se	bmsThread .start(); CLE Thread .start(); System.out. println (" Press Ende to Mop thread try t System. in. read(); 3 Catch (Prespion e) t e. printStackTrace(); 3 bms.Thread.stopThread(); (seThread.stopThread(); 3 Dutputs:- Bms college of Engineering cse (se (se (se (se (se (se (se	bmsī1	Thread ("cook"
bmsThread .start(); Cut Thread .start(); System.out. println (" Press Ende to Mop three try t System. in. read(); 3 Catch (Exception e) t e. printStackTrace(); 3 bms.Thread.stopThread(); cseThread.stopThread(); 3 utputs:- come college of Engineering cse cse (se (se (se (se (se (se	bmsThread .start(); CLE Thread .start(); System.out. println (" Press Ende to Mop thread try t System. in. read(); 3 Catch (Prespion e) t e. printStackTrace(); 3 bms.Thread.stopThread(); (seThread.stopThread(); 3 Dutputs:- Bms college of Engineering cse (se (se (se (se (se (se (se	bmsī1	
System. Out. println (" Press Ende to Mop three try t System. in. read(); 3 (atch (Exception e) t e. print Stack Trace(); 3 bms. Thread. stop Thread(); (seThread. stop Thread(); 3 utputs:- sms lovege of Engineering (se (se (se (se (se (se (se (s	CLE Thoused . Start(); System. Out. println (" Porus Endu to Mop three try t System. in. read(); 3 Catch (Pruppion e) t e. print Stack Trace(); 3 bms. Thouad. stop Thouad(); (se Thread. stop Thouad(); 3 Dutputs:- Bms. Lollege of Engineering ese (se (se (se (se (se (se (s	acti	130 , 2000);
(attr (PrintStack Trace (); 8. printStack Trace (); 3. bms. Through stop Through (); (seThrough stop Through (); 3. stop Through (); 4. stop Through (); 5. stop Through (); 6. stop Through ()	(atch (Print Stack Trace (); 8. print Stack Trace (); 3 bms. Thouad. stop Thouad (); (se Thread. stop Thouad (); 3 Outputs:- Bons Loveys of Engineering esse (se (se (se (se	88.07233	
(attr (PrintStack Trace (); 8. printStack Trace (); 3. bms. Through stop Through (); (seThrough stop Through (); 3. stop Through (); 4. stop Through (); 5. stop Through (); 6. stop Through ()	(atch (Print Stack Trace (); 8. print Stack Trace (); 3 bms. Thouad. stop Thouad (); (se Thread. stop Thouad (); 3 Outputs:- Bons Loveys of Engineering esse (se (se (se (se	System	out printly (" Pour Enter to Mon Horage
(attr (PrintStack Trace (); 8. printStack Trace (); 3. bms. Through stop Through (); (seThrough stop Through (); 3. stop Through (); 4. stop Through (); 5. stop Through (); 6. stop Through ()	(atch (Print Stack Trace (); 8. print Stack Trace (); 3 bms. Thouad. stop Thouad (); (se Thread. stop Thouad (); 3 Outputs:- Bons Loveys of Engineering esse (se (se (se (se	try t	The state of the s
(attr (PrintStack Trace (); 8. printStack Trace (); 3. bms. Through stop Through (); (seThrough stop Through (); 3. stop Through (); 4. stop Through (); 5. stop Through (); 6. stop Through ()	(atch (Print Stack Trace (); 8. print Stack Trace (); 3 bms. Thouad. stop Thouad (); (se Thread. stop Thouad (); 3 Outputs:- Bons Loveys of Engineering esse (se (se (se (se	0	ystam. in. read();
e. print Stack Trace (); 3 bms. Through stop Through (); set Through of Engineering see (see (se	e. printStack Trace (); 3 bms. Thouad. stop Thouad (); cseThread. stop Thouad (); 3 Putputs:- Bms Lovege of Engineering cse cse cse cse cse	3	O .
bms. Thru ad, stop Thru ad (1); (se Thru ad. stop Thru ad (1); } utput:- sms lovely of Engineering sse (se (se (se (se (se (se (se (se (s	bms. Thruad. Stop Thruad (); cse Thruad. Stop Thruad (); } Outputs:- Bms Loulege of Engineering cse cse cse cse cse	catch	(Exception e) h
bms. Thouad. stop Thouad (1); IseThread. stop Thouad (1); I wiputs:- where covering of Engineering use (se (se (se (se (se (se (se	bms. Thouad. Stop Thouad (1); (se Thouad. Stop Thouad (1); 3 Dutputs:- Bone Loveye of Engineering cse Cse Cse Cse Cse Cse	- K	2. print Stack Trace ();
tsethread stop Thread (1); 3 utputs:- sms tollege of Engineering cse cse cse sms college of Engineering cse cse cse cse cse cse cse	CSETHNEAD. Stop Thread (1); 3 Outputs:- Bons covery of Engineering cse Cse Cse Cse Cse Cse	9	
y utput:- sms todays of Engineering sse (se (se (se (se (se (se (s	Julpus:- Bons coverye of Engineering cse cse cse cse cse		
utput:- sms tollege of Engineering sse cse cse cse sms coulege of Engineering cse cse cse cse	Borns cortage of Engineering CSE CSE CSE CSE	LSET	read. stop Thread (1);
utput:- sms tollege of Engineering sse cse cse cse sms coulege of Engineering cse cse cse cse	Borns cortage of Engineering CSE CSE CSE CSE	ť	
sms tollege of Engineering (se (se (se sms coulde of Engineering (se (se (se (se	BMS Lovege of Engineering CSE CSE CSE CSE	3	
sms tollege of Engineering (se (se (se sms coulde of Engineering (se (se (se (se	BMS Lovege of Engineering CSE CSE CSE CSE	Time Ve	
CSE CSE CSE SMS coulge of Engineering CSE CSE CSE	CSE CSE CSE CSE	utputs:-	
CSE CSE CSE SMS coulge of Engineering CSE CSE CSE	CSE CSE CSE CSE	and talled D	(alm)
CSE CSE CSE SMS coulge of Engineering CSE CSE CSE	(SE (SE (SE	· · · · · · · · · · · · · · · · · · ·	uigi nuoung
CSE USE USE USE USE USE USE USE USE	(SE (SE		
CSE USE BMS coulige of Engineering CSE CSE USE	(s∈ (s∈		
est coulge of Engineering est est	C&€	TO DAYLONG	
BM3 coulge of Engineering CSE CSE	MON-5		
CSE CSE		10/4	Engineering
CSE CSE	C86	/ /	8 8
	CSE		
CIE	CSE	LSE.	
- 0.0	CSE	15	
Bons college of Engineering	Bons college of Engineering	CSE	Engineritag
CSE CSE		-	

20102124	Lak - 9: Guate a new interface to perform integer dis.
	import javax, swing *;
	Import jour out t
	import java aut ;
	import java, aust event:
	elass swing Demo &
	Sucha Pema () h
	J. Frame itim = new straine + wasting)
	jtim. setSize (275, 150);
	Ifom sit hayout (new them regard to
	ifim set Pefault Close Openation (SFrame, Cout-On-as
	Thatel jeals = new Thatel ("Enter the dividus
	ou wdink?
	Tientfield ajtf = new Trentfield (8);
	Jiextfield bjit = new Jiextfield (8);
	JButton kutton = new JButton ("(alculati");
	Thatel err: new Trabel();
	Italiel alab = new Italiel ();
	Thatel bleb - rew Tlabell),
	Thatel onlab - new Italiel();
9	ifrm_add(crr);
	jfrm. add (jlab),
	Jirm. add (ajtf);
	ifrm - add (bit)
	frm. add (Kutton);
	yfor odd (alali);
	trin. add (blat);
	itim. odd (anulei)
	4

	nature of the ham Achon Liebert
_	Action history 1 = new Action history ()/ public void entionPary ormed (Action Event eve) & System. Out, events (18)
-	System. out. println ("Action went from a text
_	little went from a text
_	feld ");
-	3;
+	afth, add Action history (1);
_	bitt add Arthon Wither (1);
+	
+	toutton add Action Listery (new Action listery () &
+	public soid oution Performed (Action Event eve) [
+	try h
+	int a - Indian, pany Int (a) H garier+ ()).
+	int a - Indigu. parse Int (ajtt. geriext ()); int b = Indigu. parseint (bjttf.geriext());
+	int ans = a/b;
+	114 244 - 470)
+	a law. setTent ("In A="ta);
_	blak. setfect ("In B="+67;
	arulah setText ("Inthru = "toru");
1	3
T	catch ! Number Format Exception e) h
	alali. settent ("");
	blak settest ("");
	anulali. setteatt "")
	exc. settenty "Enter only intigues")
	3
	catch (Aritmethic Exceptation ()[
	alali setteatth
+	blob not lest ("");
	and all set feat (**);
-	CIV, set fext (B snowld be NOW xtlo! ");
	- J

Strame . set Visible (True); public static void main (string args 13)h
SuringUtilities. Invoke Latu (nuv Runnalde () h

public void run() f

nuv SuringDemo (); 33: Output:-Enter the dividend & divider: 200 Ans = 100 Calculate 8=2

Week - 10 06/02/24 1PC deus ah booken value set - falses Synchronized int get()? while (!valueSet) 3 catch (Enturupted Exception c) &

System. out. println ("Interrupted Exception raught");)

System. out. print ln (" got: "+n); wait (); ronity (); return no Synchronized void put (intr) { while (value Set) Walt (); 3 catch (interrupted incuption e) h System. out. printle ("Put "+n); class Producer implements Runnable h Producer (Qq) F this. q= q : new Thouged (this, "Producer"). Start ();

	Page Page
Î	public void run () (
Ī	1nti=0;
Ť	rutile (1 <15) L
t	g. put (1+);
t	3
t	3
t	V 11 11 11
t	dass consumer implements Runnable &
t	agi
t	consumer (a g) h
t	thù . q = 9:
t	new Thread Citris, "(onsume "). Start 1)"
t	3
t	quelic void run 1) {
t	toti=0;
t	while (i < 10) &
T	int r-g-get()
Ī	itt;
Ī	3
	3
1	
	class p(fixed) t
	public static void main (String angle (3) h
	a g = new a();
	nuo produux (83;
	nuo consumu (2);
	system. out. println("Poners (ontrol-to stop "); 3
l	3
ļ	11 1 21 1
l	Output: Put:0
	(qot o
-	(40t : 1
	CAME SECTION

401:6 401:4 901:8 Got: d Put:7 Put 19 Put: 5 Put: 3 40t:7 Got: 5 902:9 409:3 Ru.8 Put:10 Put: 6 Put: 4 90t:10 Deadlock : class A & Syndronized void for (86){ string name: Thread, writered Thorrad () get Name (); System. out. println (name + "entered A. foo "); Thread steep (1000): 3 catch (Exception e) t System, out, println("A Interrupted "); 3 Syrum. out. printer (name + "trying tocall Bo. last)") b. Lett (1) } vord lay () { System. out. privala ("Inside A. last"); class Bh synutronized void bar(A a) h String name Thread. workent Thread). get Norm! 5 ystem.out. println (name+ "entired 8. bar") try h Thread. Mup (1800); 3 Latch (Exceptions) & Syram, put, print in ("B Interrupted ");

	Page
	system, out, printle (name + "trying to call A. layl);
	a, last (); 3
-	soid last (1 h
-	System. out. prinkln ("Inside A. Last ");
-	y 0
-	1
	class Deadlock implements Rumable
-	4
	Aa = new A();
	8b = new B();
	Deadlock 1) E
	"Thread, warrent Thread (). set Name ("Male Thread"
	Ihread. + - new Thread (this, "Rawing thread");
	(.stant();
	a. 100 (b);
	system. Out prinkly (" Back in main thread ");
	3
0	Гирин:-
	main thread entired 1.500
	Racing Thread entired B. box
	main-thread trying to call B. last()
	Anside A. Last.
	Ball in main thread
	Racing thread trying to call 1. last ()
	Ineicle A. Last
	Back in other thouad
	1/

401:6 401:4 901:8 Got: d Put:7 Put 19 Put: 5 Put: 3 40t:7 Got: 5 902:9 409:3 Ru.8 Put:10 Put: 6 Put: 4 90t:10 Deadlock : class A & Syndronized void for (86){ string name: Thread, writered Thorrad () get Name (); System. out. println (name + "entered A. foo "); Thread steep (1000): 3 catch (Exception e) t System, out, println("A Interrupted "); 3 Syrum. out. printer (name + "trying tocall Bo. last)") b. Lett (1) } vord lay () { System. out. privala ("Inside A. last"); class Bh synutronized void bar(A a) h String name Thread. workent Thread). get Norm! 5 ystem.out. println (name+ "entired 8. bar") try h Thread. Mup (1800); 3 Latch (Exceptions) & Syram, put, print in ("B Interrupted ");

	Page
	system, out, printle (name + "trying to call A. layl);
	a, last (); 3
-	soid last (1 h
-	System. out. prinkln ("Inside A. Last ");
-	y 0
-	1
	class Deadlock implements Rumable
-	4
	Aa = new A();
	8b = new B();
	Deadlock 1) E
	"Thread, warrent Thread (). set Name ("Male Thread"
	Ihread. + - new Thread (this, "Rawing thread");
	(.stant();
	a. 100 (b);
	system. Out prinkly (" Back in main thread ");
	3
0	Гирин:-
	main thread entired 1.500
	Racing Thread entired B. box
	main-thread trying to call B. last()
	Anside A. Last.
	Ball in main thread
	Racing thread trying to call 1. last ()
	Ineicle A. Last
	Back in other thouad
	1/

2nd lab:

```
import java.util.Scanner;
class subject{
int subjectMarks, credits, grade;}
class Student {
    String name;
    String usn;
    double SGPA;
    Scanner s;
    subject subjects[];
Student()
int i;
subjects = new subject[9];
for(i=0;i<8;i++)
subjects[i] = new subject();
s = new Scanner(System.in);
public void getStudentDetails(){
System.out.println("Enter student name:");
name=s.nextLine();
System.out.println("Enter Student USN:");
usn=s.nextLine();}
public void getMarks(){
int i;
for(i=0;i<8;i++){
System.out.println("Enter marks of subject"+(i+1)+":");
subjects[i].subjectMarks= s.nextInt();
if(subjects[i].subjectMarks>=40&&subjects[i].subjectMarks<=100){
subjects[i].grade=calculateGrade(subjects[i].subjectMarks);}
```

```
else{
System.out.println("Invalid Marks. Marks should be between 40 and 100");}
System.out.println("enter credits:");
subjects[i].credits=s.nextInt();
}
public int calculateGrade(int marks){
if (marks > = 90)
return 10;
else if(marks>=70&&marks<=80)
return 9;
else if(marks>=60&&marks<=70)
return 8;
else if(marks>=50&&marks<=60)
return 7;
else
return 6;
}
public void computeSGPA() {
        int totalscore = 0;
        int totalcred = 0;
        for (int i = 0; i < 8; i++) {
            totalscore += subjects[i].grade * subjects[i].credits;
            totalcred += subjects[i].credits;
        SGPA = (double) totalscore / (double) totalcred;
    }
}
public class Stud{
public static void main(String args[]){
Student c1-now Student().
```

```
public void computeSGPA() {
        int totalscore = 0;
        int totalcred = 0;
        for (int i = 0; i < 8; i++) {
            totalscore += subjects[i].grade * subjects[i].credits;
            totalcred += subjects[i].credits;
        SGPA = (double) totalscore / (double) totalcred;
   }
}
public class Stud{
public static void main(String args[]){
Student s1=new Student();
s1.getStudentDetails();
s1.getMarks();
s1.computeSGPA();
System.out.println("Student name:"+s1.name);
System.out.println("Student usn:"+s1.usn);
System.out.println("Student sgpa:"+s1.SGPA);}
}
```

3rd code:

```
+ "Price: " + this.price + "\n"
         + "Number of pages: " + this.numPages + "\n";
    return bookDetails;
 }
public class Main {
  public static void main(String args[]) {
    Scanner s = new Scanner(System.in);
    System.out.print("Enter the number of books: ");
    int n = s.nextInt();
    Book[] books = new Book[n];
    for (int i = 0; i < n; i++) {
       System.out.println("Enter details for Book " + (i + 1));
       System.out.println("Name: ");
       String name = s.next();
       System.out.println("Author: ");
       String author = s.next();
       System.out.println("Price: ");
       int price = s.nextInt();
       System.out.println("Number of pages: ");
       int numPages = s.nextInt();
      // Create a new Book object with the entered details
       books[i] = new Book(name, author, price, numPages);
    }
    System.out.println("\nDetails of the books:");
    for (int i = 0; i < n; i++) {
       System.out.println("Book" + (i + 1) + ": n" + books[i].toString());
    }
  }
4<sup>th</sup> code:
import java.util.Scanner;
class InputScanner
{
  Scanner s = new Scanner(System.in);
```

```
double getInput (String prompt){
    System.out.println(prompt);
    return s.nextDouble();
  }
}
abstract class Shape extends InputScanner{
  double side1.side2;
  abstract void area();
}
class Rectangle extends Shape{
  Rectangle()
  {
    side_1=getInput("Enter length of rectangle");
    side_2=getInput("Enter breadth of rectangle");
  }
  void area()
    double area = side_1*side_2;
    System.out.println("Area of rectangle = "+area);
  }
}
class Triangle extends Shape{
  Triangle()
  {
    side_1=getInput("Enter Base of Triangle");
    side_2=getInput("Enter Height of Triangle");
  }
  void area()
```

```
{
    double area = side_1*side_2/2;
    System.out.println("Area of Triangle = "+area);
  }
}
class Circle extends Shape{
  Circle()
  {
    side_1=getInput("Enter the radius of the circle: ");
  }
  void area()
  {
    double area=Math.pi*side_1*side_1;
    System.out.println("Area of the circe = "+area);
  }
}
class main1{
  public static void main (String args[]){
    Rectangle rectangle = new Rectangle();
    Triangle triangle = new Triangle();
    Circle circle = new Circle();
    rectangle.area();
    triangle.area();
    circle.area();
  }
}
```

5th code:

```
import java.util.Scanner;
class Account {
  String customerName;
  long accountNumber;
  String accountType;
  double balance;
  public Account(String customerName, long accountNumber, String accountType, double balance) {
    this.customerName = customerName;
    this.accountNumber = accountNumber;
    this.accountType = accountType;
    this.balance = balance;
  }
  public void deposit(double amount) {
    balance += amount;
    System.out.println("Deposit of $" + amount + " successful. Updated balance: $" + balance);
  }
  public void displayBalance() {
    System.out.println("Account Balance: $" + balance);
  }
}
class CurAccount extends Account {
  double minBalance;
  double serviceCharge;
```

```
public CurAccount(String customerName, long accountNumber, double balance, double minBalance,
double serviceCharge) {
    super(customerName, accountNumber, "Current", balance);
    this.minBalance = minBalance;
    this.serviceCharge = serviceCharge;
  }
  public void checkMinBalance() {
    if (balance < minBalance) {</pre>
      balance -= serviceCharge;
      System.out.println("Minimum balance not maintained. Service charge of $" + serviceCharge + "
imposed.");
      displayBalance();
    }
  }
  public void withdraw(double amount) {
    if (amount > balance) {
      System.out.println("Insufficient funds. Withdrawal failed.");
    } else {
      balance -= amount;
      System.out.println("Withdrawal of $" + amount + " successful. Updated balance: $" + balance);
      checkMinBalance();
    }
  }
}
class SavAccount extends Account {
  double interestRate;
```

```
public SavAccount(String customerName, long accountNumber, double balance, double interestRate) {
    super(customerName, accountNumber, "Savings", balance);
    this.interestRate = interestRate;
  }
  public void computeInterest() {
    double interest = balance * (interestRate / 100);
    balance += interest;
    System.out.println("Interest computed and deposited: $" + interest);
    displayBalance();
  }
  public void withdraw(double amount) {
    if (amount > balance) {
      System.out.println("Insufficient funds. Withdrawal failed.");
    } else {
      balance -= amount;
      System.out.println("Withdrawal of $" + amount + " successful. Updated balance: $" + balance);
    }
  }
}
public class Bank {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    CurAccount currentAccount = new CurAccount("John Doe", 123456789, 1000, 500, 10);
    SavAccount savingsAccount = new SavAccount("Jane Doe", 987654321, 2000, 5);
```

```
int choice;
do {
  System.out.println("\nSelect an option:");
  System.out.println("1. Deposit");
  System.out.println("2. Display Balance");
  System.out.println("3. Compute Interest (Savings Account only)");
  System.out.println("4. Withdraw");
  System.out.println("5. Exit");
  System.out.print("Enter your choice: ");
  choice = scanner.nextInt();
  switch (choice) {
    case 1:
      System.out.print("Enter amount to deposit: ");
      double depositAmount = scanner.nextDouble();
      System.out.print("Select account (1. Current, 2. Savings): ");
      int accountType = scanner.nextInt();
      if (accountType == 1) {
        currentAccount.deposit(depositAmount);
      } else if (accountType == 2) {
        savingsAccount.deposit(depositAmount);
      } else {
        System.out.println("Invalid account type.");
      }
      break;
    case 2:
      System.out.print("Select account (1. Current, 2. Savings): ");
      int accType = scanner.nextInt();
```

```
if (accType == 1) {
    currentAccount.displayBalance();
 } else if (accType == 2) {
    savingsAccount.displayBalance();
 } else {
    System.out.println("Invalid account type.");
 }
 break;
case 3:
 if (savingsAccount instanceof SavAccount) {
    ((SavAccount) savingsAccount).computeInterest();
 } else {
    System.out.println("Invalid option for current account.");
 }
 break;
case 4:
 System.out.print("Enter amount to withdraw: ");
  double withdrawAmount = scanner.nextDouble();
 System.out.print("Select account (1. Current, 2. Savings): ");
 int accTyp = scanner.nextInt();
 if (accTyp == 1) {
    currentAccount.withdraw(withdrawAmount);
 } else if (accTyp == 2) {
    savingsAccount.withdraw(withdrawAmount);
 } else {
    System.out.println("Invalid account type.");
 }
 break;
case 5:
```

```
System.out.println("Exiting the program. Thank you!");
           break;
         default:
           System.out.println("Invalid choice. Please enter a valid option.");
       }
    } while (choice != 5);
    scanner.close();
  }
}
6<sup>th</sup> code:
1.
public class StringConstructorDemo {
        public static void main(String[] args) {
        String str1 = "Hello, World!"
        System.out.println("String created using a string literal: " + str1);
        }
}
public class StringConstructorDemo {
        public static void main(String[] args) {
                 char[] charArray = {'H', 'e', 'l', 'l', 'o'};
                 String str2 = new String(charArray);
                 System.out.println("String created using the new keyword and char array: " + str2);
        }
}
public class StringConstructorDemo {
        public static void main(String[] args) {
                 byte[] byteArray = {72, 101, 108, 108, 111};
```

```
String str3 = new String(byteArray);
                System.out.println("String created using getBytes method: " + str3);
}
public class StringConstructorDemo {
        public static void main(String[] args) {
                StringBuilder stringBuilder = new StringBuilder("Java");
                String str4 = new String(stringBuilder);
                System.out.println("String created using StringBuilder: " + str4);
        }
}
2.
public class StringDemo {
        public static void main(String[] args) {
        String exampleString = "Hello, World!"
        int length = exampleString.length();
        System.out.println("String Length: " + length);
        String stringLiteral1 = "Java"
        String stringLiteral2 = "Java" // Reusing the string literal
        System.out.println("String Literal 1: " + stringLiteral1);
        System.out.println("String Literal 2: " + stringLiteral2);
        System.out.println("Are String Literals Equal?" + (stringLiteral1 == stringLiteral2));
        String firstName = "John"
        String lastName = "Doe"
        String fullName = firstName + " " + lastName;
        System.out.println("Concatenated String: " + fullName);
        }
}
3.
```

```
class Person {
        private String name;
        private int age;
        public Person(String name, int age) {
        this.name = name;
        this.age = age;
}
@Override
public String toString() {
                return "Person{name='" + name + "', age=" + age + '}';
        }
}
public class ToStringDemo {
        public static void main(String[] args) {
                Person person = new Person("John Doe", 25);
                System.out.println(person); // Output: Person{name='John Doe', age=25}
        }
}
4.
public class SubstringExtraction {
        public static void main(String[] args) {
                String originalString = "Welcome to Bmsce college"
                char[] extractedChars = new char[5];
                originalString.getChars(11, 16, extractedChars, 0);
                String extractedString = new String(extractedChars);
                System.out.println("Extracted Substring: " + extractedString);
        }
}
```

```
5.
public class GetBytesDemo {
        public static void main(String[] args) {
                String originalString = "Hello, World!"
                byte[] byteArray = originalString.getBytes();
                System.out.println("Byte Array: " + byteArray);
                System.out.print("Bytes: ");
                for (byte b : byteArray) {
                         System.out.print(b + " ");
                }
        }
}
public class ToCharArrayDemo {
        public static void main(String[] args) {
                String originalString = "Java Programming"
                char[] charArray = originalString.toCharArray();
                System.out.println("Char Array: " + charArray);
                System.out.print("Chars: ");
                for (char c : charArray) {
                        System.out.print(c + " ");
                }
        }
}
6.
public class StringComparison {
        public static void main(String[] args) {String str1 = "Bmsce"
        String str2 = "College"
        String str3 = "BMSCE"
        System.out.println("Using equals(): Bmsce equals Bmsce -> " + str1.equals("Bmsce"));
```

```
System.out.println("Using equals(): Bmsce equals College -> " + str1.equals(str2));
        System.out.println("Using equals(): Bmsce equals BMSCE -> " + str1.equals(str3));
        System.out.println("Using equalsIgnoreCase(): Bmsce equalsIgnoreCase BMSCE -> " +
        str1.equalsIgnoreCase(str3));
}
7.
public class RegionMatchesExample {
        public static void main(String[] args) {
                String mainString = "Welcome to Bmsce College of Engineering"
                String subString = "Bmsce College"
                boolean isMatched = mainString.regionMatches(11, subString, 0, subString.length());
                if (isMatched) {
                        System.out.println("Substring is matched.");
                } else {
                        System.out.println("Substring is not matched.");
                }
        }
}
8.
public class StartsWithExample {
        public static void main(String[] args) {
                String mainString = "Hello, World!"
                boolean startsWithHello = mainString.startsWith("Hello");
                boolean startsWithJava = mainString.startsWith("Java");
                System.out.println("Starts with 'Hello': " + startsWithHello); // Should be true
                System.out.println("Starts with 'Java': " + startsWithJava); // Should be false
        }
}
```

```
9.
public class EndsWithExample {
        public static void main(String[] args) {
                String mainString = "Hello, World!"
                boolean endsWithWorld = mainString.endsWith("World!");
                boolean endsWithJava = mainString.endsWith("Java");
                System.out.println("Ends with 'World!': " + endsWithWorld); // Should be true
                System.out.println("Ends with 'Java': " + endsWithJava); // Should be false
        }
}
10.
public class EqualsVsDoubleEquals {
        public static void main(String[] args) {
                String str1 = "Hello"
                String str2 = "Hello"
                String str3 = new String("Hello");
                boolean equalsResult1 = str1.equals(str2); // true
                boolean equalsResult2 = str1.equals(str3); // true
                boolean doubleEqualsResult1 = (str1 == str2); // true (due to string pooling)
                boolean doubleEqualsResult2 = (str1 == str3); // false (different objects)
                System.out.println("Using equals(): " + equalsResult1 + ", " + equalsResult2);
                System.out.println("Using ==: " + doubleEqualsResult1 + ", " + doubleEqualsResult2);
        }
}
11.
import java.util.Arrays;
public class AlphabeticalSorting {
```

```
public static void main(String[] args) {
                String[] words = {"van", "watch", "ball", "cat", "xmas", "yatch", "zee", "apple", "ice",
                "jug", "kite", "lift", "man", "net", "orange", "dog", "ent", "free", "gun", "hen", "parrot",
                 "queen", "ring", "star", "tree", "umbrella"};
                 System.out.println("Original Array: " + Arrays.toString(words));
                System.out.println("Sorted Array: " + Arrays.toString(words));
        }
}
12.
import java.util.Arrays;
public class NumberSorting {
        public static void main(String[] args) {
                String[] numbers = {"10", "9", "8", "7", "6", "5", "4", "3", "2", "1"};
                Arrays.sort(numbers);
                System.out.println("Sorted Numbers:");
                for (String number: numbers) {
                         System.out.println(number);
                }
        }
}
13.
public class StringReplaceExample {
        public static void main(String[] args) {
                String originalString = "Thwas was a test. Thwas was, too."
                String targetSubstring = "was"
                String replacementString = "is"
                int index = originalString.indexOf(targetSubstring);
```

```
StringBuilder result = new StringBuilder();
                while (index != -1) {
                result.append(originalString.substring(0, index));
                result.append(replacementString);
                index += targetSubstring.length();
                originalString = originalString.substring(index);
                index = originalString.indexOf(targetSubstring);
        }
                result.append(originalString);
                System.out.println("Original String: " + originalString);
                System.out.println("After Replacement: " + result.toString());
        }
}
14.
public class StringConcatenationDemo {
        public static void main(String[] args) {
                String s1 = "hello";
                String s2 = "world"; //
                String result = s1.concat(s2);
                 System.out.println("Concatenated String: " + result); } }
15.
public class StringReplaceDemo {
  public static void main(String[] args) {
    String originalString = "Welcome to College";
    String modifiedString = originalString.replace("College", "Commege");
    System.out.println("Original String: " + originalString);
    System.out.println("Modified String: " + modifiedString);
```

```
}
16.
public class StringTrimDemo {
  public static void main(String[] args) {
    String originalString = "Hello Friends";
    String trimmedString = originalString.trim();
    System.out.println("Original String: "" + originalString + """);
    System.out.println("Trimmed String: "" + trimmedString + """);
  }
}
17.
import java.util.Arrays;
import java.util.Comparator;
import java.util.Scanner;
class Student {
  private int registrationNumber;
  private String fullName;
  private short semester;
  private float cgpa;
  public Student() {
  public Student(int registrationNumber, String fullName, short semester, float cgpa) {
    this.registrationNumber = registrationNumber;
    this.fullName = fullName;
```

```
this.semester = semester;
  this.cgpa = cgpa;
} public void display() {
  System.out.println ("Registration Number:" + registration Number);\\
  System.out.println("Full Name: " + fullName);
  System.out.println("Semester: " + semester);
  System.out.println("CGPA: " + cgpa);
  System.out.println("-----");
}
public int getRegistrationNumber() {
  return registrationNumber;
}
public String getFullName() {
  return fullName;
public short getSemester() {
  return semester;
}
public float getCgpa() {
  return cgpa;
}
public static void main(String[] args) {
  Scanner scanner = new Scanner(System.in);
  Student[] students = new Student[5];
  for (int i = 0; i < 5; i++) {
    System.out.println("Enter details for student " + (i + 1) + ":");
```

```
System.out.print("Registration Number: ");
    int regNumber = scanner.nextInt();
    scanner.nextLine(); // Consume newline
    System.out.print("Full Name: ");
    String name = scanner.nextLine();
    System.out.print("Semester: ");
    short semester = scanner.nextShort();
    System.out.print("CGPA: ");
    float cgpa = scanner.nextFloat();
    students[i] = new Student(regNumber, name, semester, cgpa);
  }
  System.out.println("\nStudent Records:");
  for (Student student : students) {
    student.display();
  }
  sortByCGPA(students);
  System.out.println("\nStudent Records (Sorted by CGPA):");
  for (Student student : students) {
    student.display();
  }
  sortByName(students);
  System.out.println("\nStudent Records (Sorted by Name):");
  for (Student student : students) {
    student.display();
  }
private static void sortByCGPA(Student[] students) {
  Arrays.sort(students, Comparator.comparingDouble(Student::getCgpa).reversed());
```

}

```
}
  private static void sortByName(Student[] students) {
    Arrays.sort(students, Comparator.comparing(Student::getFullName));
  }
}
18.
public class StringBufferDemo {
  public static void main(String[] args) {
    StringBuffer stringBuffer = new StringBuffer("Hello, World!");
    stringBuffer.setLength(5);
    System.out.println("After setLength(5): " + stringBuffer);
    char charAtIndex = stringBuffer.charAt(1);
    System.out.println("charAt(1): " + charAtIndex);
    stringBuffer.setCharAt(1, 'a');
    System.out.println("After setCharAt(1, 'a'): " + stringBuffer);
    char[] charArray = new char[5];
    stringBuffer.getChars(0, 5, charArray, 0);
    System.out.println("getChars(0, 5, charArray, 0): " + new String(charArray));
  }
}
public class StringBufferDemo2 {
  public static void main(String[] args) {
    StringBuffer stringBuffer = new StringBuffer("Hello");
    stringBuffer.append("World!");
    System.out.println("After append: " + stringBuffer);
    stringBuffer.insert(6, ", Java");
    System.out.println("After insert(6, \", Java\"): " + stringBuffer);
    stringBuffer.reverse();
    System.out.println("After reverse: " + stringBuffer);
```

```
stringBuffer.delete(5, 11);
    System.out.println("After delete(5, 11): " + stringBuffer);
    stringBuffer.deleteCharAt(1);
    System.out.println("After deleteCharAt(1): " + stringBuffer);
  }
}public class StringBufferDemo3 { public static void main(String[] args) { StringBuffer stringBuffer = new
StringBuffer("Hello, Java!"); // replace() method stringBuffer.replace(7, 12, "World");
System.out.println("After replace(7, 12, \"World\"): "
19.
abstract class Bird {
  public abstract void fly();
  public abstract void makeSound();
}
class Eagle extends Bird {
  @Override
  public void fly() {
    System.out.println("Eagle flies high in the sky.");
  }
  @Override
  public void makeSound() {
    System.out.println("Eagle screeches loudly.");
  }
}
class Hawk extends Bird {
  @Override
  public void fly() {
    System.out.println("Hawk soars gracefully through the air.");
  }
```

```
@Override
  public void makeSound() {
    System.out.println("Hawk emits a piercing cry.");
  }
}
public class BirdTest {
  public static void main(String[] args) {
    // Create instances of Eagle and Hawk
    Eagle eagle = new Eagle();
    Hawk hawk = new Hawk();
    System.out.println("Eagle:");
    eagle.fly();
    eagle.makeSound();
    System.out.println();
    System.out.println("Hawk:");
    hawk.fly();
    hawk.makeSound();
  }
}
20.
abstract class Shape {
  public abstract double calculateArea();
  public abstract double calculatePerimeter();
}
class Circle extends Shape {
  private double radius;
  public Circle(double radius) {
    this.radius = radius;
```

```
}
  @Override
  public double calculateArea() {
    return Math.PI * radius * radius;
  }
  @Override
  public double calculatePerimeter() {
    return 2 * Math.PI * radius;
  }
}
class Triangle extends Shape {
  private double side1, side2, side3;
  public Triangle(double side1, double side2, double side3) {
    this.side1 = side1;
    this.side2 = side2;
    this.side3 = side3;
  }
  @Override
  public double calculateArea() {
triangle
    double s = (side1 + side2 + side3) / 2.0;
    return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
  }
  @Override
  public double calculatePerimeter() {
    return side1 + side2 + side3;
```

```
}
}
public class ShapeTest {
  public static void main(String[] args) {
    // Create instances of Circle and Triangle
    Circle circle = new Circle(5.0);
     Triangle triangle = new Triangle(3.0, 4.0, 5.0);
for Circle
     System.out.println("Circle:");
     System.out.println("Area: " + circle.calculateArea());
    System.out.println("Perimeter: " + circle.calculatePerimeter());
     System.out.println();
for Triangle
     System.out.println("Triangle:");
     System.out.println("Area: " + triangle.calculateArea());
    System.out.println("Perimeter: " + triangle.calculatePerimeter());
  }
}
7<sup>th</sup> code:
package CIE;
public class Internals {
  private int[] internalMarks = new int[5];
  public Internals() {
  }
```

```
public void setInternalMarks(int[] internalMarks) {
    this.internalMarks = internalMarks;
  }
  public int[] getInternalMarks() {
    return internalMarks;
  }
}
package CIE;
public class Student {
  public String usn;
  public String name;
  public int sem;
  public Student() {
    this("", "", 0);
  }
  public Student(String usn, String name, int sem) {
    this.usn = usn;
    this.name = name;
    this.sem = sem;
```

```
}
public void setUsn(String usn) {
  this.usn = usn;
}
public void setName(String name) {
  this.name = name;
}
public void setSem(int sem) {
  this.sem = sem;
}
public String getUsn() {
  return usn;
}
public String getName() {
  return name;
}
public int getSem() {
  return sem;
}
```

}

```
package SEE;
import CIE.Student;
public class External extends Student {
  public int[] seeMarks = new int[5];
public External() {
    this("", "", 0, new int[5]);
  }
 public External(String usn, String name, int sem, int[] seeMarks) {
    super(usn, name, sem);
    this.seeMarks = seeMarks;
  }
public void setSeeMarks(int[] seeMarks) {
    this.seeMarks = seeMarks;
  }
public int[] getSeeMarks() {
    return seeMarks;
  }
}
import CIE.Student;
import CIE.Internals;
import SEE.External;
import java.util.Scanner;
public class FinalMarks {
  public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);
    // Allow the user to enter the number of students
```

```
System.out.print("Enter the number of students: ");
    int n = scanner.nextInt();
    Student[] students = new Student[n];
    Internals[] internals = new Internals[n];
    External[] externals = new External[n];
    // Initialize students, internals, and externals
    for (int i = 0; i < n; i++) {
      students[i] = new Student();
      System.out.print("Enter USN for student " + (i + 1) + ": ");
       students[i].setUsn(scanner.next());
      System.out.print("Enter name for student " + (i + 1) + ": ");
       students[i].setName(scanner.next());
      System.out.print("Enter semester for student " + (i + 1) + ": ");
       students[i].setSem(scanner.nextInt());
       internals[i] = new Internals();
      // Assuming a simple method to input internal marks with validation
       internals[i].setInternalMarks(inputMarksWithValidation("internal", i, scanner, 0, 50));
      externals[i] = new External(students[i].getUsn(), students[i].getName(), students[i].getSem(), new
int[5]);
      // Assuming a simple method to input external marks with validation
      externals[i].setSeeMarks(inputMarksWithValidation("external", i, scanner, 0, 100));
      // Calculate final marks for the ith student and display
```

```
int[] finalMarks = new int[5];
       for (int j = 0; j < 5; j++) {
         finalMarks[j] = internals[i].getInternalMarks()[j] + externals[i].getSeeMarks()[j] / 2;
      }
       System.out.println("Student " + (i + 1) + " Final Marks: " +
           finalMarks[0] + ", " + finalMarks[1] + ", " + finalMarks[2] + ", " +
           finalMarks[3] + ", " + finalMarks[4]);
    }
    scanner.close();
  }
  private static int[] inputMarksWithValidation(String type, int studentIndex, Scanner scanner, int min,
int max) {
    int[] marks = new int[5];
    System.out.println("Enter " + type + " marks for student " + (studentIndex + 1) + ": ");
    for (int i = 0; i < 5; i++) {
      int mark;
       do {
         System.out.print("Subject " + (i + 1) + ": ");
         mark = scanner.nextInt();
         if (mark < 0 | | mark > max) {
           System.out.println("Invalid input. " + type + " marks should be between 0 and " + max + ".
Please try again.");
         }
      } while (mark < 0 || mark > max);
       marks[i] = mark;
    }
```

```
return marks;
  }
}
8<sup>th</sup> code:
import java.util.Scanner;
class WrongAge extends Exception{
WrongAge(String error){
System.out.println(error);
}
}
class Father{
int age;
Father(int age) throws WrongAge{
if(age<0)
throw new WrongAge("Father's age cannot be negative");
this.age=age;
}
}
class Son extends Father{
int age;
Son(int age,int s_age) throws WrongAge{
super(age);
if(s_age>=age)
throw new WrongAge("Son'age cannot be greater than Father's age");
this.age=s_age;
}
```

```
}
class LabQ7{
public static void main(String args[]){
Scanner sc=new Scanner(System.in);
try{
System.out.println("Enter the Father's age:");
int f_age=sc.nextInt();
System.out.println("Enter the Son's age:");
int s_age=sc.nextInt();
Son a=new Son(f_age,s_age);
System.out.println("Father's age:"+f_age);
System.out.println("Son's age:"+s_age);
}
catch(WrongAge e){
System.out.println("Wrong Age entered");}
catch(Exception ee){
System.out.println("Unexpected error:"+ee);}
}
}
8<sup>th</sup> code (Threads):
class DisplayThread extends Thread {
  private String message;
  private int interval;
  private boolean running = true;
  public DisplayThread(String message, int interval) {
    this.message = message;
    this.interval = interval;
```

```
}
  public void run() {
    while (running) {
      System.out.println(message);
      try {
        Thread.sleep(interval);
      } catch (InterruptedException e) {
        e.printStackTrace();
      }
  }
  public void stopThread() {
    running = false;
  }
}
public class ThreadExample {
  public static void main(String[] args) {
    DisplayThread bmsThread = new DisplayThread("BMS College of Engineering", 10000);
    DisplayThread cseThread = new DisplayThread("CSE", 2000);
    bmsThread.start();
    cseThread.start();
    System.out.println("Press Enter to stop the threads...");
    try {
      System.in.read();
    } catch (Exception e) {
      e.printStackTrace();
    }
    bmsThread.stopThread();
    cseThread.stopThread();
```

```
}
}
9<sup>th</sup> code:
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
  SwingDemo(){
    // create jframe container
    JFrame jfrm = new JFrame("Divider App");
    jfrm.setSize(275, 150);
    jfrm.setLayout(new FlowLayout());
    // to terminate on close
    jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    // text label
    JLabel jlab = new JLabel("Enter the divider and divident:");
    // add text field for both numbers
    JTextField ajtf = new JTextField(8);
    JTextField bjtf = new JTextField(8);
    // calc button
    JButton button = new JButton("Calculate");
    // labels
    JLabel err = new JLabel();
    JLabel alab = new JLabel();
```

```
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
// add in order :)
jfrm.add(err); // to display error bois
jfrm.add(jlab);
jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
jfrm.add(alab);
jfrm.add(blab);
jfrm.add(anslab);
ActionListener I = new ActionListener() {
  public void actionPerformed(ActionEvent evt) {
    System.out.println("Action event from a text field");
  }
};
ajtf.addActionListener(I);
bjtf.addActionListener(I);
button.addActionListener(new ActionListener() {
  public void actionPerformed(ActionEvent evt) {
    try{
      int a = Integer.parseInt(ajtf.getText());
      int b = Integer.parseInt(bjtf.getText());
      int ans = a/b;
```

```
alab.setText("\nA = " + a);
       blab.setText("\nB = " + b);
       anslab.setText("\nAns = "+ ans);
     }
     catch(NumberFormatException e){
       alab.setText("");
       blab.setText("");
       anslab.setText("");
       err.setText("Enter Only Integers!");
     }
     catch(ArithmeticException e){
       alab.setText("");
       blab.setText("");
       anslab.setText("");
       err.setText("B should be NON zero!");
     }
   }
 });
 // display frame
 jfrm.setVisible(true);
}
public static void main(String args[]){
 // create frame on event dispatching thread
 SwingUtilities.invokeLater(new Runnable(){
   public void run(){
     new SwingDemo();
```

```
}
    });
  }
}
10<sup>th</sup> code:
class Q {
  int n;
  boolean valueSet = false;
  synchronized int get() {
    while (!valueSet)
      try {
         wait();
       } catch (InterruptedException e) {
         System.out.println("InterruptedException caught");
      }
    System.out.println("Got: " + n);
    valueSet = false;
    notify();
    return n;
  }
  synchronized void put(int n) {
    while (valueSet)
      try {
         wait();
      } catch (InterruptedException e) {
```

System.out.println("InterruptedException caught");

```
}
    this.n = n;
    valueSet = true;
    System.out.println("Put: " + n);
    notify();
  }
}
class Producer implements Runnable {
  Qq;
  Producer(Q q) {
    this.q = q;
    new Thread(this, "Producer").start();
  }
  public void run() {
    int i = 0;
    while (i < 15) {
      q.put(i++);
    }
 }
}
class Consumer implements Runnable {
  Qq;
  Consumer(Q q) {
    this.q = q;
```

```
new Thread(this, "Consumer").start();
  }
  public void run() {
    int i = 0;
    while (i < 15) {
      int r = q.get();
      i++;
    }
  }
}
class PCFixed {
  public static void main(String args[]) {
    Q q = new Q();
    new Producer(q);
    new Consumer(q);
    System.out.println("Press Control-C to stop.");
  }
}
10<sup>th</sup> code (DEADLOCK):
class A {
  synchronized void foo(B b) {
    String name = Thread.currentThread().getName();
    System.out.println(name + " entered A.foo");
    try {
      Thread.sleep(1000);
```

```
} catch (Exception e) {
      System.out.println("A Interrupted");
    }
    System.out.println(name + " trying to call B.last()");
    b.last();
  }
  void last() {
    System.out.println("Inside A.last");
  }
}
class B {
  synchronized void bar(A a) {
    String name = Thread.currentThread().getName();
    System.out.println(name + " entered B.bar");
    try {
      Thread.sleep(1000);
    } catch (Exception e) {
      System.out.println("B Interrupted");
    }
    System.out.println(name + " trying to call A.last()");
    a.last();
  }
  void last() {
    System.out.println("Inside B.last");
  }
}
```

```
class Deadlock implements Runnable {
  A a = new A();
  Bb = new B();
  Deadlock() {
    Thread.currentThread().setName("MainThread");
    Thread t = new Thread(this, "RacingThread");
    t.start();
    a.foo(b); // get lock on a in this thread.
    System.out.println("Back in main thread");
  }
  public void run() {
    b.bar(a); // get lock on b in other thread
    System.out.println("Back in other thread");
  }
  public static void main(String args[]) {
    new Deadlock();
  }
}
```