Laboratory Exercises

Course Name : **Object Oriented Programming Laboratory.**
Course Code : 11UCSL404
Max Marks :50 Credits: 2 Semesters: 4th

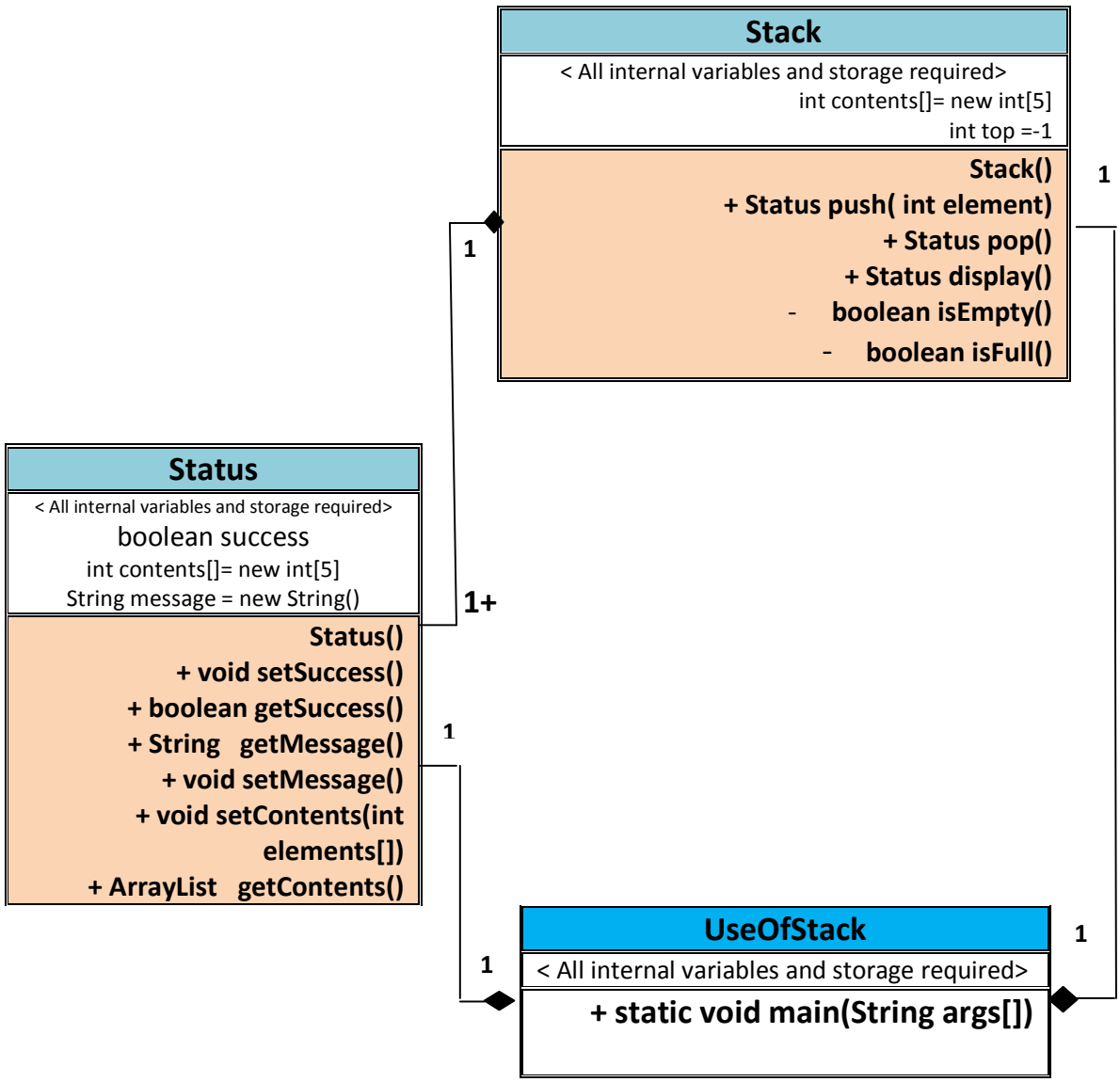
Term Work No.	Description of the term work and expected learning
Cycle-1 T1	Cooperative Bank started by retired government employees' association, wish to automate its banking operations. In order to understand better about the benefits of computer automation, it wishes to automate only one account to begin with and its associated transactions. The various operations performed on account are as follows: **Credit:** Allows the user to credit amount. Minimum amount to be credited is Rs 100 and is multiple of ten rupees. If credit is successful then it signals it by sending 1 to calling routine and 0 if fails. **Withdrawl:** Allows the user to debit amount. Minimum amount to be debited is 100 and is multiple of ten rupees, subject to the condition that, the balance after debit must be at least 2000 rupees. If credit is successful then it signals it by sending 1 to calling routine and 0 if fails. **Balance:** Allows the user to know the balance. It returns the balance amount in the account. **Note:** Customers are allowed to open an account with minimum credit amount of Rs 5000. a) Design the required system using appropriate design tool. b) Implement the system in Java language. (Text based menu driven system) c) Develop the test cases to test all required features. **Expected Learning:** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand and apply** exception handling in construction of robust system.

Cycle-1 T2	Extend the system given in Sl.No-1 to accommodate 100 accounts. a) Design the required system using appropriate design tool. b) Implement the system in Java language. (Text based menu driven system) c) Develop the test cases to test all required features. **Expected Learning:** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand and apply** exception handling in construction of robust system. 5. **Understand** the change request and **provide** features extensions to the existing system. 6. **Use** built in classes like Arrays/ Vectors and enumeration in system development.
Cycle-1 T3	Every employee (Teacher) of SDMCET is given employee IDs and they must possess contact number required to contact in case of emergency. There are two types of teachers and are termed as "**Regular Teachers**" and "**Contract Teachers**". Regular teachers get their salary fixed at 1.5 lakhs per month and will be revised once in two years. Contract teachers get their salary at the rate of 1000 rupees per day they work. They are given an extra privilege of handling tutorial classes for maximum two courses. They get extra remuneration of Rs 500 per hour for tutorial. These extra earnings will be added to their normal salary to declare it as gross salary. **Expected Learning:** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand and apply** OO concepts like: abstract class, inheritance and composite objects in solving problems.

Cycle-1

T4

It is required to implement the standard data structure- STACK in object Oriented Paradigm. The concept stack to be implemented is as shown below.



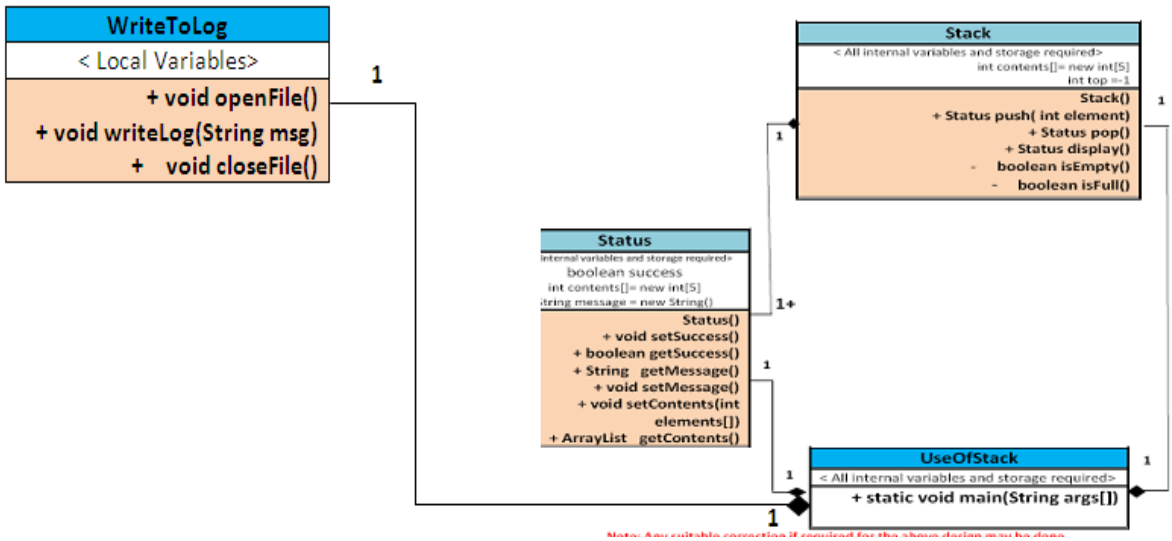
Note: Any suitable correction if required for the above design may be done.

The class Stack is reusable component. All its services takes parameter and return Status object with appropriate values set in it. Stack services does not print or interact with user directly.

Status object has two parameters and are success which is boolean type and contents which is array of integers.

In case of push operation, Status object contain only success variable with true value in it.

	In case of pop operation, Status object contain success variable with true value in it and "contents" array contains the element popped. In case of display operation, Status object contain success variable with true value in it and "contents" array contains all the element of the stack object. In all failure scenarios, the "success" variable of "Status" object contains false value. a) Implement the given design in Java language. (Text based menu driven system) b) Develop the test cases to test all required features. c) Compare features with standard Stack class available in Java library and understand the strength and weaknesses. **Expected Learning :** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Compare the** features of two given system and understand the strength and weaknesses.
Cycle-2 T5	**Exercise on Packages and Interfaces:** This is an extension to term work T3. Here assume that you have stronger abstraction called " Reporting" which has a capability to reportSelf(); This features is to be brought to "RegularTeacher" as well as "ContractTeacher" through the concept of **interface**, which is stronger form of abstract class and is also used to realize multiple inheritance. The behavior of self-reporting is different for regular teacher and contract teacher. In case of regular teacher, it prints ID, contact number and salary where as it prints only ID and contact number for contract teacher. Use package feature available in java language to group services. **Expected Learning :** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem.

	2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand** the need and **group** the services using packages for better maintenance. 5. **Understand and apply** multiple inheritances in problem solving. 6. **Understand and apply** interface concept in problem solving. 7. **Differentiate** abstract class and interface class and understand their use in system development.
Cycle-2 T6	Exercise on Multithreading: Producer Consumer Problem or Database transaction conflicts. **Expected Learning :** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand** the need and issues of multithreading. 5. **Resolve Conflict** due to interleaved operations of threads.
Cycle-2 T7	Exercise on Streams: Create Log files for exerciseT4. Log file records all activity of the system in a particular format. Note: Create separate class called "WriteToLog" which has capability to write in to user specified file through the services: openFile(), closeFile(), writeLog() with appropriate input parameters and return values. Use these services in Stack class of T4. 

	Expected Learning : After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Understand** the need for Log file for any system. 5. **Use streams** for data storage and retrieval activities.
Cycle-2 T8	Exercise on GUI: Use of Frames for T7 (T4). Menu for performing various activities to be provided. **Expected Learning :** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Build** GUI for user input and output activities. 5. **Understand** the need for event based activities and its programming.
Cycle-2 T9	Exercise on GUI: Use of Applets, other visual components like button, text box etc for T7 (T4). **Expected Learning :** After completing this term work, students should be able to : 1. **Understand and apply** the concept of ADT, Class, Objects and their properties in developing solutions for a given problem. 2. **Represent** OO design specification using appropriate tool. 3. **Design** test cases and **validate** the system features. 4. **Build** GUI for user input and output activities. 5. **Understand** the need for event based activities and its programming.
Cycle-3 T-10	**Lab Test based on Cycle 1 and 2. (5 marks)**
Completion of work: ONE term work completion per week, starting from **3rd week** of the semester	

Submission of Report: Every week, printed/ handwritten report on term work completed in previous week. Report organization for every exercise is as follows:

i. Problem definition,
ii. Design: Class Diagram, UI and Test Cases,
iii. Program Listing,
iv. Sample Inputs and Outputs,
v. Remark on Learning outcomes and
vi. References.

Generic Guidelines: Refer syllabus for details.

Mandatory Requirements:

Completion of all 10 experiments is compulsory. Non completion of any single experiment will make students **not eligible** to appear for ESE and hence have to **repeat the course next time when offered**.

Evaluation and Grading:

1. 9 experiments X 5 marks = 45 marks.
2. Cycle-3 : Lab test at the end of cycle - 2, conducted before CAT-3 exam = 5 marks
3. Total = 50 marks (Internal)
4. Department conducts ESE based on policy set for Laboratory.

Note:

- RUBRICS / General guidelines for evaluation (Version 1.0) →Distribution of marks (5) for every experiments/test for individual student:

Name & Signature of Course Teacher:	**USN:**		**Name:**	
Criteria	Expectation: Compliance without concern	Expectation: Compliance with concern	Expectation: Weakness	Expectation: Deficiency
Understanding of concepts (OO & Problem domain) (2 Marks)	2 Can apply concepts to other problems	1 Cannot solve other problems using this concepts but understanding for current exercise is OK	0.5 Inadequate understanding of OO and problem domain	0 No or wrong/poor understanding of OO and problem domain
Programming efforts to meet expected learning outcome defined for the exercise. (2 Marks)	2 Can apply concepts to other problems	1 Cannot solve other problems using this concepts but understanding for current exercise is OK	0.5 Inadequate understanding of java syntax	0 No or wrong/poor understanding of java syntax
Completion of term work in time. (0.5 Marks)	0.5 In time completion without concern	0.5 In time completion as per expectation with concern	0.25 Work partially complete but can complete in another week of time	0 Work not started or incomplete and cannot complete in another week of time
On time report submission of report (0.5 Marks)	0.5 On time submission without concern	0.5 On time submission as per expectation with concern	0.25 Report partially complete but can complete in another week of time	0 Report writing not started or incomplete and cannot complete in another week of time
Total Marks scored out of (5) :				

- Separate note book is to be maintained for this lab.
- All designs and other required preparations are to be written in this book before entering lab.
- Books can be referred during programming in the laboratory.
- Use extra slots in order to complete the experiments in time. Maintaining deadlines is mandatory.
- All experiments must be done in the environment suggested by the college. Copying the source code in and out of the college machines is not permitted. Students may use their individual laptop. In any case, same machine to be used from start to end. However ESE will be in the machine provided in department laboratory.