



Problem Definitions for July 2021 & January 2022

Important Notes

1. **Viva-voce of this project is compulsory.**
2. **Please follow MCS-044 guidelines for process of solving project problem and for the presentation format for submission of mini project report.**
3. **Please do not attempt the problems given in the course material of MCS-044, Block -1 or any other old problems. You must attempt one of the problems given in this section, if you submit mini project during July, 2021 or January, 2022 session.**

INTRODUCTION

The mini project is designed to help you develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing. In this booklet the list of the problem definitions for the July, 2021 and January, 2022 sessions are given. Every year, the list of problem definitions will change. **Please do not attempt the problems given in the booklet (MCS-044, Block-1) received by you along with your course material.**

PROBLEM DEFINITIONS

We have divided different projects into four broad areas / categories of computer science as given below, so that you can select any one of these categories for your Mini project.

- Application development
- Networking project
- System software
- Website development.

An initial list of project definition will be given below in the following sections. However, student can elaborate the project definitions after discussing it with the project counsellor. Students should **select one project from the given categories only** as per their interest, experience and knowledge in that area. Students should evaluate themselves and then should choose the project. Students may propose modifications/suggestions in the given project specification and finalize it in consultation with the MCS-044 counsellor.

APPLICATION DEVELOPMENT PROJECTS

Here we focus on investigating ideas in application development through different projects. A set of possible project name and their details will be presented; however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) **Project Name: Departmental Store Inventory Management System**

Description

A departmental store maintains its inventory using a computerized system. The system maintains the present stock of each item, list of suppliers of the items, the records of issue of items to various clients, minimum time to process and deliver an order and the minimum inventory of an item on which a reorder is processed. The system is expected to provide reports on the present stock status, the issue of stock to clients, the purchases made in the last month, the list of suppliers who had supplied in the last month etc. You may also keep track of different items, which are being sold by the departmental store and the price of these items. Analyse the system requirements and design the system. Use suitable data structure/database and programming language to implement this system. You may add more functionality into the system.

2) **Project Name: State Bus Transport System**

Description

A state bus company maintains the list of its buses, drivers, routes and route timings using a database system. The list of buses includes the bus number, last service date, total kilometers done by the bus, date of purchase and expected life of the bus, the route it is used on etc. The route details provide the list of stops and arrival time of the bus on those stops. The driver details list the basic information of the driver and the weekly duties of driver on various routes. The system is used to produce list of duties of driver in the next week, the list of buses that are due for servicing this week, the list of routes and timings, the number of new buses that are required to be purchase in the next financial year etc. Create a system, which performs the tasks as above. Analyse the system requirements and design the system. Use suitable data structure/database to implement this system. You may add more functionality into the system.

NETWORKING PROJECTS

We will focus on simulating some of the basic protocols on 8-10 nodes to make networking project. Two of the possible project topics are presented here, however, students are encouraged to be creative and develop their own ideas in the given project domains.

1) **Project Name: Simulation of Congestion Control in a packet switched network**

Description

Assume a network contains about 8-10 nodes. Demonstrate the process of congestion control in a packet switched network, as referred in section 3.7 of Unit 3 of Block 3 (Network Layer). You must provide detailed documentation about implementation of the project including headers, checksum etc. You must use implement the protocol on Unix/Linux operating system.

2) **Project Name: Simulation of Flooding, Shortest path routing and distance vector routing protocols**

Description

Assume that a network contains about 6-8 nodes. Demonstrate the use of flooding, shortest path routing and distance vector routing protocol between different pairs of source and destination nodes. Make suitable assumptions about distance and/or any other parameter reflecting the networking environment. You must use proper data structure, and provide detailed documentation about implementation of the project.

SYSTEM SOFTWARE DEVELOPMENT PROJECTS

Here we will focus on implementing some of the basic system software application. Two of the possible projects and their details are given here, however you are encouraged to be creative and develop your own ideas in the given project domains.

1) **Project Name: Developing library Utilities for File encryption and decryption**

Description

Create library utilities preferably using UNIX/Linux that implements any two of the following encryption/decryption algorithms:

- (a) Twofish encryption algorithm
- (b) Triple DES encryption algorithm
- (c) RSA algorithm

You must implement the encryption algorithm yourself and should not use existing library utilities. You must also write the appropriate utility to decrypt the file, which has encrypted using your encryption algorithm. You must write proper algorithm for encryption/decryption giving details of data structure and the processes. You must use an object-oriented programming language for implementing this project. You must check your report by using a similarity checking software and should also submit the similarity report generated by the software.

2) **Project Name: Demonstration of Mutual Exclusion and Synchronisation using monitors**

Description

Demonstrate the implementation of any mutual exclusion and synchronisation problem using monitor. You must write your own code for the same. You must implement the processes using appropriate data structure and constructs that ensure no concurrency related problem like no starvation, no deadlock etc. You may make suitable assumptions for the implementation. You may use object-oriented programming language for this implementation. You must check your report by using a similarity checking software and should also submit the similarity report generated by the software.

WEB DEVELOPMENT PROJECTS

Here, we will focus on investigating new ideas in application development through different projects. A set of possible project name and their details will be presented; however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) **Project Name: Online Loan Management system**

Description

A financial company gives loans to its customers and employees. The company gives unsecured loan of a maximum of Rs 1 lakh at an interest of 20% compounded annually. The financial company also gives secured loans; however, they are given at a different rate of interest based on the duration of the loan. Each loan requires a set of documentation, which includes the customer details, their financial status and previous loans taken by them. The financial company produces the loan schedule of each person. The monthly collection of actual loan installments from the customers is also recorded. Any person who defaults the loan repayment twice is given a warning and after the fourth loan repayment default a loan recovery process is initiated against the person. The financial company also generates reports of loan dispersed, loan recovery, bad loan information, etc. on a monthly and yearly basis. You must study the problem domain and analyse the requirements for the system in detail. Design & develop this as an online system.

2) **Project Name: Online Grievance management portal**

Description

A university addresses the problems of its students using an online grievance management portal. The portal allows admitted students of the university to register online grievances using an online form, which includes a drop-down list "Subject" (as you can find in email software). The "Subject" drop-down list should be generated using a database. The grievances based on the "Subject" are forwarded to concerned officers, whose list is also a part of the system. The portal keeps track of the date of forwarding the mail to different persons. A delay of more than 2 days in answering the grievance is reported. In addition, the system keeps track of the types of grievances; how many grievances are received, resolved and pending etc. Study various requirements for such a system. Analyse the requirements in detail; and design and develop the online system.

GUIDELINES

The MCS-044 block covers the majority of the guidelines regarding the formulation of the project proposal, formulation of the project report and the format to be followed for the project report. However, the following are the detailed guidelines with respect to the counseling sessions and evaluation scheme.

Practical Counseling sessions

Students can discuss their topic with the counsellors at study centres and the counsellors will give suggestions on project specification at the study centre during the practical sessions. There are total 10 practical sessions, as given below:

Name of the Topic	No. of Practical Sessions (3 hrs each)
Project specification	1
Coding / Implementation	5
Testing	2
Documentation	2

Role of the Counsellor

The MCS-044 Mini-project counsellor is the person who motivates and helps students during the development of the project. The counsellor should take responsibility for guiding and approving different project processes, including Analysis, Design, Coding, Testing, and also the editing of project reports. Moreover, the main responsibilities of a counsellor are:

- Dedicating adequate time to the student for providing effective supervision and encouragement,
- Making sure that the student chooses a manageable project topic,
- Providing critical comments on the student's work and progress,
- Ensuring the student has access to necessary data,
- Encouraging the student to proceed in the intended direction and to agreed time limits, and
- Making sure that the project is the student's own work.

PROJECT SUBMISSION

Project Proposal

Project proposal should be presented to, reviewed by and agreed upon in consultation with the project counsellor to provide constructive feedback on the proposal and planned programme of the project work. **No need of any formal approval to be taken on any proforma.**

Project Report

The project report will contribute to the assessment and your marks. The format of this report will follow the format, guidelines and suggestions given in the block, but details should also be discussed with your counsellor. The final reports of students doing **the project in a group should not be identical. Each student should emphasise on his/her role and responsibilities in the project work.**

Submission of the Project Report

One copy of the original project report is to be submitted to the Study Centre concerned. A photocopy of the same project report must be retained by the student and should carry with him/her at the time of the viva voce.

EVALUATION SCHEME

MCS-044 course has three main evaluation components consisting of assignment (25 marks), project report (50 marks) and viva-voce (25marks). **A student is required to score 40% marks in each of these components separately for successful completion of the course.**

The project will be assessed by a written report and a combined presentation and viva voce (viva voce). To help the students we have given some guidelines about evaluation and assessment in

the next section. If, the examiner finds that the project is lacking in any key areas then, the student will be asked to re-submit the project by selecting a new topic in the next session.

Resubmission of the project by the failed students

If the student fails in project report evaluation or viva-voce or in both, the students need to redo the entire process by selecting a new problem from the list of problems which will be updated every year.

Assignment/Continuous Evaluation

25% of total marks are allotted to assignment/continuous evaluation. The assignment questions are given in the MCA 4th semester assignment booklet.

If the student failed only in assignment component and successfully passed in project report evaluation and viva-voce, s/he needs to submit the fresh assignment of the current year, as is done in the normal courses.

Final Evaluation

The Term End Practical Examination of Mini Project will be conducted at the study centre concerned. 75% of total marks are evaluated in the final evaluation. Out of these 75 marks, 50 marks are allotted for the project report evaluation and 25 marks are allotted for viva voce.