
UNIT 2 GUIDELINES AND SUGGESTIONS

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2.0 INTRODUCTION

The purpose of this unit is to provide some guidelines and suggestion for the development of the project and the preparation of your final year project report. This unit covers the format and contents of the report, some rules for the layout and presentation, some suggestions on style and language that might be helpful and some recommendations for further reading. The project report in brief should start with a short introductory chapter to cover the background to the project, or state the problem, or possibly mention the motivation for your working on this particular project. Use the main body of the report to describe objectively what you have done in the project, to justify your design decisions, the problems you faced and what you achieved in solving them. The final chapter should sum up what you have achieved in the project and, possibly, outline the scope for future work.

2.1 OBJECTIVES

After going through this unit you should be able to:

- understand the key activities of the Mini Project,
 - know your Roles and Responsibilities,
 - understand how to select a project topic,
 - understand how to start the project,
 - know the guidelines for proposal and report preparation,
 - know the Evaluation Scheme, and
 - know the Assessment Guidelines.
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2.2 KEY FEATURES OF THE PROJECT

While preparing the project students learn and practice different activities, which help them to develop the ability to solve real life problems related to software development.



There are different activities (including the details given in unit 1 and unit 2) in each phase of software development; however, some of the key activities of the project work are given below:

Analysis

- Framing the Systems Development Life Cycle (SDLC) Model for the related project,
- Understanding and evaluating the specific problem,
- Analysing and evaluating the systems requirements,
- Cost-benefit analysis,
- Performing technical feasibility, time feasibility and Operational feasibility for the project,
- Scheduling projects using both GANTT and PERT charts,
- Deciding the S/W requirement specifications and H/W requirement specifications, and
- Designing and constructing the entity-relationship (ER) diagram (for RDBMS related projects), data flow diagrams (level 0,1,2) (OR Object-oriented diagrams, System Flowcharts etc.) and data dictionary.

Design

- Plan the systems design phase and distinguish between logical and physical design requirements,
- Create the systems flow charts and state transition diagrams,
- Describe all the modules and the functionality of modules,
- Design and evaluate system inputs and outputs,
- Design and evaluate user interfaces for input, and validity checks for input data,
- Perform normalisation for the unnormalised tables for RDBMS related projects,
- Design various test cases for different testing techniques/strategies, and
- Decide various data structures.

Coding

- Performing coding according to the requirement and design document,
- Writing comments and description in coding,
- Using of naming convention of variable and functions,
- Explaining the exceptions handling and conditional checking, and
- Maintaining security.

Testing

- Performing various system testing techniques/strategies to include the different phases of testing,
- Identifying key problems with the software and re-implementation with logical justification, and
- Generating various test reports.

2.3 ROLES AND RESPONSIBILITIES

The key of making a group project successful is ensuring that each member of the team understands and accepts his or her roles and responsibilities within the team. Students may be given roles such as Team Coordinator, Auditor/Reviewer: Data Manager, Quality Manager or others according to the needs of the project. Each

student should be involved in each and every phase of software development, however, the role is an additional responsibility of the students. The domain of these roles are as given below:

- **Team Coordinator:** Conducting meetings, coordinating the team, maintaining milestones and regulations related to the project work,
- **Auditor/Reviewer:** Inspecting and verifying whether the meetings and discussions are being held regularly. Also s/he will check if the project and management related documents are maintained properly and whether all team members are updated with latest information of the project.
- **Data Manager:** Maintaining records and information related to meetings and discussions related to the project, and
- **Quality Manager:** Maintaining records and information related to quality assurance in the project.

Clarifying this understanding explicitly at the beginning of the process, and reviewing it periodically throughout the duration of the project, can help avoid a great deal of confusion and frustration and increase the efficiency and effectiveness of the team. Students can select these projects in a group or individually according to their interest and the complexity of the project.

2.3.1 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.

2.3.2 Project Team / Student

The project team should be organised and determined towards the fulfilment of their projects' objectives and tasks. A maximum of four students should work on a project, however, an individual student can also undertake the project on his/her own. The main responsibilities of the project team/student are to:

- Ensure that an appropriate amount of time and effort is applied to the project,
- Ensure that they are responsive to the guidance of their counsellor,
- Acknowledge the text, material and ideas of others properly,
- Meet all milestones and regulations related to the work, and
- To communicate any problems that are likely to prejudice the quality or time lines of the work to the counsellor as and when such problems arise.



2.4 STEPS OF THE MINI PROJECT

We have listed here five general steps in your Mini Project, which may help you to determine the milestones and regulations related to project work.

- Selection of Topic Area,
- Project Report Planning,
- Project Proposal Report,
- Project Final Report, and
- Project Assessment

2.4.1 Selection of Topic Area

The choice of the topic for the project has great importance so it should be discussed with your counsellor in detail. The topic needs to integrate the interests of the student with the specialised expertise of the counsellor, and be of the appropriate level of difficulty. Students are encouraged to think about the areas of their interest in which they would like to undertake a project, and in consultation with a counsellor, an initial topic can be identified.

2.4.2 Project Report Planning

You should provide an overall aim for your project, which is a declaration of what you would like to achieve at the end of the project. This should be followed by a number of objectives, which act as clearly defined stages that make up your project.

Project Plan

A project plan should be included which provides an estimate of the time that you think you will require in order to work and meet each of your objectives. In your project plan avoid scheduling tasks linearly, try to overlap and tackle more than one task at any point of time.

You should begin planning your report from the day you begin your Mini-project. The report is one of the products of your work, in the same way as a program is a product. You should discuss with your counsellor the way in which your work will be reported. You can produce an outline plan of your report after your first meeting with your counsellor. This plan will not be detailed, but you can gradually increase the amount of detail in the plan until it forms the complete basis for writing the report.

The process of planning can help you sort out your ideas, make vague ideas precise and sequential. One common mistake students make is, to believe that a plan cannot be changed or that it is a sign of weakness to change a plan. A plan is another tool to be used to get work completed according to a satisfactory standard. It needs to be treated with as much respect as any other tool. At first, the plan might be in the list of chapter analyse headings. Next, one or more of the chapters can be broken down into sections, then the sections into subsections, and so on until a whole chapter is ready to be written. You may decide to split a chapter into two or more chapters or to merge two or more chapters into one. This means that you can use your plan to decide when to strengthen your report with some extra work, or when to move on to some new work.

A less common mistake that students make is to think that their report has to be written in order, from the first page to the last. It is wise not to begin writing until you have some level of plan for the whole report, but you can write parts as you go along. For instance, when you have the material for your review of previous work, you can write that chapter. It is quite usual to write the inner chapters before the last chapter and then to write the introductory chapter as the last part you write.



2.4.3 Project Proposal Report

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. Further, in this section, you can present details regarding the preparation of the project proposal. The preparation of the Project proposal report may be taken to be an opportunity for students to practice their report writing skills. It is expected that this report will contain an overall structure for the project analysis along with a substantial part of the survey of technologies. The survey of technologies, and associated list of cited references, would be complete at this stage. The project proposal should contribute to some of the content of the final report. It also provides the counsellor with an opportunity to make constructive comments on the written work completed at this stage.

2.4.4 Project Final Report

The final report will contribute to the assessment and your marks. The format of this report will follow the format, guidelines and suggestions given in this 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.

2.4.5 Project Assessment

The project presentation and viva voce also contribute to the final assessment. The presentation will provide an opportunity for the student to set the work done into context and to identify the main features of the work. Student should have good understanding and knowledge of each and every phase of software development either it's a group or individual project. In addition, the student will be expected to defend successfully the conclusions put forward in the report. The examiners will be looking for clear evidence that the student has a depth of understanding of the subject areas.

2.5 GUIDELINES FOR THE PROJECT PROPOSAL

These guidelines on report preparation gives simple and practical recommendation on the problems of getting started, getting organised, dividing the vast task into less difficult pieces and working on those pieces. It includes a suggested structure and a guide to what should go in each section of the project proposal and the project report.

Project Proposal

As we have discussed earlier the project proposal should be prepared in consultation with your counsellor during the counselling sessions. The project proposal should clearly state the objectives of the project. The project work should compulsorily include the analysis phase of the software development.

Front page

The front page of the proposal should contain the project title, followed by your name and your counsellor's name. The contents of this proposal report should contain the following:

Structure

1. INTRODUCTION
 - 1.1 Background
 - 1.2 Objectives
 - 1.3 Purpose and Scope
 - 1.3.1 Purpose
 - 1.3.2 Scope



2. SURVEY OF TECHNOLOGIES
3. REQUIREMENTS AND ANALYSIS
 - Problem Definition
 - Requirements Specification
 - Planning and Scheduling
 - Software and Hardware Requirements
 - Preliminary Product Description
 - Conceptual Models.
4. REFERENCES

The description of these topics are already explained in the previous unit, however, the references at this stage of the project proposal may be different from the references of the project report, so you should provide here a list of reference which is related to your project topic: literary and the review, survey of technologies that acts as a good reference to your work. This will demonstrate that your project is current and it is supported by articles, papers or books, which are accessible. (Refer to the reference in further sections). After finalising the proposal report, students should submit the project proposal report along with the proforma.

2.6 GUIDELINES FOR THE PROJECT REPORT

When you are about to begin writing the project report, it seems a lengthy, complicated job. It will seem less discouraging if you write continuously and prepare the documentation of each phase from the start of the project. However, in this case, towards the conclusion, you will even find, an enjoyment, satisfaction in the sense of achievement and pleasure in the enhancement of your technical writing. Let us look at how you should make a start.

Before writing your project report, first write the report outlines containing chapter headings, sub-headings, some figure titles and perhaps some other details, notes and comments. The report should contain a full and coherent account of your work. Although there will be an opportunity to present your work verbally, and demonstrate any software, the major part of the assessment will be based on the written material in your project report.

Project Report Format

The project report documentation should contain 80 to 100 pages for analysis, design, and testing phases, however, the size of complete report may vary depending upon the size of coding /implementation and appendices. The project documentation details should not be too generic in nature. To be more specific, whatever theory in respect of these topics is available in reference books should be avoided as far as possible. The project documentation should be in respect of your project only. You should make sensible use of appendices. For example, software user instructions, detailed code listings, correspondence may be relegated to appendices. Note that spiral bindings are not suitable for handing in the project report.

Project Report Layout

Project report should contain all the details and text should be short and concise, lengthy reports may not be qualitative, and care should be taken to edit the material sensibly. The project report should normally be printed with single line spacing on A4 paper (one side only). Figures should be clearly drawn and all material should be reproducible by normal photocopy. All pages, tables and figures must be numbered

and figures should have titles. Detailed information about the layout for the project proposal and report are also listed below:



Font size and margin

1. The report is to be bound with a clear front cover.
2. The text is in 12-point Times New Roman font.
3. The pages are of A4 size, with margins as given below, except for the front cover, which has a specific format given in unit 1. Margins of pages should follow the following specifications.
 - a. Left margin - 2 inch. from edge of paper.
 - b. Right margin - 1 inch. from edge of paper.
 - c. Top margin - 1 inch. from edge of paper.
 - d. Bottom margin - 1 inch. from edge of paper.
4. The above margins shall be observed on charts, graphs, tables, and drawings. Folded papers or large size paper will not be accepted unless there is absolutely no other way for the material to be presented.

Heading

1. Headings used in the project report should follow the following convention:
2. Main Headings or Chapter Headings
 - a. Times Roman, 16 Font size (1,2,3 etc.) numerals.
 - b. Capital and Bold.
 - c. Must begin a new page and be centered.
 - d. Main headings are to be titled names that reflect content of the text that follows. Main headings are not to be identified as chapters.
 - e. The number of the headings shall be followed by a period and two spaces.
 - f. Must precede the following text material by second heading by three spaces.
3. Second Headings
 - a. Times Roman, 14 Font size, Bold, 2.1, 2.2, 2.3, etc.
 - b. Must be centered and be typed in capital and lower case (sentence case) letters; i.e., the first letter of each word except conjunctions, prepositions, and articles must be a capital letter. Omit period at the end of the heading.
 - c. The letter designation of the heading shall be followed by a period and two spaces.
 - d. Must be four spaces below preceding text and three spaces ahead of succeeding text.
4. First sub-headings
 - a. Times Roman, 12 Font size, Bold, 2.2.1, 2.2.2, etc.
 - b. Must be typed on separate lines beginning at the left margin line of the text, but need not begin on a new page.
 - c. Must be typed in capitals and lower case letters except conjunctions, prepositions, and articles.
 - d. The number designation of the heading shall be followed by a period and two spaces. Omit period at the end of the heading.
 - e. Must be separated from the succeeding text by three spaces.
5. Second sub-headings (second sub-headings should be avoided if possible).
 - a. Times Roman, 12 Font size, Bold.
 - b. Must be typed on the same line as the text it introduces beginning at the left margin line of the text.



- c. Must be typed in sentence case.
 - d. Must be followed by a period at the end of the heading and must be underscored by a line.
 - e. The letter designation shall be followed by a period and two spaces.
- Appendices re-start the section numbering, using capital letters as section labels and Arabic numerals as sub-section labels (i.e., A.1, A.2.); appendix headers are in decreasing-sized fonts.
 - If a section is divided into sub-sections, it has at least two subsections. Similarly for subsections divided into sub sub-sections, and so on.
 - The font matter, Conclusions, Recommendations, Glossary, Acknowledgements, and References sections are not divided into sub-sections. (Include in Main Heading or Chapter Heading).

Figure and Tables

- Each figure has a number and a caption below the figure. As given in the example of a *Figure*.

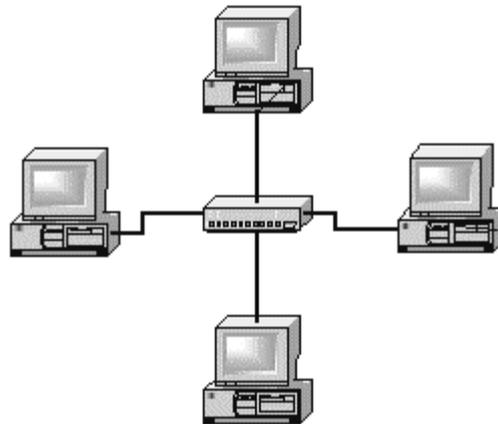


Figure 1: A typical computer network

- Each table has a number and a title above the table. As given in the example of a *Table*.

Table 1: Comparison of various data structures

Operation	Sequential List	Linked List	AVL-Tree
Search	$O(\log n)$	$O(n)$	$O(\log n)$
Delete	$O(n)$	$O(1)$	$O(\log n)$
Insert	$O(n)$	$O(1)$	$O(\log n)$

- Figure and table numbering restarts at the beginning of each appendix, using a combination of the appendix label and figure/table number within the appendix (e.g., A-1, A-2).
- Each figure and table is cited (referred to by number) in the report text, either on the same page as the figure/table or on the preceding page.
- Figures and tables are legible.



Paragraphs

Paragraph indentations must be uniformly eight letter spaces long. Series of paragraph items which are to be listed without headings under any of the regular headings may, for clarity be designated as follows: (A), (B), (C). No period is necessary between the parenthesis and the first sentence. Series of items listed in the interior of a paragraph may be designated as follows: (a), (b), (c). A period must not follow the parenthesis. Each item must begin with a lower case letter and must end with a semi-colon, unless it is a complete sentence. A new paragraph must not begin at the bottom of a page if there is not sufficient space for at least two lines.

Footnotes

Footnotes should be used only if absolutely necessary.

- Footnote references shall be indicated in the text by an Arabic number placed superior to the text and immediately following the word phrase or sentence, on which the footnote is to be appended.
- Footnotes shall be sequential for each page and for the entire report.
- Footnotes shall be placed at the bottom of the page on which they are indicated. They shall be indented from the margin line of the text by eight spaces and placed under a broken line made of 15 dashes.
- Footnotes shall be single spaced typing.

Pagination

Each page in the report is expected to bear a number. Only one side of the paper may be used. The following plan should be used exclusively:

- a. The preliminary section, including the title page; copyright page, if any; foreword, preface, or acknowledgements; table of contents; etc., should be numbered, using lower case Roman Numerals, e.g., i, ii, iii, etc. The title page counts as Page i, but the number does not appear. The sequence of the preliminary section is as follows:

Introduction	Page i - number does not appear
Survey of Technologies.....	Page ii, iii, as necessary
Requirements and Analysis	Page iii, iv, as necessary
References	Page v, vi, as necessary

For the remainder of the report Times numbers are used. Each page must be numbered. Page numbers are to be placed two centimeters from the top and right hand margins on the pages. Include all pages for illustrations, tables, appendices, bibliography, etc. The numbering in the main body of the report should begin with Page 1 and run consecutively to the last page. No punctuation, such as dash or a period, should accompany the page number.

- Page numbering restarts at the main body of the report: pages in the main body and back matter, including appendices, are numbered using Arabic numerals, with the first page of the Introduction as page one.
- Page numbers are centered at the bottom of the page.

Specially Designated Expressions

- (1) Specially designated expressions usually mean equations, formulas, etc.
- (2) Specially designated expressions shall be centered on the page shall be set below the preceding text and before the succeeding text by three line spaces.



- (3) The expressions shall be identified by an arabic number in parenthesis placed opposite the expression and in line with the right margin of the text. They should be numbered in each chapter in the order of their appearance together with the chapter number, e.g., (6.14).

References

The numerical reference of the material shall be indicated in the text by an arabic numeral in square brackets (e.g., [12]) placed in the text immediately following the name, word, phrase, or sentence which the reference concerns (in most cases this will be the author's name). The number in parenthesis should indicate the order of appearance of the reference in the text. The listing of references in the references shall be in the order in which they are used in the text and shall bear the same number as was used in the reference in the text.

It is very important that you acknowledge any of the work of others that you use or adapt in your own work, or that provides the essential background or context to your project. The use of references is the standard way to do this. Please follow the given standard for the references of books, journals, and online materials.

The list of cited references is placed between the main text and the appendices. This section should start on a new page, and should not have a chapter or section number, just the heading "References". Each reference should be as complete as possible. However, some schemes for writing references are given below:

- **A Journal Paper**

name(s) of author(s), year of publication, title of paper, name of journal, volume number issue number (optional), page numbers.

- **A Conference Paper**

name(s) of author(s), year of conference, title of paper, name(s) of editor(s), name of conference, place of conference (optional), publisher of proceedings, place of publication, page numbers.

- **A Book**

name(s) of author(s), year of publication, chapters (if only part of the book is relevant), title of book, name of publishers, place of publication (optional), page numbers.

- **A Web Page**

name(s) of author(s), year of publication, title of paper, url, date last accessed.

Appendices

These should contain detailed information not required on a first reading of the main text, but necessary for closer study of the project and in particular its continuation or replication. The Appendices should also include a program disk/cd when appropriate.

Coding style

In general during coding, most of your development time is spent in debugging, troubleshooting, and practicing general maintenance, especially on larger projects. Even when you work on small projects, a significant amount of time is usually spent



analysing and fixing code. The readability of your code is important for your benefit and the benefit of your team members. When following conventions, you increase readability, which increases workflow and helps find and fix any errors in your code, and all programmers follow a standardised way of writing code, which improves the project in many ways. For C, this involves things like brace placement, indentation, and the way parentheses are used but the coding conventions and style varies from language to language hence, you should follow the coding conventions of the language, which you have used in your project implementation.

Style of English

The report should be written in an objective style, in the third person impersonal tense: e.g., “The following software was developed....”not “I developed the following software....”. An impersonal style keeps the technical factors and ideas to the forefront of the discussion and you in the background. Try to be objective and quantitative in your conclusions. For example, it is not enough to say vaguely “because the compiler was unreliable the code produced was not adequate”. It would be much better to say “because the A compiler produced code which ran 2-3 times slower than a fast enough scheduler could not be written using this algorithm”. The second statement is more precise, clear and informative and gives an impression that the student knows the project and subject very well.

Submission of the Project Report

You have to submit your project report by the given date. 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, which should be produced before the evaluation.

2.7 EVALUATION SCHEME

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. If the student is re-submitting the project report then the students needs to repeat the entire process beginning with the approval of the project proposal.

Project Synopsis/Proposal

Students can discuss their project topic and proposal with counsellors at study centres during counselling, however, each student must send their complete project proposal to the counsellor with the proforma of the project proposal given in appendix 2. Further, counsellors will give suggestion on the project proposal/synopsis; students should modify the project work according to the suggestions given in the proforma of the project proposal.

Assignment/Continuous Evaluation

25% of total marks are allotted to continuous evaluation.

Final Evaluation

75% of total marks are evaluated in the final evaluation. These 75 marks will be given, based on the evaluation of project report. The weightage will be given to analysis, design, coding/implementation, testing and viva-voce.



2.8 ASSESSMENT GUIDELINES

In this section we have given a few general parameters as checkpoints for the assessment of any software development project. You can note these points and emphasise them during the project report preparation and examination. Basically, assessment will be based on the quality of your report, the technical merit of the project and the project execution. Technical merit attempts to assess the quality and depth of the intellectual effort you have put into the project. Project execution is concerned with assessing how much work you have put in.

Analysis

In Project planning include cost estimation and project scheduling. The Cost and efforts estimation is to be done with the help of functional point analysis or other similar methods. The project scheduling is identified with:

- (i) Pert chart: Proper decomposition of stages, and
- (ii) Gantt chart: Time, line structure and validity of chart.

You may know that the software requirement specification (SRS) document is one of the important documents of your project. The indicators for SRS document is whether you have used some standardisation like IEEE standards or any other international standard, or whether your SRS has a proper structure based on sound software engineering concepts as given in unit 3 or it is given in a running text. Project analysis for DBMS/Application development projects should contain the ER diagram, Data Flow Diagram and Data Dictionary, so you should include these with the following requirements. However for other categories of project you should prepare class diagrams, behavior model and /or state transition diagram and details of various data structures used.

- The Entity Relationship diagram (ER Diagram) should have:
 - Proper symbol of attributes, entities and relationship, and
 - Relationship of ER diagram to SRS with strong association
- Data Flow Diagram (DFD) should have:
 - All Data flow should be levelled and should have proper input and output.
 - Relationship of data flow to data dictionary Context Diagram, Level 1 and Level 2.
- **Data Dictionary:** It should explain each entity and relationship in ER diagram and data flow in DFD.

Design

Project design should include the desired features and operations in detail, including user interface design, program structure, schema design and normalised tables and data integrity and constraints. You should include them with the requirements given below:

- **Program Structure:** It should have the proper modularisations of software and specification of each module.
- **Schema Design and Normalised Tables:** Normalise the table to minimum 3NF. If demand of Demoralisations clearly explain the reasons.
- **Data Integrity and Constraints:** Explain the referential diagram. Define entity integrity, which should include keys, alternate keys and other keys, value constraints and ranges.



- **Procedural Design:** Explain using Flowchart / Pseudo code / PDL.
- **User Interface Design:** Coherence with dataflow and processor; Consistency of interface and naming convention.
- **Architecture:** Program architecture and explanation on suitability of data structure used.

Coding

Coding phase of software development includes different activities like refining the algorithms for individual components, transferring the algorithms into a programming language (coding), translating the logical data model into a physical one and compiling and checking the syntactical correctness of the algorithm with these activities. You should include the comments and description in code, use the standardisation in coding, use the methodology for error handling and security implementation. These parameters ensure software quality and reliability. You should include them with the requirements given below:

- **Comments and Description:** Should have comments with functional description which include the input, output, total function calls to/from other functions, function parameters, description of main variables, Data type, logic description, etc.
- **Standardisation of Coding:** Use of naming convention of variable and functions, nested depth, naming constant, use of data structure and style.
- **Error Handling:** Explain exceptions handling and conditional checking.
- **Parameter passing and calling:** Check the technique used for this purpose, how it optimises the coding.
- **Security:** Maintain confidentiality, integrity and authorisation according to the requirement and needs of the system. Also maintain database level security, use of Views, use of revoke and grant, user and access rights and ensure steps taken against hacking of the system.

Testing

Testing is a process of devising a set of inputs to a given piece of software that will cause the software to exercise some portion of its code. The developer of the software can then check if the results produced by the software are in accordance with his or her expectations. It includes, number of activities such as correcting syntactically and semantically erroneous system components, detecting as many errors as possible in the software system, and assuring that the system implementation fulfills system specification.

It ensures the quality, efficiency and reliability of the software, which is measured by the testing methodology and techniques used for unit, integrated and system testing. You should give all the reports and results of test cases for unit, integrated and system testing. How debugged your code is and what actions you have taken too improve the code, must, be explained. Good testing can be measured by criteria such as correctness, reliability, user friendliness, maintainability, efficiency and portability of software.

Organisation of report

Report organisation improves the professional attitude of writing reports. You should emphasise on the proper binding of the project report, the cover page, page numbering, organisation of content, and proper printout of text and images.



Viva Voce

Student may be asked to write code for problem during viva to demonstrate his coding capabilities and s/he may be asked to write any segment of coding given in project report.

2.9 PITFALLS AND SOME TIPS

The main purpose of this course is to gain experience with the help of the concepts and methods learned from the previous courses particularly, in knowing the practical situation/problem in software development. We have explained most of the components of the project in detail, however you may need some tips that may be helpful and are generally required by students.

In recent years, we have noticed, that projects suffer from the lack of proper analysis and later any review, failure to implement an engineering approach and lack of critical element. A proper analysis and literary review is necessary for you to show that you can place your work in the wider context of computing. An engineering approach is one where you follow some appropriate process or methodology that leads from requirements to design to implementation and testing. By adopting such a process, it is much less likely that, you will fail to take some crucial factor into consideration, which is an important aspect of software engineering.

The critical element involves showing what you independently believe to be good and bad about what you've read, what you have been taught, what you have been asked to do, what you have done, what you have not done and the consequences thereof. It does not involve blindly accepting as fact everything that you have been told or read. However, we have listed a few points that generally are found to be lacking in the projects submitted by our students. These observations may be used by students as valuable feedback.

Sometimes students opt for the wrong project problem/topic without, understanding the depth of the requirements, and their own limitations in that area.

- Few students are over enthusiastic and they don't freeze the requirement or expectations till, the coding and implementation leads to low quality and less reliable software product.
- Most of the students assume that the coding is the only work they have to do and they neglect the importance of other software engineering processes that result in improper knowledge gain of project development and poor results/grades.
- Generally students lack critical work. They assume whatever is given in books or taught to them in software development is correct.
- Most of the students do not use the software engineering approach and methodologies for software development.
- Most of the students do not use standardisation in different phases of software development.
- Some students do not prepare documents such as the SRS, SDD, and Test Cases etc. in different phases of software development.
- Some students never consider the importance of notes and documentation, which creates problems for them during report writing.
- Generally students don't give proper acknowledgement of material used in the reference however, few are not aware of material which should be acknowledged in the reference. You must include the following material in the reference.



- Written, printed, or published (electronic or paper both) material.
- The algorithms, models, hypotheses and paradigms that are used.
- The software, which you used, including the development environment, compilers, libraries, etc. you should give the web reference of the website so that other student can collect information about it.
- Most of the students are interested in developing website projects or some system development project, but very few student are involved in research oriented work.
- A few students are too dependent on the counsellor. Remember you are responsible for coding and documentation of your project.
- A few students also copy the projects from some sources. This practice creates a major problem, as it does not encourage the student's own creativity/knowledge/potential.
- There is no need to write a detail history of Java or visual basic etc. On the other hand, it is important to mention what you have used in the project and to explain anything that might be unusual to the reader. For example, five years ago it was important to introduce the reader to Java, but now it is not required.
- Students may think, "So what if it's wrong as long as the meaning is clear". But poor spellings leave a negative impression (of carelessness) and sometimes cause confusion.

Report Format and Layout

In the previous sections, we have explained the specification of project report format and layout however, it is also important to discuss additional tips for the preparation of the report. That's why we have given you a few tips and points as given below:

- Use proper spelling and capitalisation of the programming languages, tools and other proprietary software that you have used. For example, some students write Unix and some writes UNIX, but which one of the two is correct?
- Similarly, do not leave a space before a full stop or other punctuation mark.
- Also, do not leave a space after an open bracket or before a closed bracket. You should do it (like this).
- Use round brackets only for parentheses. Keep square brackets for references.
- Commas and full stops should be placed inside quotation marks. Even at the end of sentences like "this."
- It is a good practice to leave two spaces after a full stop.
- Spell out numbers (from one to nine) in text, i.e., write "two" not "2" except where you are numbering bullet points. For number 10 and above, use numerals. Remember numbers should be spelled out when they begin a sentence.
- Spell out per cent; do not use %, and write per cent as two words without a period.
- Do not use the pronoun "I", always use "We", better use passive voice.



2.10 SCHEDULE OF PRACTICAL 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

2.11 SUMMARY

In this unit, we have tried to cover most of the areas of concern in writing a project report. We have tried to encourage you to put some effort into the project report and laid down some guidelines to be followed for layout and format. The given guidelines and suggestions are gradually becoming the ‘standard’ for project reports preparation and will be amended and improved in the light of new/fresh experience.

2.12 FURTHER READINGS

1. IEEE 1063: Software user Documentation.
2. ISO/IEC 12207: *Software Life Cycle Process*
(<http://www.software.org/quagmire/descriptions/iso-iec12207.asp>).
3. ISO/IEC: 18019: *Guidelines for the Design and Preparation of User Documentation for Application Software*.
4. <http://en.tldp.org/HOWTO/Software-Release-Practice-HOWTO/documentation.html>.
5. <http://www.sei.cmu.edu/cmm/>