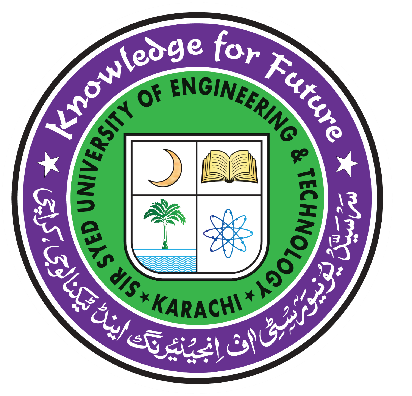
SSUET/QR/112

**Laboratory Manual**

**Introduction to Operating Systems**

**(CS-222L**)

4rd Semester Spring-2025



|  |  |
| --- | --- |
| **Student Name:** | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Student Roll# :** | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Section : \_\_\_\_\_** |

**BS in Computer Science**

**Department of Computer Science & Information Technology**

Sir Syed University of Engineering and Technology

University Road Karachi - 75300

http://www.ssuet.edu.pk

**Course Learning Outcome(s):**

|  |  |  |  |
| --- | --- | --- | --- |
| **CLO No.** | **Course Learning Outcomes (CLOs)** | **PLOs** | **Bloom’s Taxonomy** |
| 1 | **Follow** the instructions to developunderstanding of Operating Systems command and operations including process scheduling, deadlock avoidance, memory management. | PLO\_5  (Modern Tool Usage) | P3  (Guided Reponse) |
| 2 | **Construct** a project to implement different algorithms of operating system and linux shell scripting | PLO\_4  (Design/Development of Solutions) | P4  (Mechanism) |
| 3 | **Demonstrate** the knowledge through personal contribution and collaborative effort as assessed during viva and presentation. | PLO\_6  (Individual & Teamwork) | A2  (Responding to Phenomena) |

Laboratory Experiments

|  |  |  |
| --- | --- | --- |
| **Lab #** | **Topic** | **Signature** |
| 1 | Introduction to Linux operating system, Installation of Linux operating system in a Virtual Machine and explore its features. |  |
| 2 | Managing Directories, Hardware Information and Kernel distribution information, Redirection and pipes, Filters commands in Linux. |  |
| 3 | File /directory Permission and Process Management with System Calls commands. |  |
| 4 | Introduction of vi text editor to create and edit files |  |
| 5 | Implementation of Process and thread (Life cycle of process): (i) Process creation and Termination; (ii) Thread creation and Termination |  |
| 6 | Implementation of CPU Scheduling Algorithm (i)FCFS (First Come First Serve) (ii) SJF (Shortest Job First) |  |
| 7 | Implementation of CPU Scheduling Algorithm (i)Round Robin (ii)Priority based |  |
| 8 | Implementation of Deadlock Avoidance Banker’s Algorithm and study about deadlock recovery |  |
| 9 | Producer-Consumer Problem using Semaphores |  |
| 10 | Implementation of Memory Management using (i)First Fit (ii)Worst Fit & (iii) Best Fit |  |
| 11 | Execute the Linux Shell scripts |  |
| 12 | Execute the Shell script by using Control Structures and Loops |  |
| 13 | (a)Execute the Shell script by using Switch Case  (b)Execute the Shell script by using Functions |  |
| 14 | Introduction to Docker, its working with benefits and Dockerhub account creation |  |

Laboratory Rubrics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **Exceeds Expectations (>=90%)** | **Meets Expectations (70%-89%)** | **Developing**  **(50%-69%)** | **Unsatisfactory (<50%)** |
| **Software Handling**  **(2)** | Able to use software with its standard and advanced features without assistance | Able to use software with its standard and advanced features with minimal assistance | Able to use software with its standard features with assistance | Unable to use the software |
| **Programming/ Simulation**  **(5)** | Able to program/ simulate the lab tasks with simplification | Able to program/ simulate the lab tasks without errors | Able to program/ simulate lab tasks with errors | Unable to program/simulate |
| **Results**  **(2)** | Able to achieve all the desired results with alternate ways to improve measurements | Able to achieve all the desired results | Able to achieve most of the desired results with errors | Unable to achieve the desired results |
| **Lab Report**  **(1)** | Laboratory manual has no grammatical and/ or spelling errors.  All sections of the report are very well written and technically accurate. | Laboratory manual has very few grammatical/ spelling errors.  All sections of the report are technically accurate. | -Laboratory manual has multiple grammatical/ spelling errors.  Few sections of the report contain technical error s. | Laboratory manual has several grammatical/ spelling errors and sentence construction is poor.  -All sections of the report contain multiple technical errors. |

Laboratory Report Score

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Lab#** | **Criteria** | | | | **Score** |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/5 | Results  ( )/2 | Lab Report  ( )/1 |  |
|  | Software Handling  ( )/2 | Programming/ Simulations ( )/4 | Results  ( )/2 | Lab Report  ( )/1 |  |
| **Obtained Score out of (140)** | | | | |  |
| **Obtained Score out of (X) = Obtained Score out of (140)/140 \* X** | | | | |  |

Semester Project Rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Criteria** | **Exceeds Expectations (>=90%)** | **Meets Expectations (70%-89%)** | **Developing**  **(50%-69%)** | **Unsatisfactory (<50%)** | **Score** |
| **Project Demonstration**  **(5)** | Able to demonstrate the project with achievement of required objectives having clear understanding of project limitations and future enhancements. Hardware and/or Software modules are fully functional, if applicable. | Able to demonstrate the project with achievement of required objectives but understanding of project limitations and future enhancements is insufficient. Hardware and/or Software modules are functional, if applicable. | Able to demonstrate the project with achievement of a\*t least 50% required objectives and insufficient understanding of project limitations and future enhancements. Hardware and/or Software modules are partially functional, if applicable. | Able to demonstrate the project with achievement of less than 50% required objectives and lacks in understanding of project limitations and future enhancements. Hardware and/or Software modules are not functional, if applicable. |  |
| **Project results**  **(3)** | Able to achieve all the desired results with alternate ways to improve measurements | Able to achieve all the desired results | Able to achieve most of the desired results with errors | Unable to achieve the desired results |  |
| **Report Writing**  **(3)** | Project report has no grammatical and/ or spelling errors.  All sections of the report are very well-written and technically accurate. | Project report has very few grammatical/ spelling errors.  All sections of the report are technically accurate. | Project report has multiple grammatical/ spelling errors.  Few sections of the report contain technical errors. | Project report has several grammatical/ spelling errors and sentence construction is poor. |  |
| **Viva**  **(4)** | Able to answer the questions easily and correctly across the project. | Able to answer the questions related to the project | Able to answer the questions but with mistakes | Unable to answer the questions |  |
| **Obtained Score out of (15)** | | | | |  |
| **Obtained Score out of (X) = Obtained Score out of (15)/15\*X** | | | | |  |

Laboratory Examination Rubric

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| --- | --- | --- | --- | --- | --- |
| **Criteria** | **Exceeds Expectations (>=90%)** | **Meets Expectations (70%-89%)** | **Developing**  **(50%-69%)** | **Unsatisfactory (<50%)** | **Score** |
| **Performance**  **(15)** | Able to present full knowledge of both problem and solution. | Able to present adequate knowledge of both problem and solution | Able to present sufficient knowledge of both problem and solution | No or very less knowledge of both problem and solution |  |
| **Viva**  **(5)** | Able to answer the questions easily and correctly across the project. | Able to answer the questions related to the project | Able to answer the questions but with mistakes | Unable to answer the questions |  |
| **Obtained Score out of (20)** | | | | |  |
| **Obtained Score out of (X) = Obtained Score out of (20)/20\*X** | | | | |  |

Final Lab Assessment

|  |  |
| --- | --- |
| **Criteria** | **Score** |
| Laboratory Report (**15**) |  |
| Semester Project **(15)** |  |
| Laboratory Examination **(20)** |  |
| **Total Score out of (50)** |  |

***Examiner****: Sarah Farrukh*

***(Name and Signature)***