**Self-Scoring Rubric for A3: Library Management System**

**A) Class Design & OOP (30 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| A1. LibraryItem abstract base (8) | All required members; pure virtuals (displayInfo, calculateLateFee, getItemType); ctor/dtor; borrow/return; getters/setters correct. | 1–2 missing/minor mistakes. | Multiple omissions/logic flaws. | 6/8 |
| A2. Derived classes: Book, Magazine, DVD (10) | Override all pure virtuals; correct late-fee rates; extra fields implemented; operator<< and operator== as specified. | One class incomplete or one operator missing. | Several overrides/fields/operators missing. | 7/10 |
| A3. Member class (7) | All fields & methods; operator+=/-= for fees; operator<<; borrow/return list maintained. | 1 method/operator weak or edge cases mishandled. | Multiple missing or list not maintained. | 7/7 |
| A4. Encapsulation & invariants (5) | Proper access control; const-correct getters; sensible validation in mutators/borrow/return. | Minor leaks in const/validation. | Poor encapsulation/unchecked state. | 3/5 |

**Subtotal A:** 23/30

**B) Library Management Features (28 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| B1. Item mgmt (add/remove) (4) | Works; type counts updated. | Works with minor edge issues. | Unreliable or leaks. | 3/4 |
| B2. Member mgmt (add/remove) (4) | Works; safe removal semantics. | Minor issues (dangling refs). | Broken/incomplete. | 3/4 |
| B3. Search (ID required; title/author optional) (6) | searchByID plus at least one optional search; correct returns. | Only searchByID works or optional shaky. | Missing or unreliable. | 4/6 |
| B4. Borrow flow (8) | Availability enforced; due date tracked; member list updated; transaction logged. | 1 missing step or weak validation. | Multiple steps missing or wrong. | 6/8 |
| B5. Return & late fees (6) | Late fee computed by type; fees added to member; state reset; transaction logged. | Fee applied but state/log not perfect. | Fee/state/log largely incorrect. | 4/6 |

**Subtotal B:** 20/28

**C) Polymorphism & Operators (12 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| C1. Polymorphic container use (6) | vector<LibraryItem\*> used; virtual dispatch exercised throughout displays/fees. | Used but limited/no clear dispatch points. | Not truly polymorphic. | 5/6 |
| C2. Operators (6) | Library::operator+ deep-merges without dup IDs; operator[] works; stream << prints useful summaries; equality operators behave as specified. | Present with minor logic gaps or shallow copies. | Significant breakage or missing. | 5/6 |

**Subtotal C:** 10/12

**D) Transactions & Reporting (10 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| D1. Transaction class & logging (6) | Structurally correct; logs BORROW/RETURN with IDs, date, fees; operator<</display. | Logs missing one field or sporadic. | Mostly absent/incorrect. | 4/6 |
| D2. Reporting/Displays (4) | generateReport shows totals by type; available/borrowed views meaningful. | Report present but thin/incorrect counts. | Missing or misleading. | 0/4 |

**Subtotal D:** 4/10

**E) Build, Organization, Memory Safety (10 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| E1. Separate compilation & Makefile (6) | Compiles with make; no warnings (-Wall -Wextra) or trivial ones; clean target. | Builds but warnings or brittle Makefile. | Does not build reliably. | 5/6 |
| E2. Resource mgmt (4) | Clear ownership; destructor cleans all; no leaks in common paths. | Minor leaks or unclear ownership. | Frequent leaks/dangling pointers. | 3/4 |

**Subtotal E:** 8/10

**F) Code Quality & Documentation (10 pts)**

| **Criterion** | **Excellent (Full)** | **Partial** | **Minimal** | **Pts** |
| --- | --- | --- | --- | --- |
| F1. Style & readability (5) | Consistent naming, headers/guards, comments where needed, const-correctness. | Some inconsistencies. | Hard to read/understand. | 4/5 |
| F2. README / Usage notes (5) | Brief README with build/run, sample commands, file I/O notes. | Minimal notes inside code only. | None. | 4/5 |

**Subtotal F:** 8/10

**BASE TOTAL (A–F):** 73**/100**

**Extra Credit (up to +10)**

| **EC Criterion** | **Points** | **Notes** |
| --- | --- | --- |
| EC1. File I/O save/load (complete) | +6 | Persists **all** type-specific fields; robust parsing; idempotent load→save; saveTransactions included. |
| EC2. Custom exceptions | +4 | Own types thrown/caught at library boundary; clear messages; used to validate borrow/return/search. |

**MAX EXTRA:** **+10** (cap at 110%)

**Automatic Deductions (apply after subtotal)**

* **Crash on grader’s typical path**: −10
* **Undefined behavior found (e.g., invalid delete, out-of-bounds)**: −10 each occurrence (cap −20)
* **Memory leaks detected on simple run/valgrind**: −1 to −5 depending on severity
* **Hard-coded absolute paths / interactive prompts without defaults**: −3
* **No compilation instructions / broken Makefile**: −5

**Quick Grader Checklist**

* Builds with make on g++17
* LibraryItem abstract + overrides present
* Borrow/return changes both item and member, and logs a transaction
* Fees differ by type (Book 0.50/day, Magazine 0.25/day, DVD 1.00/day)
* operator+ deep-merges without duplicates
* generateReport shows item counts by type
* README explains how to run demo and (if present) save/load files

**Performance Bands (optional)**

* **A (90–100)**: Fully meets spec; clean architecture; no leaks; solid docs.
* **B (80–89)**: Minor gaps or small issues; core flows solid.
* **C (70–79)**: Several missing features, but compiles and basic flows work.
* **D (60–69)**: Unreliable flows or major spec gaps.
* **F (<60)**: Doesn’t build, or core requirements missing.