**1. Missed Call Alert (Java Fundamentals)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC1.1 | Add a single missed call | Caller: 9876543210, Time: 10:00 AM | Missed call stored and shown in list |
| TC1.2 | Add 10 missed calls | 10 different numbers | All 10 displayed in order |
| TC1.3 | Add 11th call (overflow) | New caller | Oldest call removed; last 10 retained |
| TC1.4 | Display missed calls list | Option 2 selected | Calls displayed with number and time |
| TC1.5 | View when no calls present | Choose display with empty list | Message: No missed calls |

**2. VAS Service Hierarchy (OOP / Inheritance)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC2.1 | Activate Caller Tune Service | Activation date: 22-07-2025 | Message: 🎵 Caller Tune activated |
| TC2.2 | Activate Voice Mail Service | Activation date: 22-07-2025 | Message: 📞 Voice Mail activated |
| TC2.3 | Check base class default message | Base class activateService() call | Generic activation message shown |

**3. SMS Subscription (Abstraction / Exception Handling)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC3.1 | Subscribe to SMS Pack | Call subscribe() once | Message: SMS Pack Subscribed |
| TC3.2 | Subscribe when already subscribed | Call subscribe() twice | Exception: Already Subscribed |
| TC3.3 | Unsubscribe when not subscribed | Call unsubscribe() without subscribe | Exception: Not Subscribed |
| TC3.4 | Subscribe then unsubscribe | Call subscribe() then unsubscribe() | Both actions succeed without exception |

**4. VAS Log Analyzer (Java 8)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC4.1 | Filter usage logs by CallerTune | Log list includes CallerTune & others | Only CallerTune logs shown |
| TC4.2 | Sort logs by usage time | Logs with different time durations | Logs sorted ascending by time |
| TC4.3 | Handle empty list | No entries in log | Optional: No element present |
| TC4.4 | Display first usage log | At least one entry present | First log entry printed |

**5. Bill Calculator (JUnit / Code Coverage)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC5.1 | Calculate charge for CallerTune | Type: CallerTune, Time: 10 | ₹5.0 |
| TC5.2 | Calculate charge for VoiceMail | Type: VoiceMail, Time: 10 | ₹3.0 |
| TC5.3 | Unknown service type | Type: Invalid, Time: 10 | ₹0.0 |
| TC5.4 | Usage time = 0 | Type: CallerTune, Time: 0 | ₹0.0 |
| TC5.5 | Negative usage time | Type: VoiceMail, Time: -5 | ₹0.0 |

**6. VAS Usage Tracker (Collections)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC6.1 | Add usage for one user with one service | U001 → MissedCallAlert | Entry stored and displayed |
| TC6.2 | Add multiple services for a single user | U002 → VoiceMail, CallerTune | Both services listed under U002 |
| TC6.3 | Add services for multiple users | U001, U002 | Usage shown per user |
| TC6.4 | View usage for a non-existent user | U003 not added | Null or no output |

**7. VAS Subscription (JDBC)**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC7.1 | Insert new subscription | U001, CallerTune, Active, Date | 1 row inserted in DB |
| TC7.2 | Retrieve subscription by user ID | SELECT \* WHERE userId='U001' | Matching rows returned |
| TC7.3 | Update service status | Change to 'Inactive' | DB row updated |
| TC7.4 | Delete subscription | DELETE WHERE userId='U001' | Row deleted successfully |
| TC7.5 | Insert with SQL injection (malicious) | userId = ' OR 1=1 -- | Input rejected due to parameterized query |

**8. Capstone — VAS Dashboard**

| **TC ID** | **Test Case Description** | **Input** | **Expected Output** |
| --- | --- | --- | --- |
| TC8.1 | Admin adds new VAS service | Name: "News Alert", Date: valid | Service added, visible in list |
| TC8.2 | Admin removes an existing service | Service: CallerTune | Service removed from memory & DB |
| TC8.3 | View all active subscriptions | Admin selects "View Subscriptions" | List of users & services shown |
| TC8.4 | Generate usage report | Admin selects report for CallerTune | Usage summary via Stream API shown |
| TC8.5 | Backup to DB | Save in-memory to DB | Insert successful for all active services |