🚀 Full MMSE Implementation Plan (Digital Version)

SECTION 1: ORIENTATION (10 points)

Total questions: **10** (5 time + 5 place)

1. Time Orientation (5 questions → 5 points)

Questions:

1. Year
2. Season
3. Date
4. Day
5. Month

Implementation

- Show 5 separate text boxes OR one grouped input form.
- For usability, MCQ dropdowns can be used.

Component: `TextResponseQuestion` OR `MultipleChoiceQuestion`
Input type: text or dropdown
Scoring:

- 1 point per correct answer.

Data saved:

```
{
  "year": "2025",
  "season": "Winter",
  "date": "24",
  "day": "Monday",
  "month": "November"
}
```

2. Place Orientation (5 questions → 5 points)

Questions:

1. State
2. County/District
3. Town/City
4. Hospital/Building
5. Floor/Room Level

Implementation

- 5 separate fields
- Pre-fill user geolocation? (No — avoid bias)

Component: `TextResponseQuestion`
Scoring:

- Exact match or acceptable synonyms ("First Floor" = "1st Floor")

Data saved example:

```json
{
  "state": "Maharashtra",
  "district": "Pune",
  "city": "Pune",
  "building": "Ruby Hall",
  "floor": "Second"
}
```

SECTION 2: REGISTRATION (3 points)

Total: **1 question → 3 answers → 3 points**

3. Immediate Registration of 3 Words (3 points)

Words: **Apple**, **Penny**, **Table** (or any 3 chosen words)

Implementation

Step A: Display 3 words for **5 seconds**

- Disable copying/selection
- After 5 sec → auto-hide

Step B: Ask user to repeat them

- Text field for each word
  OR
- Audio recording

Component:

- `MemoryDisplayComponent` (shows → hides)
- `TextResponseQuestion` OR `AudioRecordingQuestion`

Scoring:

- 1 point for each exactly recalled word (case-insensitive)
- Normalize spacing, spelling variants allowed if close (Levenshtein distance <= 1)

Data Example:

```
{
  "shown_words": ["Apple", "Penny", "Table"],
  "user_response": ["apple", "pany", "table"],
  "score": 2
}
```

SECTION 3: ATTENTION & CALCULATION (5 points)

Total: **1 question group** → **5 answers** → **5 points**

4. Serial 7s Subtraction OR WORLD Backwards (5 points)

Option A: Serial 7s from 100

Expected answers:
93, 86, 79, 72, 65

Implementation Options

Option A (One line input):

User enters:
`93 86 79 72 65`

Option B (Recommended, 5 fields):

Input boxes:

- Step 1
- Step 2
- Step 3
- Step 4

- Step 5

Component:

`TextResponseQuestion` (multiple fields)

Scoring:

- 1 point per correct number
- Accept answers in sequence only

Option B: WORLD → DLROW

User types the reversed word.

Scoring:

- 5 letters correct = 5 points
- Strict or partial scoring allowed (industry standard → strict)

SECTION 4: RECALL (3 points)

Total: **1 question → 3 answers → 3 points**

---

5. Delayed Recall of the 3 Words (3 points)

Ask:
"What were the three words I asked you to remember earlier?"

Implementation

- 3 input boxes
- Should appear only after 1–2 sections have passed (natural delay)

Component: `TextResponseQuestion`
Scoring: Same as Registration.

Data stored: identical structure.

SECTION 5: LANGUAGE & PRAXIS (9 points)

Total: **6 question blocks → 9 points**

---

6. Naming Objects (2 questions → 2 points)

Objects:

- Pencil
- Watch

Implementation

- Show image 1 → "What is this?"
- Show image 2 → "What is this?"

Component:
ImageQuestion + TextResponseQuestion

Scoring:

- "Watch", "Wristwatch" both accepted
- "Pencil" accepted (color pencil vs pencil okay)

7. Repetition (1 question → 1 point)

Phrase:
"No ifs, ands, or buts."

Implementation:

- Show text OR play audio
- Ask user to repeat by **typing** OR recording audio.

Component: TextResponseQuestion or AudioRecordingQuestion

Scoring:

- Must be **exact phrase**
- Accept punctuation variations
- Reject if missing any of "ifs", "ands", "buts"

8. 3-Stage Command (3 questions → 3 points)

Steps:

1. Take paper in right hand
2. Fold it in half
3. Put it on the floor

Digital Implementation Options:

Option A – MCQ

"Select the actions in the correct order:"

- Take paper
- Fold it
- Put it down

Option B – Drag & Drop (Preferred)

3 icons that user must arrange in order.

Component:
DragAndDropSequenceQuestion

Scoring:
3 correct = 3
2 correct = 2
1 correct = 1
0 correct = 0

---

9. Reading (1 question → 1 point)

Text shown:
CLOSE YOUR EYES

Implementation:

- Show large text
- Ask user: "Perform the instruction shown."

Digital Alternative:

MCQ:
"Did you close your eyes?" → Yes/No

OR
Webcam detection (advanced)

Component: InstructionQuestion

Scoring:
Yes = 1
No = 0

---

10. Writing (1 question → 1 point)

Prompt:
"Write a complete sentence."

Requirement:

- Must contain subject & verb
- Must be meaningful
- Grammar not strict

Implementation

- Multiline input box
- Autosave

Component: `TextResponseQuestion` (multiline)

Scoring:
Manual review OR NLP validation (semantic check)

11. Copying (1 question → 1 point)

Task:
Copy intersecting pentagons.

Implementation

- Show reference image
- Provide drawing canvas
- Optional background faint image

Component: `DrawingCanvasQuestion`

Scoring:
Binary

- Recognizable, intersecting → 1
- Otherwise → 0

📊 MMSE Structure Summary

Section	#Questions	Points	Component(s)
Orientation	10	10	Text / MCQ

Section	#Questions	Points	Component(s)
Registration	1 (3 answers)	3	Memory display + Text / Audio
Attention	1 group	5	Text fields
Recall	1 (3 answers)	3	Text
Naming	2	2	Image + Text
Repetition	1	1	Text / Audio
3-Stage Command	3 steps	3	MCQ / Drag-Drop
Reading	1	1	MCQ / Instruction
Writing	1	1	Text (multiline)
Copying	1	1	Drawing canvas

Total: 30 points

🧠 SCORING SYSTEM

- Autoscoring for all text/MCQ except:
    - Writing (manual or NLP)
    - Drawing (manual or AI evaluation option)

🗂️ DATABASE MODEL (recommended)

```json
{
  "userId": "uuid",
  "testType": "MMSE",
  "timestamp": "2025-11-25T18:30:00Z",
  "responses": {
    "orientation": {...},
    "registration": {...},
    "attention": {...},
    "recall": {...},
    "naming": {...},
    "repetition": {...},
    "three_stage": {...},
    "reading": {...},
    "writing": { "sentence": "..." },
    "copying": { "drawingUrl": "..." }
  },
  "score": 23,
```

```
    "interpretation": "Mild cognitive impairment"
  }
```

🏗️ Frontend Implementation Checklist

Components Needed

- TextResponseQuestion
- MultipleChoiceQuestion
- MemoryDisplayQuestion
- AudioRecordingQuestion
- DragAndDropSequenceQuestion
- DrawingCanvasQuestion
- ImageQuestion
- InstructionQuestion

Extra behaviors

- Timer for memory display
- Delayed recall sequencing
- Case-insensitive scoring
- Semantic validation for writing
- File uploads for drawing