GUIDELINES AND MARKING SCHEME FOR PRACTICAL REPORT

Section A: Attendance and Responsibility (Total 20%)

1. Attendance (5%)

Score	Criteria
0	Student did not attend without any valid reasons.
5	Student is present.

2. Pre-entering lab (5%)

Score	Criteria
0	No preparation of experimental procedure.
3	Summary of procedures too brief, lack of details and confusing.
5	Presents easy to follow steps in lab experimental, logical and adequately detailed.

3. Proper attire (5%)

Score	Criteria
0	No proper attire – covered shoes, safety goggles and lab coat.
3	Covered shoes and lab coat available but no safety goggles.
5	Safety attire checked.

4. Promptness (5%)

Score	Criteria
0	Student is late for more than 15 minutes without any valid reasons.
3	Student is late for not more than 15 minutes without any valid reasons.
5	Student is always prompt.

Notes:

1. The student MUST attend the laboratory session to be eligible for obtaining marks. NO marks will be given at all if the student did not attend any laboratory sessions without valid reasons.

2. If the student did not attend any of the laboratory session, there MUST be an official explanation (i.e., if Covid-19: MySejahtera Screenshot; Sick: MC from doctor; representing UM in activities: Official Letter from the Department/Faculty/University, etc.; Family reasons: Death of family member, etc.).

Section B: Lab Performance − Skills and Technique (Total 20%)

Score	Criteria
0-5	No skill is demonstrated.
6-10	Wrong glassware used, wrong technique, spillage and wasting of chemicals.
11-15	Right glassware used, incorrect or lack of lab technique.
16-20	Presents correct lab skill, clean and tidy.

Section C: Lab Jotter (Total 10%)

Score	Criteria
0	No jotter or student did not show raw data to the lecturer-in-charge; student exhibit evidence of data forging and/or plagiarism.
1-3	Raw data are out-of-place; major data or observations missing; no proper labelling.
4-6	Some key data or observations missing. Presentation need major improvement.
7-8	Almost all raw data and key observations written. Presentation can still be improved.
9-10	Raw data and observations tabulated/written in a clear and tidy manner, with correct units and no evidence of data forging and/or plagiarism.

Section D: Lab Report (Total 40%)

(I)   Short Report

Section	Score	Criteria
Title **(5 marks)**	0	No title.
	1	Too brief (e.g. "Lab Report", "Mercury in Fish", "Synthesis of Cinnamic Acid" or "Boiling Point of Water").
	2-3	Too long or does not identify the complete subject of study (e.g. "Determination of iron", "Determination of lead", etc.).
	4-5	Identify the complete subject of study and encapsulates the purpose of the report/study (e.g. "Kinetics of the hydrolysis of *t*-butyl chloride at 30 ℃", "Synthesis of triphenylcarbinol via Grignard reaction" or "Determination of iron in red meat via spectrophotometry").
Results (Data, figures, graphs, tables, observations, % yield, etc.) **(35 marks)**	0	Section missing completely.
	1-10	No flow of results. Figures, graphs, tables contain errors or are poorly constructed, have missing titles, captions or numbers, units missing or incorrect, numerical data did not have correct significant figures, etc.
	11-20	Most figures, graphs, tables OK, some still missing some important or required features.
	21-30	All figures, graphs, tables are correctly drawn, but some have minor problems (e.g. incorrect significant figures, incomplete observation) or could still be improved.
	31-35	All figures, graphs, tables are correctly drawn, are numbered and contain titles/captions. Observations clearly stated. Numerical data contains correct significant figures and units.
Discussion **(35 marks)**	0	Section missing completely.
	1-10	Lack of attempt to relate experimental findings and data with contemporary theories. Very incomplete or incorrect

		interpretation of trends and comparison of data indicating a lack of understanding of results.
	11-20	Some attempt to relate experimental findings and data but using inaccurate theories. Some of the results have been correctly interpreted and discussed; partial but incomplete understanding of results is still evident.
	21-30	Almost all of the results have been correctly interpreted and discussed, only minor improvements are needed.
	31-35	All of the important trends and data comparisons have been interpreted correctly and discussed; good understanding of results is conveyed.
Safety Precautions (5 marks)	0	Section missing completely.
	1	Sentences are incomplete, focusing on minor points or lack important steps.
	2-3	State only 1-2 major and most important safety precautions.
	4-5	State at least 3 major and most important safety precautions.
Conclusions (10 marks)	0	Section missing completely.
	1-3	Conclusion missing the important points or is not supported by the experimental results.
	4-6	Conclusions regarding major points are drawn, but many are misstated, indicating a lack of understanding.
	7-8	All important conclusions have been drawn, could be better stated.
	9-10	All important conclusions have been clearly made, student shows good understanding.
References (5 marks)	0	Section missing completely.
	1-3	Incomplete references to the books or any other sources used in report.
	4-5	Correct in-text citations and the references in the reference list conform to all respects of the formatting convention (e.g. APA format). Complete references to the books or any other sources used in report. References in text are matched with references in reference list (e.g. no missing references).
Appearance and Formatting (5 marks)	1	Sections out of order, too much handwritten copy, sloppy formatting.
	2	Sections in order, contains the minimum allowable amount of handwritten copy, formatting is rough but readable.
	3	All sections in order, formatting generally good but could still be improved.
	4-5	All sections in order, well-formatted, very readable.

Total section D marks = **(x/100) × 40%**

Section	Score	Criteria
Title **(5 marks)**	0	No title.
	1	Too brief (e.g. "Lab Report", "Mercury in Fish", "Synthesis of Cinnamic Acid" or "Boiling Point of Water").
	2-3	Too long or does not identify the complete subject of study (e.g. "Determination of iron", "Determination of lead", etc.).
	4-5	Identify the complete subject of study and encapsulates the purpose of the report/study (e.g. "Kinetics of the hydrolysis of *t*-butyl chloride at 30 ºC", "Synthesis of triphenylcarbinol via Grignard reaction" or "Determination of iron in red meat via spectrophotometry").
Introduction (Including objectives) **(10 marks)**	0	Section missing completely.
	1-3	Very little background information provided, or information is incorrect.
	4-6	Some introductory information, but still missing some major points.
	7-8	Introduction is nearly complete, missing some minor points.
	9-10	Introduction complete and well-written; provides all necessary background principles for the experiment with evidence of extra reading.
Experimental Procedure **(10 marks)**	0	Section missing completely.
	1-3	No sub-sections, missing several important experimental details or not written in paragraph format. Parts have been included under the wrong sub-section.
	4-6	Written in paragraph format, still missing some important experimental details.
	7-8	Written in paragraph format, important experimental details are covered, some minor details missing.
	9-10	Well-written in paragraph format, all experimental details are covered.
Results (Data, figures, graphs, tables, observations, % yield, etc.) **(25 marks)**	0	Section missing completely.
	1-7	No flow of results. Figures, graphs, tables contain errors or are poorly constructed, have missing titles, captions or numbers, units missing or incorrect, numerical data did not have correct significant figures, etc.
	8-15	Most figures, graphs, tables OK, some still missing some important or required features.
	16-20	All figures, graphs, tables are correctly drawn, but some have minor problems (e.g. incorrect significant figures, incomplete observation) or could still be improved.
	21-25	All figures, graphs, tables are correctly drawn, are numbered and contain titles/captions. Observations clearly stated. Numerical data contains correct significant figures and units.
Discussion	0	Section missing completely.

(25 marks)	1-7	Lack of attempt to relate experimental findings and data with contemporary theories. Very incomplete or incorrect interpretation of trends and comparison of data indicating a lack of understanding of results.
	8-15	Some attempt to relate experimental findings and data but using inaccurate theories. Some of the results have been correctly interpreted and discussed; partial but incomplete understanding of results is still evident.
	16-20	Almost all of the results have been correctly interpreted and discussed, only minor improvements are needed.
	21-25	All of the important trends and data comparisons have been interpreted correctly and discussed; good understanding of results is conveyed.
Safety Precautions (5 marks)	0	Section missing completely.
	1	Sentences are incomplete, focusing on minor points or lack important steps.
	2-3	State only 1-2 major and most important safety precautions.
	4-5	State at least 3 major and most important safety precautions.
Conclusions (10 marks)	0	Section missing completely.
	1-3	Conclusion missing the important points or is not supported by the experimental results.
	4-6	Conclusions regarding major points are drawn, but many are misstated, indicating a lack of understanding.
	7-8	All important conclusions have been drawn, could be better stated.
	9-10	All important conclusions have been clearly made, student shows good understanding.
References (5 marks)	0	Section missing completely.
	1-3	Incomplete references to the books or any other sources used in report.
	4-5	Correct in-text citations and the references in the reference list conform to all respects of the formatting convention (e.g. APA format). Complete references to the books or any other sources used in report. References in text are matched with references in reference list (e.g. no missing references).
Appearance and Formatting (5 marks)	1	Sections out of order, too much handwritten copy, sloppy formatting.
	2	Sections in order, contains the minimum allowable amount of handwritten copy, formatting is rough but readable.
	3	All sections in order, formatting generally good but could still be improved.
	4-5	All sections in order, well-formatted, very readable.

Total section D marks = **(x/100) × 40%**

Section E: Assessment of Understanding/Revision on Conducted Experiments (10%)

Score	Criteria
x	Test/Quiz/Lab Presentation, etc.

* For Section E: Assessment - it is up to the lecturer in-charge to decide whether he/she wants to carry out the method of assessment (simple test, presentation, etc). If he/she chooses not to, the 10% marks will be allocated back to Section D: Lab report (i.e. total marks/100 × 50%)

** Late Report Submission: −1 mark / day

Guide for Lecturers to Evaluate Skills and Techniques (Section B)

This is a simple guide for lecturers to evaluate candidates' laboratory skills and techniques. Some simple examples are shown below:

Example 1: Filtering solids using a Buchner funnel

1-5 m: The candidate does not even know what a Buchner funnel and filtering flask are, even after demonstration.

6-10 m: The candidate used a filter paper, funnel, and conical flask to filter the crystals.

11-15 m: The candidate used a Buchner funnel and filtering flask to filter. However, he/she did not cut the filter paper properly, did not wet the filter paper prior to pouring the solution, did not clamp the Flask with a retort stand.

16-20 m: The candidate used a Buchner funnel and filtering flask to filter. The candidate proceeds with clamp the filtering flask with a retort stand, cutting the filter paper to the appropriate size according to the Buchner funnel, wet it with the appropriate solvent, and pour the solution carefully until in such most of the crystals are inside the Buchner funnel.

Example 2: Acid-base titration

1-5 m: The candidate does not even know what a burette and pipette are, even after demonstration.

6-10 m: The candidate handled the pipette wrongly; filled the burette and read the volume meniscus wrongly (i.e. meniscus not parallel with the eye); did not clamp the burette securely with a retort stand; did not use the correct acid-base indicator or did not use any indicator at all.

11-15 m: The candidate used a pipette and burette correctly and clamped the burette with a retort stand and used the correct acid-base indicator. However, he/she used a beaker for the titration instead of a conical flask or did not remove the trapped air bubbles in the burette prior to titration.

16-20 m: The candidate used a pipette and burette correctly and clamped the burette with a retort stand and used the correct acid-base indicator. During titration, he/she used proper glassware and removed the trapped air bubbles in the burette prior to titration.

Example 3: Operating a UV-visible spectrophotometer

1-5 m: The candidate does not even know how to operate a UV-visible spectrophotometer, even after demonstration.

6-10 m: The candidate did not calibrate the spectrophotometer with the appropriate blank solutions before the experiment or the candidate used the wrong blank solution as reference.

11-15 m: The candidate used a calibrated spectrophotometer to do experiment but did not wipe the cuvette clean with a tissue paper prior to doing the experiment or the candidate did not rinse the cuvette properly after use.

16-20 m: The candidate used a calibrated spectrophotometer to do experiment and used the cuvette properly.

Guide for Lecturers to Evaluate Students' Understanding of Experiments (Section E)

The evaluation for Section E should encompass what the students have learned throughout the laboratory session. Examples of methods to conduct the evaluation:

(a)   Written test:
        e.g. How do you determine which layer is organic or aqueous in a separating funnel?

OR

(b)   Student conduct one of the experiments without any input from the lecturer and assessment is carried out during the experiment:
        e.g. Students carry out a recrystallisation of benzoic acid themselves.

OR

(c)   Presentation of experimental results (oral or any method deemed suitable):
        e.g. Students presenting their experiment results.

OR

(d)   Any other methods deemed suitable.