STUDENT LAB SAFETY, HIRARC, DATASHEET VERIFICATION CHECKLIST, AND BRIEF REPORT SUBMISSION

EXPERIMENT EM3: LORENTZ FORCE AND TRANSFORMER

STUDENT NAME : _____
MATRIC NO. : _____
GROUP : _____
DATE : _____

A. Equipment and System Verification Checklist

tem	Verification Requirement	✓
Power Supply	Output initially set to 0 V before energising	
Rectifier	Connected correctly between power supply and electromagnet circuit	
Cobra3 Unit	Connected and communicating with computer	
Current Sensors (6 A)	Connected to correct analog input channels	
Force/Newton Sensor	Installed securely and tared before measurement	
Coil and Iron Core	Connected correctly and securely mounted	
Electromagnet Pole Pieces	Air gap adjusted according to procedure	
Conductor Loop	Correct loop size selected and securely suspended	
Flexible Conductor Strips	Properly aligned and not excessively strained	
Transformer	Correct tap connections verified	
Transformer	Open-circuit configuration verified before testing	
Software (Measure / PowerGraph)	Measurement parameters configured correctly	
Data Acquisition System	Test measurement performed successfully	
Wiring Connections	Verified against laboratory setup diagrams	

B. HIRARC Checklist (OSH-Based Risk Assessment)

Hazard / Unsafe Condition	Potential Consequence	Control Measure	✓
High current through conductor loop (up to 5 A)	Conductor heating and equipment damage	Increase current gradually and remain within specified limits	

Improper rectifier connection	Incorrect operation and measurement errors	Verify polarity and wiring before energising	
Contact with energized conductors	Electrical shock or accidental short circuit	Avoid touching exposed conductors during operation	
Strong magnetic field near sensors and equipment	Measurement interference and instability	Maintain correct equipment positioning as instructed	
Loose conductor loop or suspension system	Unstable force measurements	Secure all mechanical components before testing	
Improper use of Tara function	Incorrect force measurements	Zero the force sensor before every measurement sequence	
Excessive attraction between conductor strips	Mechanical disturbance and measurement errors	Ensure maximum strip separation and proper alignment	
Changing circuit connections while energized	Component damage and inaccurate results	Switch OFF power before modifications	
Transformer tap misconnection	Incorrect output voltage and equipment stress	Verify turn-ratio selection before energising	
Excessive transformer input voltage	Transformer overheating	Do not exceed specified voltage range	
Poor cable management	Accidental disconnection and equipment damage	Keep leads organized and secured	
Incorrect data recording	Invalid engineering conclusions	Verify readings before saving or reporting results	

C. Engineering Practice Verification

Requirement	✓
Experimental setup verified against laboratory diagrams	
Force sensor tared before measurement	
Current-sensor operation verified	
Electromagnet air gap adjusted correctly	
Conductor-loop dimensions verified before testing	
Current increased gradually during measurements	
Transformer tap selection verified before testing	

Experimental results compared with theoretical relationships	
Data recorded accurately and honestly	
Equipment returned to zero-voltage condition after testing	

D. Student Declaration

I confirm that:
☐ Equipment connections have been verified before energisation.
☐ Current sensors and force sensor have been checked and configured correctly.
☐ The force sensor has been tared before measurement.
☐ Electromagnet and conductor-loop assemblies have been securely installed.
☐ Transformer connections and tap selections have been verified.
☐ Hazards have been identified and appropriate control measures implemented.
☐ No damaged equipment, cables, or connectors are being used.
☐ Demonstrator approval has been obtained before starting the experiment.

Student Signature : _____

Date : _____

E. Experiment Data Results and Discussion

In Lab Task (During Lab)

TEST 1: Current Balance / Force acting on a current-carrying conductor
Part 1: Force vs. Conductor Current (I_L)

S.No.	Conductor Current, I_L (A)	Mass reading (g)	Force, F (N)
1			
2			
3			
4			

Part 2: Force vs. Coil Current (I_m)

S.No.	Coil Current, I_m (A)	Mass reading (g)	Force, F (N)
1			
2			
3			
4			

TEST 2: Transformer
Part 1: Secondary Voltage (U_S) vs. Primary Voltage (U_P)
(For a fixed turns ratio, n)

S.No.	Primary Voltage, U_P (V_{rms})	Secondary Voltage, U_S (V_{rms})
1	0	
2	2	
3	4	
4	6	

Part 3: Step-down Transformer (US vs. Turns Ratio)
(For a fixed primary voltage, UP = 15 V_{rms})

S.No.	Turns Ratio, n	Secondary Voltage, US (V_{rms})
1		
2		
3		
4		

DISCUSSION:

CONCLUSION:

LAB LECTURER SIGNATURE : _____
DATE : _____

INSTRUCTOR SIGNATURE : _____
DATE : _____