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

EXPERIMENT EM2: MAGNETIC FIELD OUTSIDE A CONDUCTOR & IN HELMHOLTZ ARRANGEMENT

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

A. Equipment and System Verification Checklist

Item	Verification Requirement	✓
AC / DC Power Supply	Output initially set to 0 V before energisation	
Teslameter / Magnetic Field Meter	Powered and functioning correctly	
Teslameter Probe	Probe undamaged, correctly oriented and positioned	
Multimeter	Correct current range selected and leads connected securely	
Current Transformer	Connections verified before operation	
Straight Conductor	Installed securely and clear of accidental contact	
Parallel Conductors	Correct configuration and current direction selected	
Ruler / Distance Scale	Positioned for consistent probe-distance measurement	
Cobra3 Unit	Connected and functioning correctly	
Tesla Measuring Module	Connected securely to Cobra3 unit	
6 A Current Sensor	Connected to Analog In 2/S2 as instructed	
Movement Recorder	Connected correctly and movement is unobstructed	
Hall / Tesla Probe Module	Connected and aligned with the measurement axis	
Helmholtz Coils	Mounted securely; coil spacing checked before measurement	
Computer / Measure Software	Communication established and required parameters configured	

B. HIRARC Checklist

Hazard / Unsafe Condition	Potential Consequence	Control Measure	✓
Contact with energised terminals or conductors	Electric shock or short circuit	Do not touch exposed conductors while energised; switch supply OFF before changing connections	

High current through conductors or coils	Heating and possible equipment damage	Increase supply gradually; monitor current and stop if abnormal heating is observed	
Changing conductor/coil connections while energised	Arcing, transient voltage or equipment damage	Set output to 0 V and switch current OFF before unplugging or reconfiguring connections	
Incorrect wiring before energisation	Equipment malfunction or incorrect readings	Verify the circuit against the experiment figure before power ON	
Loose or damaged cables	Intermittent readings, short circuit or electrical hazard	Inspect leads and connectors; do not use damaged cables	
Incorrect meter range or connection	Meter overload or invalid readings	Confirm multimeter/current-sensor range and terminal connections before measurement	
Incorrect probe orientation or position	Invalid magnetic-field measurements	Align the probe as specified and maintain the required distance/orientation	
High current applied for excessive duration	Conductor or coil overheating	Use only the required current and avoid prolonged energisation	
Unsecured Helmholtz coils or movement apparatus	Movement of apparatus and measurement error	Secure coils, probe assembly and movement recorder before measurement	
Moving probe/movement recorder during operation	Pinch/entanglement or equipment displacement	Keep hands and loose items clear of moving parts and ensure the thread path is unobstructed	
Incorrect phase relationship in Test 1	False polarity/negative magnetic-field indication	Check the phase indication and follow the experiment instruction before interpreting readings	
Magnetic or ferromagnetic objects near probe/coils	Distorted magnetic-field measurements	Keep unnecessary magnetic/ferromagnetic objects away from the measurement region	

C. Engineering Practice Verification

Requirement	✓
Test 1 setup checked against Figure 1	
Supply output verified at 0 V before energisation or changing conductors	
Teslameter probe position and distance reference verified	
Correct straight/parallel conductor configuration verified before each measurement	

Test 2 setup checked against Figures 2 and 3	
Cobra3, Tesla module, 6 A current sensor and movement recorder connections verified	
Hall probe alignment and movement direction verified	
Hall probe/distance calibration performed with coil current OFF	
Helmholtz coil spacing checked, including a = R = 200 mm where required	
Coil current kept constant where specified in the procedure	
Data recorded accurately and honestly	
Power/current switched OFF before disconnecting equipment after testing	

D. Student Declaration

☐ All electrical and measurement connections have been checked before energisation.

☐ The power-supply output will be set to 0 V before changing conductor or coil connections.

☐ The Teslameter/Hall probe position and orientation have been verified.

☐ The correct meter/sensor range and software settings have been selected.

☐ The Helmholtz coil and movement-recorder assemblies are secure before operation.

☐ I will switch the coil current OFF before unplugging a cable leading to a coil.

☐ Hazards have been identified and the stated control measures will be followed.

☐ No visibly damaged equipment, probes or cables will be used.

Student Signature : _____

Date : _____

E. Experiment Data Results and Discussion
In Lab Task (During Lab)

Test 1: Magnetic field outside a straight conductor

Voltage (V)	**Current I(A)**	**Magnetic field B(mT)**
2		
4		
6		
8		
10		
12		

Table 2: Magnetic field (B) vs. Distance (d) (Voltage V= 5V)

Distance	d(cm)	Magnetic field B (mT)
0		
1		
2		
3		
4		
5		

Table 3: Parallel conductor with same current direction

Distance	d(cm)	Magnetic field B (mT)
3		
2		
1		
0		
-1		
-2		
-3		

Table 4: Parallel conductor with opposite current direction

Distance	d(cm)	Magnetic field B (mT)
3		
2		
1		
0		
-1		
-2		
-3		

DISCUSSION:

CONCLUSION:

LAB LECTURER
SIGNATURE : _____

DATE : _____

INSTRUCTOR
SIGNATURE : _____

DATE : _____