



**FEDERAL BOARD OF INTERMEDIATE AND
SECONDARY EDUCATION**

H-8/4, ISLAMABAD



INTER-TECH

**ASSESSMENT MANUAL FOR PRACTICAL
OF
IOT ADVANCED SOLUTIONS
HSSC-I**

**FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION
H-8/4, ISLAMABAD**

IoT & DATA CODING
Scheme of Studies 2024

IoT ADVANCED SOLUTIONS

Purpose:

- This **Assessment Manual** to ensures **standardized marking** for all students.
- Faculty can simply **tick/check and assign marks** during exams.
- Students know **exactly what is expected** from them.
- This format provides **clarity, fairness, and transparency** for both faculty and students.

Section I – Theory Paper Assessment (40%-40 Marks)

Component	Criteria	Max Marks	Marks Obtained
MCQs (20%)	Knowledge recall, basic concepts	8	
Short Answer Questions (50%)	Comprehension, application, clarity	20	
Long Essay / Analytical- based (30%)	Depth of understanding, analysis, Clarity of subject.	12	
Total Theory		40	

Section II – Practical Assessment (60%- 60 Marks)

A. Projects/Portfolios (30%- 30 Marks)

Criteria	Max Marks	Marks Obtained
Practical Task Execution (Hardware setup, sensor/actuator interfacing, and correct circuit connections): Accuracy, functionality, and safety.	2Qx15=30	
Programming & Application (Correct code writing/uploading, successful execution, basic data display using dashboard/widgets, and explanation of visualization tools): Accuracy, completeness, and presentation.		
General Evaluation: Completeness of Portfolio/manual, Neatness, Organized, timely submission, Accuracy & Correctness In the view of above portfolio Two Questions will be assigned from the Experiments/Practicals list. Students will attempt both questions. Each question carries 15 marks.		
Total	30	

- External Examiner reserves the right to select any two question (practical's/Experiments) from the attached list to evaluate the candidate performance as required by the FBISE examination criteria.

Verification Level: Subject Teacher/Instructor and HOD/Principal with Name, Signature &

Stamp. Countersigned by the external examiner.

Marking: Marks shall be awarded by the External Examiner.

B. Viva Voce (10%-10 Marks)

Criteria	Max marks	Marks Obtained
Theory-based Questions (knowledge of IoT concepts, hardware, software, tools, and communication technologies)	5Qx2=10	
Scenario-based Questions (questions related to IoT project implementation, problem identification, sensor selection, data flow, and application area)		
Total Viva	10	

Note: Only five questions will be asked. No additional question is allowed

C. Hands-on Practical Skills (20%-20 Marks)

Criteria	Max Marks	Marks Obtained
Portfolio: It comprises of correct setup and operation of IoT hardware with accurate program execution, successful connectivity, data monitoring, and clear demonstration of system functionality. Note: Teacher will observe the hands on skill during the performance of experiment	20	
Total	20	

NOTE:

- Hands-on Practical skills/Experimental skills marks will be awarded as per candidate performance by the External Examiner.

D. Time Duration for Practical (03 Hours)

Final Summary of Assessment

Component	Max Marks	Marks Obtained
Section I: Theory Paper Assessment	40	
Grand Total	40	
Section II: Practical Assessment		
Projects/portfolio	30	
Viva	10	
Hands-on practical Skills	20	
Grand Total	60	

1. External Examiner

To ensure transparency, reliability and validity. Students will be evaluated by a qualified external examiner.

Responsibilities:

- Oversees the **entire practical exam process**.
- Ensures exams are conducted **according to policy**.
- Countersigned by the external examiner.
- Evaluates **hands-on practical skills**.
- Signs off on the **final mark sheets**.
- Maintains fairness and addresses student/examiner issues if they arise.
- Viva voce questions may be asked as per above mentioned policy.
- Special attention may be given to the availability of the lab equipment relevant to projects

2. Supporting Staff (Internal)

Lab Assistant and attendant

- Prepares lab/, equipment.
- Assist external examiner in maintaining of Projects/portfolio folders.

Lab attendant

- Serve external examiners.
- Assist lab assistant in preparation of labs.

IOT Advance Solutions

LIST OF EXPERIMENTS/PRACTICALS

Project/Portfolio	Actions / Activities / Practicals	Description
Introduction to IoT & System Design	1. Design block diagrams of basic IoT systems. 2. Compare IoT applications and architectures.	Understand IoT architecture, identify components, explain data flow, compare applications.
Core Hardware Practicals	3. Install Arduino IDE and upload Blink. 4. Program LED, button, buzzer. 5. Install Raspberry Pi OS and run Python. 6. Control GPIO using Python.	Install/configure hardware tools, write Arduino/Python programs, interface GPIO.
Networking & Connectivity	7. Study network layers/topologies. 8. Connect ESP8266 to Wi-Fi. 9. Configure Arduino Cloud. 10. Control relay via Internet. 11. Build small sensor mesh network.	Configure connectivity, cloud integration, remote control, networking concepts.
Data & Dashboard Practicals	12. Visualize sensor data in Grafana. 13. Display live ESP8266 widgets. 14. REST API with Postman. 15. Basic predictive analytics.	Create dashboards, monitor data, test APIs, analyze sensor data.
Final Project	16. Design and implement an IoT-based Monitoring or Control System with report and presentation.	Integrate hardware, software, networking, cloud, testing and presentation.



**IOT ADVANCED SOLUTIONS
PRACTICAL MODEL PAPER
HSSC-I**

Time allowed: 3:00 Hours

Total Marks :30

Note: Attempt the following Questions

Q.1 Design a Basic IoT System and perform the following tasks: **15 Marks**

- i. Draw and label the Sensor, Controller, Connectivity, Cloud and Application layers. **(4 Marks)**
- ii. Identify two sensors and one controller used in the system. **(3 Marks)**
- iii. Show the data flow using arrows. **(4 Marks)**
- iv. Explain the function of each layer. **(4 Marks)**

Q.2 Develop an Arduino-based IoT application: **15 Marks**

- i. Install and configure the Arduino IDE. **(3 Marks)**
- ii. Write and upload a program to blink an LED or control an LED using a push button. **(6 Marks)**
- iii. Demonstrate the working of the circuit. **(3 Marks)**
- iv. Explain the Arduino program structure (`setup()` and `loop()`). **(3 Marks)**

Note: Marks will be awarded as per candidate's performance by the External Examiner, including practical knowledge, communication, confidence, and presentation skills.