

IoT Applications (315341)

MSBTE Diploma · K-Scheme · Electronics & Telecommunication (EJ) and allied branches, Semester 5 · Important Questions

How this list was made: Based on MSBTE papers **W-2025** and **S-2026** available on msbte.ac.in — these are the **only two** K-scheme papers of this course so far, so the analysis is based on a small sample. Every question of both papers (53 in all) was grouped by topic. **High** = asked in both papers, **Medium** = asked in one paper, **Low** = in the K-scheme syllabus but not asked yet. Practice guidance only — not a prediction of the exam.

Syllabus marks weightage (suggested by MSBTE): Unit I – 12, Unit II – 14, Unit III – 18, Unit IV – 12, Unit V – 14 (total 70). Unit III (sensors and actuators) carries the most marks.

Topics asked in both papers

#	Topic	Unit	Times asked
1	Enabling technologies of IoT (cloud computing, WSN, big data, embedded systems)	1	3 (S-26, W-25)
2	MQ-4 gas sensor – construction, working, pins, use	3	3 (S-26, W-25)
3	LM35 / DHT11 – pin details, interfacing, DHT11 data format	3	3 (S-26, W-25)
4	Actuators – definition, relay, stepper motor	3	3 (S-26, W-25)
5	HTTP / HTTP-REST – features, advantages, methods	4	3 (S-26, W-25)
6	IoT – definition and need	1	2 (S-26, W-25)
7	IoT architecture – four layer / four stage (with sketch)	1	2 (S-26, W-25)
8	NodeMCU pins / GPIO pins (EN, RST, Vin, TX, D0–D8, A0)	2	2 (S-26, W-25)
9	Communication ports – UART, I2C, SPI	2	2 (S-26, W-25)
10	PIR motion sensor – features / principle	3	2 (S-26, W-25)
11	IR sensor – construction and working	3	2 (S-26, W-25)
12	MQTT – topics, MQTT vs CoAP	4	2 (S-26, W-25)
13	LoRa – communication process, platform, applications	4	2 (S-26, W-25)
14	Light control using LDR and NodeMCU (street light / light intensity)	5	2 (S-26, W-25)
15	Greenhouse control system using IoT	5	2 (S-26, W-25)
16	EV battery management using IoT	5	2 (S-26, W-25)

Unit I – Basics of Internet of Things (IoT) (12 marks)

Question / topic	Marks	Asked in	Probability
Enabling technologies of IoT (cloud computing, WSN, big data, embedded systems) <ul style="list-style-type: none"> State cloud computing in IoT. (W-25 Q.1g, 2 M) Explain any four enabling technologies in IoT. (W-25 Q.2a, 4 M) 	2 M, 4 M	S-26, W-25	High

<ul style="list-style-type: none"> Explain in brief wireless sensor network as supporting technology for IoT. (S-26 Q.3b, 4 M) 			
IoT – definition and need <ul style="list-style-type: none"> State any two need of internet of things. (W-25 Q.1a, 2 M) Define the term Internet of Things. (S-26 Q.1a, 2 M) 	2 M	S-26, W-25	High
IoT architecture – four layer / four stage (with sketch) <ul style="list-style-type: none"> Illustrate four layer architecture of IoT with neat sketch. (W-25 Q.2d, 4 M) Draw the four stage IoT architecture and explain in brief. (S-26 Q.2a, 4 M) 	4 M	S-26, W-25	High
Characteristics of IoT <ul style="list-style-type: none"> State any four characteristics of IoT system and explain each. (S-26 Q.2d, 4 M) 	4 M	S-26	Medium
IoT system challenges – design and security <ul style="list-style-type: none"> Explain different IoT system challenges for design and security. (W-25 Q.4e, 4 M) 	4 M	W-25	Medium
Types of IoT systems / IoT levels In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Physical and logical design of IoT In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
History of IoT In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit II – Fundamentals of NodeMCU (14 marks)

Question / topic	Marks	Asked in	Probability
NodeMCU pins / GPIO pins (EN, RST, Vin, TX, D0–D8, A0) <ul style="list-style-type: none"> Illustrate the purpose of GPIO pins in Node MCU. (W-25 Q.3a, 4 M) Explain the use of following pins of Node MCU: EN, RST, Vin, TX. (S-26 Q.2c, 4 M) 	4 M	S-26, W-25	High
Communication ports – UART, I2C, SPI <ul style="list-style-type: none"> Draw a neat block diagram of SPI device interface. (W-25 Q.1b, 2 M) Compare UART and I2C communication protocol. (Any two points) (S-26 Q.1d, 2 M) 	2 M	S-26, W-25	High
NodeMCU ESP8266 features / technical specifications <ul style="list-style-type: none"> List four features of Node MCU. (W-25 Q.1c, 2 M) Explain the different technical specifications of Node MCU ESP8266. (Any six points) (W-25 Q.6b, 6 M) 	2 M, 6 M	W-25	Medium

Arduino IDE – library functions, setup() and loop() <ul style="list-style-type: none"> List any four library functions of Arduino IDE. (S-26 Q.1b, 2 M) State the use of setup() and loop() function of Arduino sketch. (S-26 Q.1g, 2 M) 	2 M	S-26	Medium
Firmware and Wi-Fi of NodeMCU <ul style="list-style-type: none"> Describe firmware and WiFi used with Node MCU and explain two features with example. (W-25 Q.5c, 6 M) 	6 M	W-25	Medium
Arduino character functions (isdigit, isalpha, isalnum, isxdigit, islower, isupper) <ul style="list-style-type: none"> Explain the following character functions of Arduino IDE: isdigit(), isalpha(), isalnum(), isxdigit(), islower(), isupper(). (S-26 Q.5a, 6 M) 	6 M	S-26	Medium
NodeMCU program – LED / switch interfacing <ul style="list-style-type: none"> Write a program for Node MCU to operate onboard LED according to status of switch connected to Node MCU pin no D5. (S-26 Q.3d, 4 M) 	4 M	S-26	Medium
ESP8266 hardware architecture (block diagram) In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Arduino IDE setup – create, compile and upload a program In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
PWM, timers, strings and arrays on NodeMCU In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit III – IoT Sensors and Actuators (18 marks)

Question / topic	Marks	Asked in	Probability
MQ-4 gas sensor – construction, working, pins, use <ul style="list-style-type: none"> Demonstrate construction and working of MQ4 sensor. (W-25 Q.3b, 4 M) Explain the use of MQ4 sensor. (S-26 Q.1h, 2 M) State the pins of MQ4 Gas sensor module and state the function of each pin. (S-26 Q.2b, 4 M) 	2 M, 4 M	S-26, W-25	High
LM35 / DHT11 – pin details, interfacing, DHT11 data format <ul style="list-style-type: none"> Demonstrate how LM35 sensors interfaces with Node MCU. (W-25 Q.4c, 4 M) Explain the pin details of DHT11 and LM35 sensors. (S-26 Q.5b, 6 M) Give the format of serial data received via Data pin of DHT11 and Explain it. (S-26 Q.6b, 6 M) 	4 M, 6 M	S-26, W-25	High
Actuators – definition, relay, stepper motor <ul style="list-style-type: none"> Explain working of stepper motor with phase energization. (W-25 Q.2c, 4 M) 	2 M, 4 M, 6 M	S-26, W-25	High

<ul style="list-style-type: none"> Explain the construction and operation of Relay with its applications. (W-25 Q.6c, 6 M) Define the term Actuator. (S-26 Q.1f, 2 M) 			
PIR motion sensor – features / principle <ul style="list-style-type: none"> State any two features of PIR sensor. (W-25 Q.1d, 2 M) Explain the principle of working of PIR motion sensor for object distance detection. (S-26 Q.4b, 4 M) 	2 M, 4 M	S-26, W-25	High
IR sensor – construction and working <ul style="list-style-type: none"> Illustrate constructional details of IR sensor and explain its working in details. (W-25 Q.5b, 6 M) Explain the principle of working of IR sensor with suitable sketch. (S-26 Q.4e, 4 M) 	4 M, 6 M	S-26, W-25	High
LDR – working and interfacing In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Servo motor, solenoid valve, IoT-enabled actuators In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Linear and digital input devices In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit IV – IoT Communication Protocols (12 marks)

Question / topic	Marks	Asked in	Probability
HTTP / HTTP-REST – features, advantages, methods <ul style="list-style-type: none"> List any four advantages of HTTP-REST. (W-25 Q.1e, 2 M) List any four features of HTTP Protocol. (S-26 Q.1c, 2 M) List all the commands / methods of HTTP protocol and explain any four in brief. (S-26 Q.6c, 6 M) 	2 M, 6 M	S-26, W-25	High
MQTT – topics, MQTT vs CoAP <ul style="list-style-type: none"> Compare MQTT and CoAP protocols in IoT (range, network type, scalability, reliability). (W-25 Q.3d, 4 M) Explain MQTT topics in details with suitable examples. (S-26 Q.4c, 4 M) 	4 M	S-26, W-25	High
LoRa – communication process, platform, applications <ul style="list-style-type: none"> Illustrate the detailed communication process of LoRa with its two applications. (W-25 Q.4b, 4 M) Explain LoRa wireless communication platform. (S-26 Q.3a, 4 M) 	4 M	S-26, W-25	High
IoT cloud platforms (AWS IoT, ThingSpeak, Google, Azure) <ul style="list-style-type: none"> Describe the function of cloud platforms in IoT communication protocols with example. (W-25 Q.2b, 4 M) 	4 M	W-25	Medium
Wi-Fi (IEEE 802.11) – features / characteristics <ul style="list-style-type: none"> Explain any four characteristics and features of Wi-Fi. (W-25 Q.4a, 4 M) 	4 M	W-25	Medium

NB-IoT – features and applications In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Web server with NodeMCU In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
MQTT with NodeMCU – connect broker, publish, subscribe In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
CoAP – features and methods In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit V – IoT Applications (14 marks)

Question / topic	Marks	Asked in	Probability
Light control using LDR and NodeMCU (street light / light intensity) <ul style="list-style-type: none"> Explain street light control system using Node MCU and LDR. (W-25 Q.3c, 4 M) Draw and explain smart controlling of light intensity using Node MCU. (S-26 Q.4d, 4 M) 	4 M	S-26, W-25	High
Greenhouse control system using IoT <ul style="list-style-type: none"> Draw block diagram of Green house control using IoT and explain its parts. (W-25 Q.5a, 6 M) Draw and explain Green House Control System using IoT. (S-26 Q.5c, 6 M) 	6 M	S-26, W-25	High
EV battery management using IoT <ul style="list-style-type: none"> Draw block diagram of EV battery management using IoT and explain each block in details. (W-25 Q.6a, 6 M) Draw block diagram of Electric Vehicles (EV) battery management using IoT. (S-26 Q.1e, 2 M) 	2 M, 6 M	S-26, W-25	High
Home automation – appliance control via relay and cloud (program) <ul style="list-style-type: none"> Write a program to turn ON/OFF the Home appliance connected to D2 pin via relay to Node MCU by using cloud server. (S-26 Q.6a, 6 M) 	6 M	S-26	Medium
Smart energy meter using IoT <ul style="list-style-type: none"> Describe the working of smart energy meter using sensors. (W-25 Q.4d, 4 M) 	4 M	W-25	Medium
Smart city (definition / applications) <ul style="list-style-type: none"> Define smart city in IoT context. (W-25 Q.1f, 2 M) 	2 M	W-25	Medium
IoT applications in healthcare <ul style="list-style-type: none"> State four different IoT applications in the field of Healthcare industry. (S-26 Q.3c, 4 M) 	4 M	S-26	Medium
Industrial IoT – applications, predictive maintenance <ul style="list-style-type: none"> List any four IoT applications in Industrial automation. Explain any 	4 M	S-26	Medium

one in brief. (S-26 Q.4a, 4 M)			
Smart traffic control / waste management In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
IoT based surveillance system In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Weather monitoring / forecasting using IoT In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Exam tips from the two papers

- Paper pattern: Q.1 any FIVE (2 M each), Q.2–Q.4 any THREE (4 M each), Q.5–Q.6 any TWO (6 M each); 3 hours, 70 marks.
- **Block diagrams of applications** come every time — greenhouse control (6 M in both papers), EV battery management, LDR-based light control. Practise drawing them neatly with labels.
- **Sensors** are the biggest area: MQ-4, PIR, IR, LM35 and DHT11 — learn construction/principle, pin details and interfacing with NodeMCU.
- **NodeMCU pins** (EN, RST, Vin, TX, GPIO, A0) and specifications were asked in both papers.
- S-2026 had two NodeMCU programs (switch–LED, relay via cloud). Practise short Arduino-IDE sketches with pinMode, digitalWrite/Write, analogRead and Wi-Fi/MQTT.
- Protocols: HTTP/HTTP-REST (features, methods), MQTT (topics, MQTT vs CoAP) and LoRa were asked in both papers.

Note: This is a **important-question list prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in