

Embedded System (315338)

MSBTE Diploma · K-Scheme · Electronics (EJ) group, Semester 5 · Important Questions

How this list was made: Based on MSBTE papers **W-2025** and **S-2026** available on msbte.ac.in (the only two K-scheme papers of this course available so far). Every question of both papers 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.

Most repeated topics

#	Topic	Unit	Times asked
1	ATmega8 / AVR architecture – block diagram and blocks	2	3 (S-26, W-25)
2	Microcontroller types PIC, AVR, ARM – features, applications, comparison	2	3 (S-26, W-25)
3	Embedded system – definition, characteristics, examples	1	2 (S-26, W-25)
4	Classification / types of embedded systems (explain any one)	1	2 (S-26, W-25)
5	Selection criteria for an embedded system (flexibility, maintainability, reliability, NRE cost ...)	1	2 (S-26, W-25)
6	Modes of communication – serial/parallel, synchronous/asynchronous	3	2 (S-26, W-25)
7	Zigbee (with LoWPAN / compared with Bluetooth)	3	2 (S-26, W-25)
8	CAN protocol – data frame format, comparison with USB	3	2 (S-26, W-25)
9	IEC 61850 GOOSE protocol – publisher-subscriber model, significance	3	2 (S-26, W-25)
10	I2C protocol – frame format, advantages, comparison with SPI	3	2 (S-26, W-25)

Unit I – Overview of Embedded Systems (12 M)

Question / topic	Marks	Asked in	Probability
Embedded system – definition, characteristics, examples <ul style="list-style-type: none"> Define an embedded system with an example. (W-25 Q.1a) State four characteristics of embedded system. (S-26 Q.1c) 	2 M	S-26, W-25	High
Classification / types of embedded systems (explain any one) <ul style="list-style-type: none"> Classify embedded systems with one suitable example. Explain any one in brief. (W-25 Q.6a) State different types of embedded system. Describe any one in detail. (S-26 Q.3b) 	4 M, 6 M	S-26, W-25	High
Selection criteria for an embedded system (flexibility, maintainability, reliability, NRE cost ...) <ul style="list-style-type: none"> List and explain any four selection criteria for choosing an embedded system. (W-25 Q.4a) 	4 M	S-26, W-25	High

<ul style="list-style-type: none"> Explain selection criteria: flexibility, maintainability, reliability, NRE cost. (S-26 Q.2a) 			
Block diagram of a basic embedded system <ul style="list-style-type: none"> Draw and explain the block diagram of a basic embedded system. (W-25 Q.3a) 	4 M	W-25	Medium
Role of RTC (Real Time Clock) in an embedded system <ul style="list-style-type: none"> What is the role of RTC (Real Time Clock) in Embedded system. (S-26 Q.1b) 	2 M	S-26	Medium
Layered model of embedded system In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit II – Microcontroller Architecture (16 M)

Question / topic	Marks	Asked in	Probability
ATmega8 / AVR architecture – block diagram and blocks <ul style="list-style-type: none"> Draw internal architecture of ATmega8 microcontroller (+ purpose of watchdog timer). (W-25 Q.5a) Draw AVR Microcontroller Architecture and describe in brief. (S-26 Q.4a) Sketch the block diagram of ATmega 8 and describe the function of each block. (S-26 Q.6a) 	4 M, 6 M	S-26, W-25	High
Microcontroller types PIC, AVR, ARM – features, applications, comparison <ul style="list-style-type: none"> List any two applications of ARM microcontrollers. (W-25 Q.1c) Compare PIC, AVR, and ARM microcontrollers. (Any four) (W-25 Q.2a) Explain any four advantages of PIC microcontroller over 89C51 microcontroller. (S-26 Q.2c) 	2 M, 4 M	S-26, W-25	High
Arduino-specific AVR (ATmega168/328) features; ATmega8 vs ATmega328 <ul style="list-style-type: none"> List any four features of the Arduino specific AVR microcontroller. (W-25 Q.1b) Compare ATmega8 and ATmega328 in terms of memory, speed, peripherals and sleep modes. (W-25 Q.3b) 	2 M, 4 M	W-25	Medium
Sleep modes of AVR microcontroller <ul style="list-style-type: none"> State various sleep modes in AVR microcontroller and explain any two in detail. (S-26 Q.3c) 	4 M	S-26	Medium
Programming configuration of ATmega8 – I/O ports, counters, timers <ul style="list-style-type: none"> Explain the programming configuration of ATmega8 with respect to I/O ports, counters, and timers. (W-25 Q.6b) 	6 M	W-25	Medium
RISC vs CISC architecture <ul style="list-style-type: none"> Compare RISC and CISC Architectures. (Any six points) (S-26 Q.5b) 	6 M	S-26	Medium

Communication protocols supported by AVR • Mention two communication protocol supported by AVR microcontrollers. (S-26 Q.1f)	2 M	S-26	Medium
--	-----	------	--------

Unit III – Communication Standards and Protocols (14 M)

Question / topic	Marks	Asked in	Probability
Modes of communication – serial/parallel, synchronous/asynchronous • Differentiate between serial and parallel communication. (Any two points) (W-25 Q.1d) • State the difference between Synchronous and Asynchronous communication. (Any two points) (S-26 Q.1a)	2 M	S-26, W-25	High
Zigbee (with LoWPAN / compared with Bluetooth) • Justify the use of Zigbee and LoWPAN in real-world low-power embedded system applications. (W-25 Q.2b) • Compare Zigbee and Bluetooth Protocol. (any four points) (S-26 Q.3d)	4 M	S-26, W-25	High
CAN protocol – data frame format, comparison with USB • Compare USB and CAN communication protocols. (Any four points) (W-25 Q.3c) • With suitable data frame format explain CAN protocol. (S-26 Q.4d)	4 M	S-26, W-25	High
IEC 61850 GOOSE protocol – publisher-subscriber model, significance • Explain the IEC 61850 GOOSE protocol and its significance in electric power system applications. (W-25 Q.4b) • Explain the publisher-subscriber model of GOOSE protocol. (S-26 Q.4b)	4 M	S-26, W-25	High
I2C protocol – frame format, advantages, comparison with SPI • Compare SPI with I2C protocol in terms of speed, number of lines, and data transfer. (W-25 Q.5b(ii)) • Explain I2C frame format. State two advantages and two disadvantages. (S-26 Q.5a)	3 M, 6 M	S-26, W-25	High
SPI protocol – master-slave configuration • Describe the working of SPI protocol with a master-slave configuration. (W-25 Q.5b(i))	3 M	W-25	Medium
LoRa communication protocol – working, advantages, IoT uses • Write a note on LORA Communication Protocol: working, advantages, IoT uses. (S-26 Q.6b)	6 M	S-26	Medium
USB protocol (topology, transfer types) • (asked only as USB vs CAN comparison) (W-25 Q.3c)	4 M	W-25	Medium

IrDA and Wi-Fi wireless protocols In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
---	---	---------	-----

Unit IV – Real Time Operating System (12 M)

Question / topic	Marks	Asked in	Probability
Deadlock – how it occurs, strategies to prevent / handle • Explain how deadlock occurs with suitable example and state strategies to handle it. (W-25 Q.3d) • Explain how deadlock occurs; state two strategies to prevent deadlock in RTOS. (S-26 Q.5c)	4 M, 6 M	S-26, W-25	High
RTOS scheduling algorithms (role; Round Robin with priority) • Explain the role of scheduling algorithms in RTOS. (W-25 Q.4d) • Explain Round Robin with priority scheduling algorithm. (S-26 Q.4e)	4 M	S-26, W-25	High
Watchdog timer – purpose • State the purpose of watchdog timer (part of ATmega8 question). (W-25 Q.5a) • State the purpose of watchdog timer. (S-26 Q.1d)	2 M	S-26, W-25	High
RTOS definition; hard vs soft real time • Define real-time operating system (RTOS). (W-25 Q.1e) • Compare Hard Real time and Soft Real time: file size, response time, validation, performance. (S-26 Q.2b)	2 M, 4 M	S-26, W-25	High
Characteristics of RTOS (scalability, predictability ...) • Explain the features of RTOS: i) Scalability ii) Predictability. (W-25 Q.2c)	4 M	W-25	Medium
Task management in RTOS with inter-task communication • Describe task management in RTOS with inter-task communication. (W-25 Q.4c)	4 M	W-25	Medium
Features of microkernel • List out features of Microkernels (Any four). (S-26 Q.1g)	2 M	S-26	Medium
Semaphore; interrupt handling and resource allocation in RTOS In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit V – I/O Interfacing with Arduino (16 M)

Question / topic	Marks	Asked in	Probability
Temperature sensor LM35 interfacing – program • Write a program to read temperature from LM35 using Arduino. (W-25 Q.4e)	4 M, 6 M	S-26, W-25	High

<ul style="list-style-type: none"> • Write a program for ATmega 328 to read a temperature from LM35. (S-26 Q.6c) 			
Arduino boards – Uno / Nano / Mega features and comparison <ul style="list-style-type: none"> • State any four features of Arduino MEGA. (W-25 Q.1g) • Compare Arduino Nano and Arduino Mega Boards. (Any four points) (S-26 Q.4c) 	2 M, 4 M	S-26, W-25	High
Motor interfacing with Arduino – DC motor / stepper motor <ul style="list-style-type: none"> • Describe how to interface a stepper motor with Arduino and write a simple program to control it. (W-25 Q.6c) • Draw the interfacing diagram of D.C. motor with Arduino Uno. (S-26 Q.2d) 	4 M, 6 M	S-26, W-25	High
Arduino functions – digital I/O (pinMode, digitalWrite), math functions <ul style="list-style-type: none"> • Explain the use of pinMode() and digitalWrite() functions in Arduino. (W-25 Q.1f) • Explain any four mathematical functions used in Arduino programming. (W-25 Q.2d) 	2 M, 4 M	W-25	Medium
Relay interfacing with Arduino (AC lamp) <ul style="list-style-type: none"> • Write a program to interface a relay module with Arduino to control an AC lamp; interfacing diagram. (W-25 Q.5c) 	6 M	W-25	Medium
Seven segment LED interfacing with Arduino <ul style="list-style-type: none"> • With suitable diagram explain interfacing of Seven Segment LED with Arduino. (S-26 Q.3a) 	4 M	S-26	Medium
LCD interfacing – pin functions (RS, R/W, E) <ul style="list-style-type: none"> • State the function of following pins of LCD: i) RS ii) R/W. (S-26 Q.1e) 	2 M	S-26	Medium
Keyboard (keypad) and ultrasonic sensor interfacing; Arduino functional block diagram In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Exam tips from the two papers

- **Pattern (same in both papers):** Q1 any 5 of 7 (2 M), Q2 and Q3 any 3 of 4 (4 M), Q4 any 3 of 5 (4 M), Q5 and Q6 any 2 of 3 (6 M); 70 marks, 3 hours.
- **An LM35 temperature program came in both papers** (4 M with Arduino, 6 M for ATmega328). Practise one Arduino version and one register-level version with the connection diagram.
- **ATmega8 / AVR architecture** was asked three times (4 M and 6 M) — learn to draw the block diagram neatly with the 8-bit data bus, memories, ports and timers.
- Motor interfacing (DC motor with L293D, stepper with ULN2003), seven segment, LCD pins and relay were all asked — keep one labelled interfacing diagram ready for each.
- Unit III protocols carry many 4 M comparisons: serial/parallel, sync/async, Zigbee vs Bluetooth, USB vs CAN, SPI vs I²C. CAN frame format, I²C frame format and GOOSE publisher–subscriber

model were asked with diagrams.

- RTOS: deadlock (conditions + handling) and scheduling algorithms came in both papers.
- Only two K-scheme papers exist so far, so "High" here means "asked in both papers" — it is not a guarantee.

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

