

IoT Applications (315341)

MSBTE Diploma · K-Scheme · Model Question Paper — Set B

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) State any four characteristics of an IoT system.
- b) Draw a neat block diagram of SPI interface between a master and slave devices.
- c) State the use of the following Arduino functions: pinMode(), digitalWrite(), analogRead(), delay().
- d) State any two applications of PIR sensor.
- e) State the function of each pin of an IR obstacle sensor module.
- f) Define MQTT broker and MQTT topic.
- g) Draw the block diagram of electric vehicle (EV) battery management using IoT.

Q.2 Attempt any THREE of the following:**12**

- a) Draw the four-stage IoT architecture and explain each stage in brief.
- b) Explain cloud computing and big data analytics as enabling technologies of IoT.
- c) Illustrate the purpose of GPIO pins of NodeMCU with pin diagram. State the special function of any four GPIO pins.
- d) Explain the working of a stepper motor with full-step phase energization sequence. A stepper motor has a step angle of 1.8° ; find the number of steps per revolution and the steps required to rotate it by 90° .

Q.3 Attempt any THREE of the following:**12**

- a) Compare MQTT and CoAP protocols on the basis of: i) transport protocol ii) communication model iii) message/header size iv) reliability.
- b) Illustrate the construction of an IR sensor and explain its working for obstacle detection.
- c) Explain the physical design of IoT with a generic block diagram of an IoT device.

- d) Draw and explain smart control of light intensity using NodeMCU and LDR (PWM based). Write the program.

Q.4 Attempt any THREE of the following:

12

- a) State the pins of MQ-4 gas sensor module and their functions. Draw its interfacing with NodeMCU.
- b) State any four features of Wi-Fi (IEEE 802.11). Write a program to connect NodeMCU to a Wi-Fi network in station mode.
- c) Describe the working of an IoT based smart energy meter with a block diagram.
- d) Explain UART communication with its frame format. Draw the frame for transmitting the character 'K' (8N1) and find the time to send one frame at 9600 baud.
- e) Compare LoRa and NB-IoT. (Any four points)

Q.5 Attempt any TWO of the following:

12

- a) Explain the following character functions of Arduino with a program: isAlpha(), isDigit(), isAlphaNumeric(), isHexadecimalDigit(), isUpperCase(), isSpace().
- b) Explain the pin details of DHT11 and LM35 sensors. Draw their interfacing with NodeMCU.
- c) List any four IoT applications in industrial automation. Explain predictive maintenance using IoT with a block diagram.

Q.6 Attempt any TWO of the following:

12

- a) Write a program to turn ON/OFF a home appliance connected to D1 through a relay, from a web browser, using NodeMCU as a web server. Draw the block diagram.
- b) Draw and explain an IoT based greenhouse (smart agriculture) control system. State the control action for each sensor.
- c) Explain HTTP-REST with its features and advantages. Compare HTTP and MQTT. (Any four points)

Note: This is a **model question paper 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