No. of Printed Pages : **8**

A9.4-R5.1 : Internet of Things : A Practical Approach

DURATION : 03 Hours **MAXIMUM MARKS : 100**

OMR Sheet No. :						

Roll No. : | | | | | | |

Answer Sheet No. : | | | | | | |

Name of Candidate : _____ **; Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, OMR Sheet and Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English language only.
- There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
- **PART ONE** is Objective type and carries **40** Marks. **PART TWO** is Subjective type and carries **60** Marks.
- **PART ONE** is to be answered in the **OMR ANSWER SHEET** only, supplied with the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book for **PART TWO**.
- Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the Answer Sheet for **PART ONE** is returned. However, Candidates who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the Answer Sheet for **PART ONE** to the Invigilator.
- **Candidate cannot leave the examination hall/room without signing on the attendance sheet and handing over his/her Answer Sheet to the invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

PART - ONE

(Answer all the questions; each question carries ONE mark)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "OMR" answer sheet supplied with the question paper, following the instructions therein. **(1x10)**

1.1 The microcontroller core used in ESP8266 is :

(A) ARM Cortex-M3

(B) RISC-V

(C) Tensilica Xtensa LX106

(D) AVR

1.2 The communication protocol widely used in IoT for low-power, long-range communication is :

(A) Bluetooth

(B) Zigbee

(C) Sub1Ghz

(D) WiFi

1.3 Which of the following is not an application layer protocol ?

(A) MQTT

(B) COAP

(C) HTTP

(D) I2C

1.4 Which of the following is a digital sensor ?

(A) DHT11

(B) LDR

(C) TMP36

(D) Potentiometer

1.5 The full form of ADC is :

(A) Analog Digital Circuit

(B) Automated Data Conversion

(C) Analog-to-Digital Converter

(D) Analog Data Controller

1.6 The default GPIO pin number used for I2C communication in NodeMCU is :

(A) D1 and D2

(B) D3 and D4

(C) D5 and D6

(D) D7 and D8

1.7 MQTT stands for :

(A) Messaging Queue Transport Tool

(B) Message Queue Telemetry Transport

(C) Multi Queue Telemetry Transport

(D) Messaging Query Transmission Tool

1.8 The function digitalRead(pin) in Arduino programming is used to :

(A) Write data to a digital pin

(B) Read data from an analog pin

(C) Read data from a digital pin

(D) Set the mode of the pin

1.9 The commonly used port for HTTP web servers is :

(A) 8080

(B) 80

(C) 21

(D) 443

1.10 In cloud computing, a hybrid cloud refers to :

(A) A mix of public and private clouds

(B) A private cloud owned by multiple organizations

(C) A public cloud managed by one organization

(D) A local cloud system

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and enter your choice in the "OMR" answer sheet supplied with the question paper, following the instructions therein. (1x10)

2.1 ESP8266 is capable of operating as both a client and a server.

2.2 Zigbee operates in the 2.4 GHz frequency band.

2.3 MQTT is a connection-less protocol.

2.4 The I2C protocol uses three communication lines for data exchange.

2.5 The REST architecture is commonly used for developing APIs.

2.6 The ADC in NodeMCU can convert analog signals to 10-bit digital values.

2.7 A hybrid cloud allows private data storage but public processing of data.

2.8 HTML and CSS are programming languages.

2.9 In Industrial IoT (IIoT), security is a less critical issue than in consumer IoT.

2.10 ThingSpeak is an example of an open IoT cloud service platform.

3. **Match words and phrases in column X with the closest related meaning/word(s)/phrase(s) in column Y. Enter your selection in the "OMR" answer sheet supplied with the question paper, following the instructions therein.** **(1x10)**

X		Y	
3.1	NodeMCU GPIO pin	**A.**	Converts digital signal to analog
3.2	DHT22 sensor	**B.**	Web development language
3.3	Machine Learning Model	**C.**	Humidity and temperature sensor
3.4	DAC	**D.**	Control GPIO states
3.5	SPI protocol	**E.**	Data subscription model
3.6	PHP	**F.**	Serial Peripheral Interface
3.7	MQTT	**G.**	Algorithm used within the processing phase but is not a fundamental block of the overall IoT architecture.
3.8	Web socket	**H.**	CoAP
3.9	Apache server	**I.**	UDP
3.10	Sub1Ghz	**J.**	Actuator
		K.	Real-time communication protocol
		L.	Used to serve web pages
		M.	Long-range IoT communication

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "OMR" answer sheet supplied with the question paper, following the instructions therein. **(1x10)**

A.	Arduino IDE	**B.**	21	**C.**	MQTT	**D.**	ESP32
E.	ESP8266	**F.**	WiFi	**G.**	Sensor	**H.**	GPIO
I.	Capacitive	**J.**	Zigbee	**K.**	Hybrid	**L.**	HTTPS
M.	11						

4.1 The _____ protocol is used for publishing and subscribing messages in IoT.

4.2 The ESP8266 module has _____ GPIO pins.

4.3 A _____ cloud combines the features of public and private clouds.

4.4 _____ actuators are not typically categorized as a standard type of actuator.

4.5 The _____ pin in NodeMCU is commonly used for serial communication.

4.6 _____ is the software used for writing and uploading code to Arduino.

4.7 HTTP and _____ are protocols used to communicate over the web.

4.8 NodeMCU is based on the _____ microcontroller chip.

4.9 _____ is the protocol widely used for real-time, low-latency communication in IoT.

4.10 In an IoT system, the _____ device collects data from the environment.

PART - TWO

(Answer any FOUR questions)

5. (a) Describe the architecture of the ESP8266 microcontroller and its main features.

(b) Explain the steps required to set up the Arduino IDE for programming the NodeMCU. **(7+8)**

6. (a) What are the different types of sensors used in IoT applications?

(b) Discuss the principles of analog and digital sensor interfacing with NodeMCU. **(5+10)**

7. (a) Compare MQTT and COAP protocols in terms of functionality and use cases.

(b) Explain the steps to connect an IoT device using IPv4 and IPv6. **(10+5)**

8. (a) Describe how a web server can be set up using NodeMCU for remote monitoring.

(b) Explain the difference between GET and POST methods in REST services. **(9+6)**

9. (a) Discuss the role of cloud services in IoT, with examples of public and private cloud solutions.

(b) Describe a case study of an IoT application using the ThingSpeak cloud platform for data management. **(7+8)**

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SPACE FOR ROUGH WORK

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