No. of Printed Pages : **8**

A9.4-R5 : Internet of Things (IoT): 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 Web services can be implemented by :

(A) HTTP and REST principles

(B) Websockets

(C) Both (A) and (B)

(D) None of these

1.2 NodeMCU Development board is featured with :

(A) wifi capability

(B) digital and analog pins

(C) serial communication protocol.

(D) All of the above

1.3 The output of analog sensors are always :

(A) analog

(B) digital

(C) both (A) and (B)

(D) None of these

1.4 Zigbee architecture may have the following component :

(A) Full Function Devices

(B) Reduced Function Devices

(C) PAN Coordinator

(D) All of the above

1.5 IPv6 addresses are _____.

(A) 64-bit

(B) 128-bit

(C) 256-bit

(D) None of these

1.6 IoT revolution is because of the advancements in _____.

(A) Sensor Networks

(B) Mobile devices

(C) Wireless communications

(D) All of the above

1.7 The output of digital sensors are always :

(A) Analog

(B) Digital

(C) Both (A) and (B)

(D) None of these

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1.8 Publisher-subscriber model involves _____.

(A) Publishers

(B) Brokers

(C) Consumers

(D) All of the above

1.9 Zigbee specification are based on _____.

(A) 802.11

(B) 802.15.4

(C) 804.13.6

(D) None of these

1.10 What is the sensor/protocol used in GSN ?

(A) CoAP

(B) HTTP

(C) MQTT

(D) XMPP

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 MQTT is a light weight messaging protocol based on the publish-subscribe model.

2.2 A minimum of 7 external components can be added to ESP 8266.

2.3 CoAP runs on top of TCP instead of UDP.

2.4 Virtualization Technology is the main technology behind the development of Cloud Model.

2.5 ESP 8266 has both types of memory on die, i.e., ROM AND RAM both.

2.6 REST is unidirectional but Websocket is bidirectional.

2.7 Arduino provides IDE environment.

2.8 Zigbee supports both topologies, i.e., Star topology and Peer-to-peer topology.

2.9 A web service takes the help of SOAP to describe the availability of service.

2.10 Service Transport is responsible for encoding messages in a common XML format.

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	IPv4	**A.**	Security management
3.2	Request-Response communication model	**B.**	IIOT
3.3	Supports to create multiple virtual environments onto the same physical hardware in Cloud Environments	**C.**	Application Layer Protocol
3.4	MQTT runs at port no	**D.**	32 bit protocol
3.5	Connecting machines to other machines/data management, optimization and productivity that possibly make "smart factories".	**E.**	6LoWPAN
3.6	IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the **cloud**	**F.**	REST
3.7	CoAP	**G.**	SNMP (Simple Network Management Protocol)
3.8	IPv6 over low power WPANs	**H.**	A document-based NoSQL database
3.9	Responsible for controlling access to the network based on the predefined policy.	**I.**	Thing Speak
3.10	MongoDB	**J.**	Post Office Protocol, version3 (POP3)
		K.	1883
		L.	Virtual Machine Monitors
		M.	DHCP

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.	Protocol	**B.**	Virtual Private Network (VPN)	**C.**	17	**D.**	Access Control Policy
E.	IP Security (IPSec)	**F.**	Node to Node communication	**G.**	RFID	**H.**	Sensitivity
I.	CoAP	**J.**	Secure Sockets Layer (SSL)	**K.**	Presence of nearby objects	**L.**	Keys
M.	Zigbee						

4.1 _____ is web-objects communication using request/response interactions model.

4.2 Data link control deals with _____.

4.3 The ESP8266 has _____ GPIO pins.

4.4 A number or a set of numbers on which the cipher operates _____.

4.5 _____ to ensure secure access consider using advanced face and voice recognition systems, biometrics.

4.6 _____ communicates a string for ID, a time-stamp and location data.

4.7 A collection of protocols designed by the IETF (Internet Engineering Task Force) to provide security for a packet at the network level is _____.

4.8 Proximity sensors are used for _____.

4.9 _____ provides security and compression services to data generated from the application layer.

4.10 Change in output of sensor with change in input is _____.

PART - TWO

(Answer any FOUR questions)

5. (a) What is GPIO ? How many GPIO pins are there in ESP 8266 microcontroller ? Specify the functions of each GPIO pin along with the associated states and restrictions, if any.

(b) What are the advantages of using MQTT client with Arduino IDE ? **(7+8)**

6. (a) Why do many sensors have three or four terminals for communication to microcontroller? How are such sensors used for IoT Applications and Services ?

(b) What is software library ? What is the significance of creating this library ? **(7+8)**

7. (a) Write Steps to push data from NodeMCU to thing speak cloud.

(b) What is Zigbee ? What are the layers of Zigbee ? Also give the functions of each layer. **(7+8)**

8. (a) What are the security model profiles and protocols for the IoT ?

(b) Write a program to Blink an LED using ESP8266 NodeMCU. **(7+8)**

9. (a) What are the cloud computing features and advantages of using it ? What are the main concerns in using it ?

(b) What are the various device types that are adopted in Zigbee ? Give a brief description. **(8+7)**

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