No. of Printed Pages : **8**

A10.4-R5.1 : INTERNET OF THINGS (IoT) USING RASPBERRY Pi

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 What does SBC stand for in computing ?

(A) Single Board Controller

(B) Single Board Computer

(C) Simple Board Computer

(D) System Board Computer

1.2 Which programming language is primarily used for programming Raspberry Pi ?

(A) C++

(B) Python

(C) Java

(D) Ruby

1.3 Which command is used to change the password on Raspberry Pi using raspi-config ?

(A) passwd

(B) change-password

(C) update-password

(D) set-password

1.4 What does GPIO stand for ?

(A) General Purpose Input Output

(B) General Processor Input Output

(C) General Program Input Output

(D) General Purpose Integrated Output

1.5 Which operating system is recommended for Raspberry Pi ?

(A) Windows

(B) Raspbian

(C) Ubuntu

(D) MacOS

1.6 Which of the following is an IoT protocol ?

(A) HTTP

(B) MQTT

(C) FTP

(D) SMTP

1.7 The apt-get command in Linux is used for :

(A) File management

(B) Package management

(C) User management

(D) Network configuration

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1.8 In GPIO programming, which of the following is a digital input ?

(A) Potentiometer

(B) Push button

(C) Temperature sensor

(D) Light sensor

1.9 The Raspberry Pi can be used to create a :

(A) Web server

(B) Gaming console

(C) Desktop computer

(D) All of the options

1.10 Which library is used for Python programming in Raspberry Pi for handling GPIO ?

(A) WiringPi

(B) Pygame

(C) Tkinter

(D) Matplotlib

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 The Raspberry Pi does not require an operating system to run.

2.2 Python supports object-oriented programming.

2.3 You can configure the Raspberry Pi's camera using the raspi-config command.

2.4 Linux file permissions are based on user roles: owner, group, and others.

2.5 GPIO pins can be used to control motors and LEDs only.

2.6 The pip command is used to install Python packages.

2.7 A shell script can be executed automatically at system startup.

2.8 Raspberry Pi can only connect to wired networks.

2.9 JSON is a data format used for structuring data in IoT applications.

2.10 Node-RED is a visual programming tool used for IoT applications.

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	Raspberry Pi Model B	**A.**	GPIO Pin Configuration
3.2	raspi-config	**B.**	Raspbian
3.3	Apache Web Server	**C.**	Terminal
3.4	WiringPi	**D.**	Configuration Tool
3.5	Python List	**E.**	Script
3.6	I2C	**F.**	Digital Output
3.7	LED	**G.**	Automating Tasks
3.8	Shell Scripting	**H.**	Debian
3.9	MQTT	**I.**	Serial Communication
3.10	Temperature Sensor	**J.**	Message Queuing Protocol
		K.	Package Management
		L.	Data Structure
		M.	Environmental Monitoring

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.	GPIO	**B.**	IDLE	**C.**	ping	**D.**	Touch
E.	NOOBS	**F.**	Debouncing	**G.**	HTTP	**H.**	Network
I.	apt-get	**J.**	Module	**K.**	Sensor	**L.**	Script
M.	Single Board Computer						

4.1 The primary function of the _____ pins is to read and write digital signals.

4.2 The tool used to easily install operating systems on a Raspberry Pi is called _____.

4.3 The command used to install packages in Debian-based systems is _____.

4.4 Raspberry Pi is a type of _____ that integrates all necessary components on a single board.

4.5 The programming environment commonly used for Python is _____.

4.6 In GPIO programming, _____ refers to the ability to control multiple devices using a single pin.

4.7 The _____ command in Linux is used to create a new file.

4.8 A Python _____ is a reusable piece of code that can be imported into programs.

4.9 The _____ command is used to check network connectivity.

4.10 The _____ library is used in Python to handle HTTP requests.

PART TWO

(Answer any FOUR questions)

5. (a) Write a Python program to create a simple IoT-based temperature monitoring system. The program should :

- Simulate temperature sensor data (you can randomly generate values between 20°C to 40°C).
- Store the data in a Python list.
- Use a function to calculate the average temperature from the list.
- Print the current temperature and the average temperature in a well-formatted output.

(b) Describe any two models of Raspberry Pi and discuss factors to consider when selecting a model. **(8+7)**

6. Explain the role of GPIO pins in Raspberry Pi and discuss how to interface a temperature sensor using GPIO. **(15)**

7. (a) Describe the role of the terminal in Linux and explain how to navigate the filesystem using basic commands.

(b) Explain file permissions in Linux and how they impact file management. Provide examples.

(c) Discuss the purpose of shell scripting in Linux. **(5+5+5)**

8. (a) Explain what GPIO pins are and discuss their classification (I2C, SPI, UART) in the context of Raspberry Pi.

(b) Discuss the concept of debouncing in digital input applications and provide an example scenario where it is necessary. **(8+7)**

9. (a) Explain how sensor data can be displayed on a web page using Raspberry Pi.

(b) Discuss the role of Node-RED in IoT applications and provide an example of how it can be used with MQTT. **(5+10)**

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