BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(RA)-2022
Course Name – Sensor and Actuator Devices for Robotics
Course Code - PEC-ECR602A
(Semester VI)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Define the primary characteristic of the Internet of Things (IoT).
a) Centralized control b) Interconnectivity
c) Offline operation d) Limited scalability

(ii) Duplicate which protocol is commonly used for communication in IoT?
a) HTTP b) SMTP
c) MQTT d) FTP

(iii) Enumerate which model is used for communication between IoT devices and servers?
a) Peer-to-peer b) Client-server
c) Hybrid d) Broadcast

(iv) Examine which technology is essential for the functioning of Wireless Sensor Networks (WSNs)?
a) Bluetooth b) RFID
c) Zigbee d) NFC

(v) Identify what technology enables storage and processing of IoT data remotely?
a) Edge computing b) Cloud computing
c) Fog computing d) Grid computing

(vi) Name the primary function of actuators in IoT devices?
a) Sense environmental data b) Process data locally
c) Initiate physical actions d) Transmit data wirelessly

(vii) Omit which technology enables real-time data processing at the edge of the network?
a) Edge computing b) Cloud computing
c) Fog computing d) Grid computing

(viii) Quote which protocol is commonly used for lightweight and efficient communication in IoT?
a) HTTP b) CoAP
c) MQTT d) FTP

(ix) Read which of the following is a popular microcontroller board commonly used in IoT projects?

a) Arduino b) Zigbee
c) Raspberry Pi d) MQTT

(x) Recall what is the primary function of the SPI (Serial Peripheral Interface) on microcontrollers?

a) Serial communication between devices b) Analog to digital conversion
c) Pulse width modulation d) Real-time clock synchronization

(xi) Record which interface is used for connecting multiple peripherals to a microcontroller on the Raspberry Pi?

a) Serial b) SPI
c) I2C d) USB

(xii) Recognize what type of sensor is commonly used to detect the presence of objects in robotics applications?

a) Voltage sensor b) Level sensor
c) Motion sensor d) Temperature sensor

(xiii) Record what is the primary purpose of a temperature sensor?

a) To measure the amount of voltage in a circuit b) To detect changes in temperature
c) To measure the level of liquid d) To determine motion

(xiv) Tabulate which type of sensor is commonly used to measure the level of liquid in tanks or reservoirs?

a) Voltage sensor b) Level sensor
c) Motion sensor d) Temperature sensor

(xv) Restate what technology is commonly used for hosting web servers in IoT applications?

a) Python b) Java
c) C++ d) Node.js

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Determine how SDN enables dynamic network reconfiguration in response to changing IoT application requirements. (3)
3. Tell the GPIO capabilities of Arduino and Raspberry Pi. (3)
4. Discuss the different cloud storage models commonly used in IoT deployments, and how do they differ. (3)
5. Explain the significance of communication APIs in IoT applications deployed on cloud platforms. (3)
6. Illustrate sensors and actuators in the context of IoT. Provide examples of each. (3)

OR

Appraise the importance of physical design in IoT systems. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain the process of device provisioning and configuration using NETCONF in IoT deployments. (5)
8. Dissect the challenges associated with scaling IoT projects based on Arduino and Raspberry Pi, and propose strategies for addressing them. (5)
9. Choose unipolar and bipolar stepper motors in terms of construction, operation, and suitability for different IoT applications. (5)
10. Devise the construction and operation of a temperature sensor with a thermistor. Discuss the advantages and limitations of thermistors compared to other temperature sensing (5)

technologies.

11. Tell the working principles of level sensors and provide examples of their applications in IoT scenarios, such as water level monitoring and industrial tank level sensing. (5)
12. Dissect the role of embedded systems in IoT devices. How do they enable sensing, processing, and communication functionalities? (5)

OR

Analyze the impact of IoT on energy management and conservation. Provide examples of IoT-based solutions for energy efficiency. (5)

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