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**BRAINWARE UNIVERSITY**

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Term End Examination 2025-2026**Programme – M.Tech.(RA)-2025****Course Name – Industrial Internet of Things and Industry 4.0****Course Code - MEC20405****(Semester II)****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) Which of the following best describes the First Industrial Revolution?
- | | |
|---------------------------------------|--|
| a) Mass production and assembly lines | b) Introduction of water and steam power |
| c) Use of electronics and IT systems | d) Automation and data exchange |
- (ii) Identify, Industry 3.0 primarily focused on:
- | | |
|--------------------------------------|-----------------------------------|
| a) Steam power | b) Electricity and assembly lines |
| c) Electronics and IT for automation | d) Cyber-physical systems |
- (iii) Analyze the importance of interoperability in Industry 4.0 ecosystems.
- | | |
|-------------------------------|------------------------------------|
| a) Facilitates data silos | b) Enhances seamless communication |
| c) Reduces system integration | d) Restricts M2M communication |
- (iv) Evaluate the most significant advantage of IIoT in industrial settings.
- | | |
|-------------------------------|--|
| a) Increased manual oversight | b) Improved production efficiency through predictive analytics |
| c) Higher operational costs | d) Limited machine connectivity |
- (v) Analyze the primary function of an IoT gateway in an industrial network.
- | | |
|---------------------------------------|--|
| a) Converts analog signals to digital | b) Manages sensor communication with cloud platforms |
| c) Stores data locally | d) Reduces the number of connected devices |
- (vi) Evaluate the security risks of using Bluetooth in IIoT applications.
- | | |
|---|--|
| a) It has a high encryption standard | b) It is vulnerable to unauthorized access and eavesdropping |
| c) It requires physical security measures | d) It has higher power consumption than Wi-Fi |
- (vii) Identify the role of an actuator in an IIoT system.
- | | |
|-------------------------------------|---|
| a) To send sensor data to the cloud | b) To convert electrical signals into physical action |
| c) To store collected data | d) To monitor environmental conditions |

- (viii) Identify the sensor commonly used for industrial pressure measurement.
- Load cell
 - Pressure transducer
 - Ultrasonic sensor
 - IR sensor
- (ix) Identify, IoT Gateways typically support which type of data transmission.
- Only wired communication
 - Only wireless communication
 - Both wired and wireless communication
 - Only Bluetooth
- (x) Identify, which feature of an IoT Gateway enhances its security.
- Data compression
 - End-to-end encryption
 - Increased power consumption
 - Direct database storage
- (xi) Explain how AI improve predictive maintenance in IIoT.
- Identifies failure patterns from sensor data
 - Replaces all industrial workers
 - Eliminates the need for maintenance
 - Increases hardware costs
- (xii) Indicate, which of the following is a challenge in implementing predictive maintenance.
- High initial investment
 - Reduced equipment lifespan
 - Limited data availability
 - Increased network latency
- (xiii) Indicate the purpose of a collaborative platform in cyber-physical systems
- Increase data isolation
 - Improve teamwork and real-time data sharing
 - Restrict access to data
 - Eliminate cloud computing
- (xiv) Indicate the key function of Product Lifecycle Management (PLM)
- Increasing manual data processing
 - Limiting collaboration
 - Managing product data from design to disposal
 - Reducing automation
- (xv) Identify a real-world application of VR in training
- Flight simulation for pilots
 - Watching YouTube videos
 - Browsing social media
 - Texting on a smartphone

Group-B

(Short Answer Type Questions)

3 x 5=15

- Describe Industrial IoT (IIoT) and its significance in industries. (3)
- Evaluate the effectiveness of Industry 4.0 in small industries. (3)
- Describe actuators and explain their role in industrial processes. (3)
- Describe the primary role of cloud computing in IIoT. (3)
- Explain the significance of smart sensors in Cyber-Physical Systems. (3)

OR

- Explain how is AI used in Cyber-Physical Systems. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

- Explain the concept of Industrial IoT (IIoT) with its key components. (5)
- Describe smart factories and explain their major characteristics. (5)
- List and describe five types of actuators used in IIoT. (5)
- Analyze the impact of IIoT in modern industrial automation. (5)
- Explain the role of AI in Cyber-Physical Systems with examples. (5)
- Explain how sensor networks optimize industrial processes. (5)

Explain the applications of LoRa in IIoT.

OR

(5)

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