

B.I.E.E. 4th Yr. 2nd Semester Examination, 2024-25

SUBJECT: Industrial IoT

Figures out of the right margin indicate full marks.

Instructions: **Candidates are required to answer any 5 (five) from Group A to D, taking at least one from each group.**

Group – A (Module 1) C01

1.
 - (a) How does the Industrial Internet of Things (IIoT) operate, and what are the key technologies and processes that enable its functionality?
 - (b) What is the significance of Physical-to-Digital-to-Physical (PDP) loop in IIoT and describe how this process functions within
 - (c) Explain an overview of the architecture of the Industrial Internet of Things (IIoT) by considering the key components involved.

(4+3) + (3+4) + 6 = 20
2.
 - (a) State the nine pillars of technological advancement that form the foundation of Industry 4.0.
 - (b) What are the key application areas of the Industrial Internet of Things (IIoT), and how is it transforming various industries?
 - (c) Name at least three vendors for IIoT.

6 + (5+5) + 4 = 20
3.
 - (a) How are smart sensors classified in Industrial Internet of Things (IIoT) applications, and what roles do they play in enabling intelligent industrial systems?
 - (b) What are the most commonly used smart sensors in Industrial Internet of Things (IIoT) applications, and what functions do they serve?
 - (c) In the context of the Industrial Internet of Things (IIoT), what does the acronym 'W.A.G.E.S.' stand for and how these sensors are connected with IIoT framework?

(5+3) + (4+3) + (3+2) = 20

Group – B (Module 2) CO2

4. (a) Describe the different types of actuators used in Industrial Internet of Things (IIoT) systems, and how do they function within industrial applications?"

(b) What is the essential function of IIoT Gateways?

Provide an explanation with a relevant diagram.

(c) Why is “Sushi” sensor so widely used in IIoT applications?

(4+4)+ (3+5) +4=20

5. (a) State the concept of “Digital Twin” and how does it integrate with the Industrial Internet of Things (IIoT) to enhance industrial operations?

(b) What are the key differences between the Industrial Internet of Things (IIoT) and the Internet of Things (IoT), and how do their applications and technologies vary?

(6 +4) + (5+5) = 20

6. (a) What are the key technologies that enable the functionality of the IIoT, and how do they contribute to its efficiency and effectiveness?

(b) Why is 5G considered a crucial enabler for IIoT and how does it enhance its performance and capabilities?

(c) What are the key security risks and vulnerabilities associated with IIoT, and how might they impact industrial operations?

(4+4) +(3+4) + (3+2) = 20

Group C (Module 3)CO3

7. (a) What makes PaaS a beneficial choice for developers building modern applications?
- (b) What are the different types of virtual machines, and how are they utilized in modern cloud computing environments?
- (c) What operational and technical challenges do IaaS providers face in effectively managing underlying physical hardware virtualized environments?

6 + (4+4) + 6 = 20

8. (a) What are the main architectural components of Google App Engine (GAE), and what roles do they play in hosting web applications?
- (b) Describe the key features of LoRa (Long Range) technology with the help of a suitable diagram.
- (c) "MQTT is the Lightweight messaging protocol for M2M communication" - explain the term "light weight".

(5+5) + 6 + 4 = 20

9. (a) How does Platform as a Service (PaaS) enhance the application development lifecycle in terms of efficiency, scalability, and deployment?
- (b) List and briefly describe a few commonly used HTTP verbs in RESTful web services.
- (c) How is a LoRa gateway implemented, and what are the key steps and considerations involved in setting it up for IIoT applications?

6+(3+4)+(4+3)=20

Group - D(Module 4) C04

10. (a) How does the Industrial Internet of Things (IIoT) enhance public safety in smart cities, and what impact does it have on urban management and emergency responses?
- (b) What IIoT-based solutions are used to reduce traffic congestion in smart cities, and how do they improve urban mobility and transportation efficiency?
- (c) State the concept of intelligent car parking system and how does it utilize IIoT technologies to improve parking efficiency and user experience?

(4+3) + (3 +4)+(3+3) = 20

11. (a) What do you mean by IoMT? Explain the advantages of using IoT in healthcare.
- (b) In what ways do the insurance providers leverage IIoT to enhance risk assessment, operational competence, and customer service? How is IIoT healthcare architecture different from IoT based structure?
- (c) Apart from monitoring patients' health, Interpret in which other ways IoT devices are very useful in hospitals.

(2 + 5) + (4+4) +5 = 20

12. (a) Which type of surgical tools are used in robotic surgeries and why? State the names of a few of such devices.
- (b) Name at least six wearable devices of IoT in Healthcare and describe any one of them.
- (c) *"Put an end to manual on-site meter readings and data processing of water, gas and electricity consumption by using IIoT framework"*
- Justify.

(3 + 3) + (5+4) + 5 = 20