



B.E/B.TECH DEGREE EXAMINATIONS: APRIL / MAY 2024

(Regulation 2018)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EIE0011: Industry 4.0

COURSE OUTCOMES

CO1: Comprehend the drivers and enablers of Industry 4.0

CO2: Understand the opportunities, challenges brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits.

CO3: Outline the various systems used in a manufacturing plant and their role in an Industry 4.0 world

CO4: Analyze the power of Cloud Computing in a networked economy

Time: Three Hours

Maximum Marks: 100

Answer all the Questions: -

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|--|-----|-------------------|
| 1. Mention the four stages of Industrial revolution. | CO1 | [K ₂] |
| 2. List the six design principles of Industry 4.0. | CO1 | [K ₂] |
| 3. IEEE 802.15.4 uses DSSS (direct sequence spread spectrum) coding scheme to transmit information. Explain its features. | CO2 | [K ₂] |
| 4. Outline the analogy and goal of IoT networking layer. | CO2 | [K ₂] |
| 5. Infer the Augmented Reality net impact in process industry and configure its hardware modules? | CO2 | [K ₂] |
| 6. What are the types of Big Data in IIoT? Explain | CO3 | [K ₂] |
| 7. List the three critical key elements in building the industrial internet for Process industry? | CO3 | [K ₂] |
| 8. How is fog computation is different from an edge computation in IIoT platform. | CO4 | [K ₂] |
| 9. Mention the components of Cybersecurity and operational security. | CO3 | [K ₂] |
| 10. Outline the Futuristic Industrial Plant Cyber Physical Systems using 5C Architecture for a IIoT in Industrial Processes? | CO4 | [K ₂] |

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks) (Answer not more than 400 words)

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|--|---|-----|-------------------|
| 11. a. Explain MQTT Publish/Subscribe Framework and its quality of services. | 8 | CO1 | [K ₃] |
| b. Describe the features of Wireless HART Communication Protocol | 8 | CO1 | [K ₃] |

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|-----|----|--|----|-----|-------------------|
| 12. | a. | What are Cyber-Physical Systems (CPS)? How does it differ from Embedded System? | 8 | CO2 | [K ₃] |
| | b. | Design the platform for a home automation system using CPS Architecture for Industry 4.0 | 8 | | |
| 13. | | Create an application and explain its control aspects (Parameters to be controlled) with programming sequence using Mind sphere. | 16 | CO3 | [K ₄] |
| | | <ul style="list-style-type: none"> • Draw the process diagram – Note down the control parameters-Initialization of Mind Sphere-Use the editor function. • Derive the steps in programming the cloud foundry and usage. • Elaborate the sequence with respect to mind sphere tools. • Elaborate the implementation for the developed application with graphical waveform. | | | |
| 14. | a) | Design an Industrial cloud-based platform for a Unit operation Plant. | 8 | CO2 | [K ₃] |
| | b) | Explain the variant features of ProfiBus applied in process industries. | 8 | CO1 | [K ₃] |
| 15. | a) | Derive the three-tier architecture pattern applied in IIRA for a power distribution system. | 8 | CO4 | [K ₃] |
| | b) | What is SDN? Draw the SDN architecture and what does separating control and data plane means? | 8 | CO3 | [K ₃] |
| 16. | | Develop an application of Machine learning Algorithm for inspection and operation analysis of a Machine operation forecast on a cloud platform. Give detailing of the following: | 16 | | |
| | | <ul style="list-style-type: none"> • Define the objective to design. • Data gathering procedure. • Preparing Data. • Exploring Data Analysis. • Building a Machine Learning Model. • Model evaluation & Optimizations. • Prediction. | | CO4 | [K ₃] |
