Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: R9771

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Open Elective

R21UME971 – INTRODUCTION TO INDUSTRY 4.0

(Regulations R2021)

(Common to All Engineering Branches)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which one of the industrial revolutions used electric energy to create mass   CO1-U
    production for the first time?

    (a) 1st Industrial Revolution   (b) 2nd Industrial Revolution

    (c) 3rd Industrial Revolution   (d) 4th Industrial Revolution

2. What is/are the essential components of a smart factory?   CO1-U

    (a) Smart Machines   (b) People at Work

    (c) Trained Personnel   (d) All of the above

3. Small but continuous improvement refers   CO2-U

    (a) 5S   (b) Prescriptive analytics   (c) Kaizen   (d) Poka yoke

4. If the objective is maximize the quality production by ensuring production   CO2-U
    machine availability and reducing machine breakdowns, which of the
    following lean tool will best work for this?

    (a) Total Productive Maintenance   (b) Control Plan

    (c) Visual Controls   (d) Kaizen

5. Which of the following is a potential benefit of IIoT in industrial settings?   CO1-U

    (a) Increased waste and inefficiency   (b) Reduced equipment maintenance

    (c) Decreased data security   (d) Slower response times to equipment failures

6. Which of the following technologies is NOT typically associated with IIoT?   CO1-U

    (a) Sensors and actuators   (b) Cloud computing

    (c) Artificial intelligence and machine learning   (d) Virtual reality gaming

7. Which of the following materials is NOT commonly used in Sheet   CO2-U
    Lamination processes?

    (a) Paper   (b) Polymer   (c) Metal   (d) Ceramic

8. What is the primary function of Computer-Aided Design (CAD) software in   CO2-U
    the context of 3D printing?

    (a) To create virtual models of objects   (b) To control the 3D printer's movement

    (c) To decide the material used for printing   (d) To analyze the final printed object

9. Internal and external sensors are used in robots to   CO2-U

    (a) Collect information of the environment and operate the drive units, respectively

    (b) Operate the drive units and collect the information from the environment, respectively

    (c) operate the drive unit only

    (d) collect the information from the environment only

10. The number of moveable joints in the base, the arm, and the end effectors of the   CO2-U
    robot determines_____

    (a) degrees of freedom   (b) payload capacity

    (c) operational limits   (d) flexibility

PART – B (5 x 2= 10 Marks)

11. Explain key challenges of industry 4.0   CO1-U
12. Explain the Levels of Lean Automation   CO2-U
13. Illustrate the types of devices are commonly used in IIoT?   CO1-U
14. Illustrate the various applications of additive manufacturing.   CO2-U
15. Describe the various technological components of robotics   CO2-U

PART – C (5 x 16= 80Marks)

16. (a) Compare industry 4.0 with industry 3.0 and 2.0. Explain the   CO1 - U   (16)
        advantages and limitations of industry 4.0.

    (b) Explain the cyber physical system with neat sketch.   CO1 - U   (16)

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17. (a) Explain using ladder diagram the impact of Lean tools in the Industry 4.0 technologies.   CO2 - U   (16)

    (b) Explain the term JIT, CIM, JIDOKA, cellular manufacuturing, 5S, Poka yoke, Kaizen, Total productive maintenance. (Each 2 Marks).   CO2 - U   (16)

18. (a) Explain about the Industrial Internet and Key IIoT Technologies.   CO1 - U   (16)

    (b) Explain in detail about the Industrial Internet Uses in Retail sectors.   CO1 - U   (16)

19. (a) Describe the arrangement and working of Fused deposition modeling and write is applications.   CO2 - U   (16)

    (b) Explain in detail construction, working and applications of laminated object manufacturing with neat sketch.   CO2 - U   (16)

20. (a) Explain in detail the impact of robots in various fields. Write its limitations.   CO2 - U   (16)

    (b) Explain the various industrial and medical applications of today's robots.   CO2 - U   (16)

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