A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U7308

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Mechanical Engineering

21MEV308 - INDUSTRY 4.0

(Regulations 2021)

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 production for the first time? CO1-U

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

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

2. What 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. How does Rolls-Royce improve reliability in aircraft engines? CO2-U

   a) Predictive maintenance b) Prescriptive analytics

   c) Deployment of valuable devices d) All of the above

4. Which of the following refers to the term “autonomation” CO2-U

   a) Kaizen b) Kanban c) Jodoka d) 5S

5. What is the primary purpose of IIoT in industrial applications? CO 1-U

   a) To make industrial processes more complex

   b) To reduce efficiency and productivity

   c) To improve efficiency, productivity, and data-driven decision-making

   d) To increase the cost of production

6. Which wireless communication technology is commonly used in IIoT for connecting devices over short distances? CO 1-U

a) 3G b) Wi-Fi c) Bluetooth d) Satellite communication

7. Which of the following is not a benefit of 3D printing? CO 2-U

a) It is faster b) It is expensive c) It is cost-effective d It takes a lot of time

8. SLA printer's package material is in a. CO 2-U

a) Chain b) Spool c) Cartridge d) None of the above

9. The collaborative robot arms are designed to mimic the range of motion of a _____ CO 2-U

a) Network b) Machine arm c) Device d) Human arm

10. Robots are specified by CO 2-U

(a) Pay load (b) Work volume c) degrees of freedom d) all of the above

PART – B (5 x 2= 10 Marks)

11. Explain Cyber-Physical Systems? CO1-U

12. Explain about Lean Production Systems CO 2-U

13. Explain the key benefits of implementing IIoT in industries? CO1-U

14. Explain the phases of AM process CO 2-U

15. Illustrate the different types of sensors required for advanced robots CO 2-U

PART – C (5 x 16= 80 Marks)

16. (a) Examine and assess the nine Industry 4.0 pillars, outlining their links and explain the effects they will have on contemporary industrial systems. CO1 U (16)

Or

(b) Explain the Machine-to-Machine (M2M) communications and its requirements. CO1 U (16)

17. (a) Explain using ladder diagram the impact of Lean tools in the Industry 4.0 technologies CO1 -U (16)

Or

(b) Explain Lean Production Systems and how this tools impact on Industry 4.0 CO1 -U (16)

18.	(a)	Discuss about the Industrial Internet and Need of industrial internet	CO1 -U	(16)
		Or		
	(b)	Explain in detail about the Industrial Internet Uses in automobile industry.	CO1 -U	(16)
19.	(a)	Examine the arrangement and working principles of Fused Deposition Modeling (FDM), and evaluate its applications across various industries, highlighting its impact on modern manufacturing processes.	CO3 -Ana	(16)
		Or		
	(b)	Analyze the construction and working principles of the Stereolithography Apparatus (SLA) with a detailed sketch, and critically evaluate its advantages and limitations in the context of additive manufacturing technologies.	CO3 -Ana	(16)
20.	(a)	Explain in detail the impact of robots in various fields. Write its limitations.	CO1 -U	(16)
		Or		
	(b)	Explain the various sensor systems used in industrial robots.	CO1 -U	(16)