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## Department of Mechanical Engineering

### CIE - I

Date	May 2024	Maximum Marks	50
	ME124BTS	Duration	90 Minutes
Course Code	II Semester	USN:	
Sem		ENTS OF INDUSTRY 4.	0

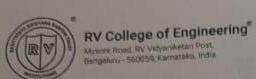
#	Ouestions	M	BT	CO
1.	Define Industry 4.0 and explain the various design principles it incorporates.  How do these principles differentiate Industry 4.0 from previous industrial revolutions?	10	2	alo l
2.5	Discuss the goals of Industry 4.0 and the reasons why industries are adopting it.  Provide specific examples to support your answer.	10	2	1
	Evaluate the opportunities and challenges of implementing Industry 4.0 in modern industries. How can companies address the challenges to capitalize on the opportunities?	10	5	1
	Analyze how horizontal and vertical integration in Industry 4.0 leads to end-to- end engineering of the overall value chain. Include the role of digital integration platforms in your analysis.	10	4	2
	Describe how Industry 4.0 is impacting the skills required in modern industries. What strategies can be implemented to prepare the workforce for these changes.		2	

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks	Part	iculars	COI	CO2	CO3	CO4	LI	L2	L3	L4	1.5	L6
Distribution	Test	Max	40	10	125	-	1578	30	7	10	10	-20

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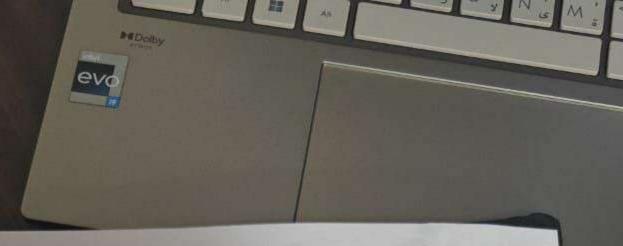
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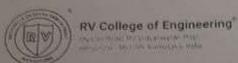
## Department of Mechanical Engineering

#### CIE-II

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	Town 2024	Maximum Marks	
Date	June 2024	Duration	90 Min
Course Code	ME124BTS		
Course Name	Elements of Industry 4.0	USN:	
Course Ivanic			

		M	BT	CO
#	Questions  Describe how augmented reality (AR) and virtual reality (VR) can be used in industrial applications such as maintenance, assembly, collaborative operations, industrial applications such as maintenance, assembly application to illustrate your answer.	10	2	3
2	Describe the advantages of additive manufacturing technologies and their impact on the environment. How are these technologies utilized in industries such as	10	2	4
3.	automotive, aerospace, electronics, and medical?  Explain the concepts of a digital twin and a virtual factory in the context of smart manufacturing. How do these concepts contribute to Total Productive Maintenance (TPM) and the implementation of Industry 4.0 in MSMEs?	1	2	3
4.	consider a mid-sized manufacturing company looking to implement cloud computing to enhance its operations. Evaluate the potential benefits and challenges associated with cloud computing in the context of Industry 4.0. Discuss how cloud computing can facilitate the IT/OT convergence and address cyber	3	6	3
5.	Imagine you are part of a team visiting a smart manufacturing facility that has adopted Industry 4.0 and Industry 5.0 principles. Create a report outlining the key technologies observed, their applications, and the benefits achieved by the facility Include an analysis of how these technologies contribute to the overal productivity and sustainability of the manufacturing processes.	y y	0	5 3





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		Department of Mechanic	ent CIE					
		Improvem	Maximum Marks		50		7.43	
	Date	July 2024	Duration	-	0 M	lin		
	ourse Code	ME124BTS	USN:				1	
Co	ourse Name	Elements of Industry 4.0	Max. Ma	rks:	10			(A)
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Wi	the ventent of	maintenance, Al algorithms an	alyze data fromto	1	2		4	1
2.	product common	none failures before they occur			1		1	
3.32	predict equipr	uting in intelligent conveyor	systems adjusts paths based	1	1	2	4	1
3.		tring in michigen conveyor	581,31				1	
	on 1	intenance uses Al algorithms to	predict equipment	Tike		2	4	
4.	Predictive Wa	Lieduster additive manufactur	ing is used to produce custom	1		2	3	
5	in the medica	i industry, additive manufaction		W				
	, pro	oviding patient-specific solutions	objects by adding material	1		2	12	
6.	15 0	nutacturing involves creating	le	1				
	by	based on digital mode	sinter material in form.	IN		2		3
7.	Selective Lase	er Sintering (SLS) uses a laser to	James Marcolli III	1		2	1000	3
X.	Google lens is	used in			-	2		3
9.	Advantages of			1297	2	100		
		additive manufacturing include	May Ma	100	T	1000	-	
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# ME114BTS / 22EM117 / 22EM217

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## RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

I / II Semester B. E. Regular / Supplementary Examinations Feb-2024 Common to all programs

# **ELEMENTS OF INDUSTRY 4.0 (ELECTIVE)**

Time: 03 Hours Instructions to candidates:

The frustum

Maximum Marks: 100

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.

2. Answer FIVE full questions from Part B. Question number 2 is compulsory. Choose any one full question from 3 or 4, 5 or 6, 7 or 8 and 9 or 10.

### PART-A

1 1.1	What are the core design principles of Industry 4.0?	02
1.2	Explain the concept of the Industrial Internet of things (IIoT) and how	77.00
	it contributes to the realization of Industry 4.0 goals.	02
1.3	What are some of the challenges that organizations may face when	
	adopting Industry 4.0 technologies?	02
1.4	Explain the concept of Horizontal and vertical integration in the	22.50
	context of Industry 4.0.	02
1.5	What are the potential industrial applications of Augmented Reality	
	(AP) and virtual Reality (VR)?	02
1.6	Explain one advantage and one environmental impact of additive	
1.0	manufacturing (3D printing) technologies.	02
1 77	Explain the concept of a "Digital twin" in manufacturing.	02
1.7	What is Total Productive Maintenance (TPM)? And why is it important	
1.8	What is Total Floductive Maintenance (1.17)	02
	in the context of Industry 4.0?	02
1.9	What are the key fundamentals of Artificial Intelligence (AI)?	02
1.10	Describe the concept of "Intelligent Objects" in the context of Al?	

### PART-B

2	a b	Explain the concept of Industry 4.0 and its significance in the context of the various industrial revolutions.  Describe the role of the Industrial Internet of Things (IIoT) in paving the road to industry 4.0.	08
3	a b	Examine the significance of skilled workers in the Industry 4.0 era. What are the strategies and initiatives that can address the shortage of skilled labor in industries embracing advanced technologies? Oiscuss the opportunities and challenges posed by the lack of resources in the context of Industry 4.0 adoption.	08
		OR	
4	a	Discuss the significance of machine sensors in manufacturing processes within the framework of vertical integration.	08

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15

one of its base corners such that the two base edges containing the corner on which

A hexagonal pyramid of base sides 25mm and 50mm axis length rests on HP on

		and its role in vertical integration.	
	5 a		1000
	b	(VR) in the context of Augmented Reality (AR) and Virtual Barks	08
		OR	08
	6 a	Explore the applications of additive manufacturing in automotive industry.  Examine the environmental impact of additive manufacturing. How does this technology contribute to sustainability in manufacturing processes?	08
18	7 a	Discuss the role of both	08
	ь	Discuss the role of both cloud and edge computing in Industry 4.0. How do these technologies complement each other?  Explain the fundamentals of cloud computing, including service models and deployment models.	08
1		OR	
8	a b	How does the integration of Information Technology (IT) and Operational Technology (OT) benefit manufacturing processes?  landscape.	08
9			08
	a b	Describe one specific case study where Al has been successfully applied in manufacturing.  Discuss the concept and advantages of an Intelligent Conveyor System in production logistics.	08
		OR	08
10	a b	Discuss the advantages of utilizing Intelligent Load Carriers in production logistics.  Define Intelligent Objects in the context of user-oriented functions and product-oriented functions.	08
			08