Paper Code: ARO 376	L	T/P	Credits
Subject: Industry 4.0	3	0	3

Marking Scheme:
Teachers Continuous Evaluation: As per university examination norms from time to time.
End Term Theory Examination: As per university examination norms from time to time.

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks : As per University norms

- ➢ There should be 9 questions in the end term examination question paper
- ➢ Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions.
- ➢ Apart from Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, students may be asked to attempt only 1 question from each unit.
- ➢ The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.
- ➢ The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required

Course Outcomes [Bloom's Knowledge Level (KL)]:

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	3	2	2	3
CO2	3	3	3	3	2	-	-	-	3	2	2	3
CO3	3	3	3	3	2	-	-	-	3	2	2	3
CO4	3	3	3	3	2	-	-	-	3	2	2	3

Course Content	**No of lectures**
Unit I **Introduction** Goals and Design Principles, Historical Context, General Framework, Need of Industry 4.0, Application areas, Dissemination of Industry 4.0 and the contributing disciplines, Current situation of Industry 4.0. Introduction to Industry 4.0 to Industry 5.0 Advances.	[9]
Unit II **Industry 4.0 and Cyber-Physical System** Cyber-Physical Systems and Next Generation Sensors, Collaborative Platform and Product Lifecycle Management, Augmented Reality and Virtual Reality technologies, Artificial Intelligence, Big Data Analytics and Advanced Analysis, Cybersecurity for Industry 4.0, Introduction to Industrial IoT: Industrial Processes, Industrial Sensing & Actuation, Industrial Internet Systems.	[9]

Unit III **Industrial IoT (IIoT)** Introduction, IIoT Business models, Architecture, Industrial IoT Sensing, Industrial IoT Communication, Big Data analytics and software-defined networks, Data management with Hadoop for IIot, IIot analytics, Industrial IoT security and Fog Computing.	[9]
Unit IV **Tools of Industry 4.0** **Tools for Industry 4.0:** Artificial Intelligence, Big Data Analytics, Machine Learning, Cloud Computing, Cyber security, Virtual Reality, Augmented Reality, IoT, Robotics, **Applications domain of Industrial Internet of Things (IoT):** Manufacturing, Healthcare, Education, Aerospace and Defense, Agriculture, Transportation and Logistics. **Impact of Industry 4.0 on Society**: Impact on Business, Government and Society.	[9]

Text Books:

[T1] Jean-Claude André, *Industry 4.0*, Wiley- ISTE, July 2019, ISBN: 781786304827, 2019

[T2] S. Misra, A. Mukherjee, and A. Roy, *Introduction to IoT*. Cambridge University Press, 2020

[T3] P. Kaliraj, T. Devi, *Big Data Applications in Industry 4.0*, ISBN 9781032008110, CRC Press, Taylor & Francis Group, 2022

Reference Books:

[R1] Alasdair Gilchrist , *Industry 4.0- The Industrial Internet of Things*, Apress Berkeley, CA, 2016 978-1-4842-2047-4