B.E Semester: 6 Mechanical Engineering
Subject Name: IOT & Smart Manufacturing (ME605-N-E)
[Dept. Elect.-2]

A. Course Objective:

- To present a problem oriented in depth knowledge of IOT & Smart Manufacturing**.**
- To address the underlying concepts and methods behind IOT & Smart Manufacturing.

B. Teaching / Examination Scheme:

Teaching Scheme				**Total Credit**	**Evaluation Scheme**					
L	**T**	**P**	**Total**		**Theory**		**Mid Sem Exam**	**CIA**	**Pract.**	**Total**
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**	**Marks**	**Marks**	**Marks**	**Marks**
3	**0**	**2**	**5**	**4**	**3**	**70**	**30**	**20**	**30**	**150**

C. Detailed Syllabus:

Unit No.	Details
1	**The Internet of Things**: An overview; Design Principles for Connected Devices; Internet Principles. **Thinking about Prototyping** – Costs versus ease of prototyping, prototyping and Production, open source versus Closed Source. **Prototyping Embedded devices** – Electronics, Embedded Computing Basics, Arduino/ Raspberry Pi/ BeagleBone Black/ etc., Electric Imp and other notable platforms Prototyping of Physical Design. Prototyping online Components – Getting Started with an API, Writing a New API,
2	**Real Time Reactions**, Other Protocols. Techniques for Writing Embedded Code – Memory Management, Performance and Battary Life, Libraries and debugging. **Automatic Storage Management** in a Cloud World – Introduction to Cloud, Relational Databases in the Cloud, Automatic Storage Management in the Cloud. Smart Connected System Design Case Study
3	**Internet of Things Privacy, Security and Governance** Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security
4	**Introduction to Smart Manufacturing**: What is “smart manufacturing” really and how does it differ from conventional/legacy manufacturing-Smart Manufacturing Processes- Three Dimensions: (1) Demand Driven and Integrated Supply Chains;(2) Dynamically Optimized Manufacturing Enterprises (plant + enterprise operations);(3) Real Time, Sustainable Resource Management (intelligent energy demand management, production energy optimization and reduction of GHG)

5	**Smart Design/Fabrication:** Smart Design/Fabrication - Digital Tools, Product Representation and Exchange Technologies and Standards, Agile (Additive) Manufacturing Systems and Standards. Mass Customization, Smart Machine Tools, Robotics and Automation (perception, manipulation, mobility, autonomy), Smart Perception – Sensor networks and Devices.
6	**Smart Applications**: Online Predictive Modeling, Monitoring and Intelligent Control of Machining/Manufacturing and Logistics/Supply Chain Processes; Smart Energy Management of manufacturing processes and facilities
7	**Smart and Empowered Workers:** Eliminating Errors and Omissions, Deskilling Operations, Improving Speed/Agility, Improving Information Capture/Traceability, Improving Intelligent Decision Making under uncertainty Assisted/Augmented Production, Assisted/Augmented Assembly, Assisted/Augmented Quality, Assisted/Augmented Maintenance, Assisted/Augmented Warehouse Operations and Assisted Training

Total hours (Theory):48
Total hours (Practical):32
Total hours:80

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1^{st} ,2^{nd} ,3^{rd}	Unit 1	20%	1,2
2	4^{th} .5^{th} ,6^{th}	Unit 2	20%	3
3	7^{th} , 8^{th} ,9^{th}	Unit 3	20%	4
4	10^{th} .11^{th} . 12^{th}	Unit 4	20%	5
5	13^{th} , 14^{th} ,$15^{th,}$,16^{th}	Unit 5	20%	6,7

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. List of Practical:

1	Sketch the architecture of IoT Toolkit and explain each entity in brief.
2	Configuring cloud database management and accessing
3	Sensors, Gateway and Cloud interface
4	Data analysis from cloud and reporting
5	Introduction to Smart Manufacturing, distinguish its signification in comparison to conventional manufacturing.

6	To Study about tools for Smart Manufacturing.
7	To study about Smart Application.
8	To study about Smart and Empowered working.

G. Students Learning Outcomes:

1	The student can identify different areas of IOT and Smart Manufacturing**.**
2	Can find the applications of all the areas in day to day life.

H. Text Books & Reference Books:

1	A. McEwen and H. Cassimally, Designing the Internet of Things, 1st edition, Wiley, 2013, ISBN-10: 111843062X.
2	N. Vengurlekar and P. Bagal, Database Cloud Storage: The Essential Guide to Oracle Automatic Storage Management, 1st edition, McGraw-Hill Education, 2013, ISBN-10: 0071790152.
3	M. Kuniavsky, Smart Things: Ubiquitous Computing User Experience Design, 1st edition, Morgan Kaufmann, 2010, ISBN-10: 0123748992.