Courses to be included in Open Elective Category

(With Effect from academic year 2020-21 onwards)

Department of Electronics and Telecommunication Engineering

Government College of Engineering,

Aurangabad M.S. 431005 India

ET3038: Introduction to Internet of Things		
Teaching Scheme **Lectures: 3 Hrs/Week** **Total Credits: 03**	**Examination Scheme** Test I Test II Teachers Assessment Final Evaluation	: 15 Marks : 15 Marks : 10 Marks : 60 Marks

Prerequisites: Nil

Course description: After completing this course, students will have a broad and fundamental understanding of IoT. Topics range from an overview of basics IoT, network and communication aspect, Domain specific applications of IoT, Developing IoTs.

Course Objectives:
- To provide a clear view of Internet of Things (IoT).
- To get accustomed with building blocks of IoT and its characteristics.
- To get familiarize with various applications of IoT.

Course Outcomes

After completing the course, students will be able to:

CO1	Understand the concepts of Internet of Things and various challenges regarding it	K1
CO2	Understand different network protocols and challenges in IoT	K2
CO3	Describe IoT applications in different domain and be able to explain their performance	K2
CO4	Demonstrate IoT applications on embedded platform	K3

Detailed Syllabus:

Unit 1	**Introduction to IoT** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT
Unit 2	**Network & Communication aspects** Basics of Networking, Communication Protocols, Sensor Networks, Machine-to-Machine Communications.Overview of Embedded OS, IoT Communication model and protocols
Unit 3	**Challenges in IoT** Design challenges, Development challenges, Security challenges, Other challenges
Unit 4	**Developing IoT** Interpretability inI oT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino. Introduction to Embedded programming, Introduction to Raspberry. Implementation of IoT with Raspberry Pi
Unit 5	**Industrial Case studies** Agriculture, Healthcare, Activity Monitoring, Home automation, Logistics, Retail, etc.

Text and Reference Books

1. Vijay Madisetti, Arshdeep Bahga, "Internet of ThingsAHands-On-Approach",2014, ISBN:9780996025515
2. Adrian McEwen, "Designing the Internet of Things",WileyPublishers,2013,ISBN: 978-1-118-43062-0
3. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things" 2013, ISBN
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter
5. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless sensor Networks: Theory and Practice"

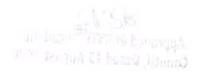**Teacher's Assessment:** Teachers Assessment of 10 marks is based on one or combination of few of following

      a. Simulation
      b. Application development
      c. Study of Industry processes and its presentation

(**Refer Applications:** Smart cities, smart home, health care, structural health monitoring, smart automation, green house farming, Factory Digitalization, Product flow Monitoring, Inventory Management, Safety and Security, Quality Control, Packaging optimization, Logistics and Supply Chain Optimization, elder care, remote health monitoring, emergency notification systems, wearable heart monitors, smart traffic control, vehicle control, smart traffic control, autonomous driving, smart grid , advanced metering infrastructure (AMI) , Environmental monitoring, movements of wildlife, earthquake or tsunami early-warning systems, surveillance, robots, human-wearable biometrics, active packaging, digital watermark or copy detection pattern, real-time obstacle detection, Noise and air pollution monitoring, etc.)

ET3039: MATLAB Programming			
Teaching Scheme	**Examination Scheme**		
Lectures: 3 Hrs/Week	Class Test I	: 15 Marks	
Credits: 3	Class Test II	: 15 Marks	
	Teachers Assessment	: 10 Marks	
	End Semester Exam	: 60 Marks	

Prerequisites: No specific prerequisites are needed.

Course Description: The course provides a gentle introduction to the MATLAB computing environment, and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including toolboxes

Course Outcomes

After completing the course, students will be able to:

CO1	Memorize the features of the MATLAB development environment.	K1
CO2	Write simple programs in MATLAB to solve scientific and mathematical problems	K2
CO3	Write functions to find modular solution of problems.	K2
CO4	Describe the MATLAB GUI effectively.	K2
CO5	Use the simulink to solve engineering problems.	K2
CO6	Apply knowledge of various tool boxes to construct and implement algorithm for a given problem.	K3

Detailed Syllabus:

Unit 1	**MATLAB Fundamentals** Brief Introduction, Installation of MATLAB, History, Use of MATLAB, Key features, Command window, Workspace, Command history, Setting directory Working with the MATLAB user interface, Basic commands, Assigning variables, Operations with variables, Character and string, Arrays and vectors, Column vectors, Row vectors, BODMAS Rules, Arithmetic operations, Operators and special characters Mathematical and logical operators, Solving arithmetic equations, Crating rows and columns Matrix, Matrix operations, Finding transpose, determinant and inverse, Solving matrix, Other operations, Trigonometric functions, fractions, Real numbers, Complex numbers

Unit 2	**M files, Plots and GUI**
	Working with script tools, Writing Script file, Executing script files, The MATLAB Editor Saving m files, Plotting vector and matrix data Plot labelling, curve labelling and editing, 2D plots, Basic Plotting Functions, Creating a Plot Plotting, Multiple Data Sets in One Graph ,Specifying Line Styles and Colors, Graphing Imaginary and Complex Data, Figure Windows Displaying, Multiple Plots in One Figure, Controlling the Axes, 3D plots Creating, Mesh and Surface, About Mesh and Surface Visualizing ,Subplots, GUI Design, Introduction Of Graphical User Interface, GUI Function, Property GUI Component Design, GUI Container Writing the code of GUI, Callback Dialog Box, Menu Designing Applications

Unit 3	**Introduction of Simulink**
	Simulink Environment and Interface, Study of Library, Circuit Oriented Design, Equation Oriented Design, Model Subsystem Design, Connect Call back to subsystem, Application

Unit 4	**Loops, Conditional Statement and functions**
	Automating commands with scripts ,Writing programs with logic and flow control, Writing functions Control statement, Programming Conditional Statement, Programming Examples, Loops and Conditional Statements, Control Flow Conditional Control — if, else, switch, Loop Control — for, while, continue, break, Program Termination — return, Functions Writing user defined functions, Built in Function, Function calling, Return Value Types of Functions

Unit 5	**Study of different tool boxes**
	Optimization Toolbox, Fuzzy logic , Simscape Fluids, Robotics System Toolbox, Control system, Power electronics (Simscape Power Systems), Simulink PLC Coder, Simulink 3D Animation, Automated Driving System Toolbox, Image processing, Signal processing, Machine learning, pattern recognition, Artificial intelligence etc.

Text and Reference Books
1. MATLAB Getting Started Guide
2. http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf
   Useful references: MATLAB Central (Script, toolbox, blog, newsgroup)
3. http://www.mathworks.com/matlabcentral/MATLAB Newsletters
4. http://www.mathworks.com/company/newsletters

Teacher's Assessment: In Teacher's Assessment totally practical oriented approach is expected. Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Prototype development
3) Simulink based small application development