INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

PRINCIPLES OF DISTRIBUTED EMBEDDED SYSTEMS								
III Semester: ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESE30	**Elective**	3	0	0	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Real Time Operating System.								

I. COURSE OVERVIEW:

This course introduces the foundation in the system concepts of distributed computing for widely used in small embedded systems. It covers basic system concepts, real time systems, real time communications, system design and CAN protocols. Through the knowledge of distributed embedded computing used to design and implement the prototype on embedded intelligence in an ever-growing array of application fields, and engineering disciplines.

II. COURSES OBJECTIVES:

The students will try to learn

I. Design principles of real time systems and its classifications for the design of embedded system.
II. The working environment of real time operating system for processes data and events that have time constraints.
III. The CAN protocol and its standards to allow the all-embedded devices to communicate with each other in a network.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Illustrate the principles of real time computer systems for the system design to controls the environment.
CO2 Demonstrate the classifications of real time systems and its components for the design of reliable embed system.
CO3 Select the suitable Time based triggered or event-triggered control strategies for stabilization of rate constrai in the distributed real time communication systems.
CO4 Summarize the fundamental aspects of real time operating system as, task scheduling, task managem Intertek communication, process input/output to implement in the real time applications.
CO5 Identify the scheduling problems and algorithms to resolve it in order to design and implementation dependable distributed embedded systems.
CO6 Model a time-triggered architecture system for the use of a single interrupt and to activate any specific acti either hardware or software.

IV. COURSE CONTENT:

MODULE - I: REAL-TIME ENVIRONMENT (10)

Real-time computer system requirements, classification of real time systems, simplicity, global time, internal and external clock synchronization, real time model. Real time communication, temporal relations, dependability, power and energy awareness, real time communication, event triggered, rate constrained, time triggered.

MODULE –II: REAL-TIME OPERATING SYSTEMS (09)

Real-time computer system requirements – classification of real time systems – simplicity – global time – internal

and external clock synchronization – real time model. Real – time communication – temporal relations – dependability – power and energy awareness – real –time communication – event triggered – rate constrained – time triggered.

MODULE –III: SYSTEM DESIGN (09)
Scheduling problem, static and dynamic scheduling, system design Validation, time-triggered architecture.

MODULE –IV: INTRODUCTION TO CAN (10)
Introduction to CAN Open – CAN open standard – Object directory – Electronic Data Sheets & Devices.

MODULE –V: CAN STANDARDS (10)
D Introduction to CAN open CAN open standard, object directory, electronic data sheets and devices.

V. TEXT BOOKS:

1. Hermann Kopetz, "Real–Time Systems-Design Principles for distributed Embedded Applications", Springer,2nd edition, 2011.
2. Glaf P. Feiffer, Andrew Ayre and Christian Key old, "Embedded networking with CAN and CAN open",Copperhill Media Corporation, 1st edition, 2008.

VI. REFERENCE BOOKS:

1. Rajkamal, "Embedded System-Architecture-Programming-Design", Tata McGraw Hill, 3rd Edition, 2011.
2. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley and sons, 2nd Edition, 2002.
3. Lyla B Das, "Embedded Systems-An Integrated Approach", Pearson, 1st Edition, 2013.
4. David E. Simon, "An Embedded Software Primer", Pearson Education, 1st Edition, 1999.

VII. WEB RESOURCES:

1. https://www.upf.edu/pra/en/3376/22580.
2. https://onlinecourses.nptel.ac.in/noc20_cs16/preview
3. https://www.coursera.org/learn/ real time embedded systems.
4. https://mitpress.mit.edu/books/ real time embedded systems.
5. http://www.apress.com

VIII. E-TEXT BOOKS:

1. http://infinity.wecabrio.com/1441982361-real-time-systems-design-principles-for-distribut.pdf
2. https://do1-vbox1.web.tku.edu.tw/kVuxfO_real-time-systems-design-principles-fordistribut_XJQN.pdf

V. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Assignments
4. Model question paper - I
5. Model question paper - II
6. Lecture notes
7. Power point presentations
8. Early Lecture Readiness Videos