PRINCIPLES OF DISTRIBUTED EMBEDDED SYSTEMS

I Semester: ES

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BESB06	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

A distributed embedded system consists of hardware and software parts interacting via an inter-connection network. This course deals with the importance of real time communication systems, classification of real time systems, real time operating systems, and the design of real-time protocols. The applications include mobiles, routers, video games consoles, mp3 players, printers, GPS receivers, dishwashers, thermostats, anti-lock banking systems, medical imaging.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The design principles of distributed embedded systems.
II. Design CAN network based systems.
III. The RTOS to design embedded system.

III. COURSE OUTCOMES:

After successful completion 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.	Understand
CO2	Demonstrate the classifications of real time systems and its components for the design of reliable embedded system.	Understand
CO3	Select the suitable Time based triggered or event-triggered control strategies for stabilization of rate constrained in the distributed real time communication systems.	Apply
CO4	Summarize the fundamental aspects of real time operating system as, Task scheduling, Task management, Intertask communication, Process input/output to implement in the real time applications.	Understand
CO5	Identify the scheduling problems and algorithms to resolve it in order to design and implementation of dependable distributed embedded systems.	Apply
CO 6	Model a time-triggered architecture system for the use of a single interrupt and to activate any specific activity either hardware or software.	Apply

IV. SYLLABUS:

UNIT-I	REAL-TIME ENVIRONMENT	Classes: 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.

UNIT-II	REAL-TIME OPERATING SYSTEMS	Classes: 09
Inter component communication, task management and dual role of time; Inter task interactions, process input/output, agreement protocols, error detection.		
UNIT-III	**SYSTEM DESIGN**	**Classes: 09**
Scheduling problem, static and dynamic scheduling, system design. Validation, time-triggered architecture.		
UNIT-IV	**INTRODUCTION TO CAN**	**Classes: 09**
Introduction to CAN open CAN open standard, object directory, electronic data sheets and devices.		
UNIT-V	**CAN STANDARDS**	**Classes: 09**
Configuration files, service data objectives, network management CAN open messages, device profile encoder.		

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 Keyold, "Embedded networking with CAN and CAN open", Copperhill Media Corporation, 1st Edition, 2008.

Reference Books:

1. Rajkamal, 'Embedded system-Architecture-Programming-Design", Tata Mc Graw 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", PearsonEducation, 1st Edition, 1999.

Web References:

1. https://www.youtube.com/watch?v=Uk9zFrEGguM
2. http://freevideolectures.com/blog/2010/11/130-nptel-iit-online-courses/

E-Text Books:

1. http://esd.cs.ucr.edu/
2. http://dsp-book.narod.ru/ESDUA.pdf
3. www.intel.com/education/highered/Embedded/Syllabus/Embedded_syllabus.pdf
4. dmi.uib.es/~jproenza/SistEncTR/Introduction.pdf