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

COURSE CONTENT

COMMUNICATION BUSES & INTERFACES								
II Semester: ES								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESE05	**Elective**	3	-	-	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Digital Electronics and Microcontrollers.								

I. COURSE OVERVIEW:
This Course deals with a variety of applications including converters that translate between RS-232, RS-485, and 3V/5V logic. Designs with fail-safe features, high noise immunity, and low power consumption are included. USB is the most successful personal-computer interface ever. PCs, tablets, phones, and other devices have USB ports that can connect to everything from keyboards, mice, and game controllers to cameras, printers, drives, audio and video devices, and more.

II. COURSES OBJECTIVES:
The students will try to learn

I. Using wireless technologies to transmit serial by select the suitable Buses for different applications.
II. Familiar USB peripherals include mice, keyboards, drives, printers, speakers, and cameras for data- acquisition.
III. Implementation of multicast-based communication protocol like Controller Area Network
IV. Overview and covering all the basics of Peripheral Component Interface architecture at a high level.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO 1 Select Low speed Serial buses for various applications
CO 2 Choose Low speed serial buses configuration for asynchronous serial communications
CO 3 Analyze the communication systems based on the Controller Area Network (CAN) standard
CO 4 Compare architectural perspective of the PCI Express Technology with PCI bus.
CO 5 Organize the transfers like control, bulk and interrupt in USB descriptors
CO 6 Understand the basic concepts of communication buses and interfaces

V. COURSE CONTENT:

MODULE – I: SERIAL BUS ARCHITECTURE (9)
Serial Buses – Physical interface, Data and Control signals, features, limitations and applications of RS232, RS485, I2C, SPI Features, Frame structure, Control signals, Limitations

MODULE –II: SERIAL BUS PHYSICAL INTERFACE (9)
Serial Buses RS232, RS485, I2C, SPI, Physical Interface, Configuration and applications

MODULE –III: CONTROLLER AREA NETWORK (CAN) STANDARD (9)

The CAN 2.0b Standard: Physical Layer, Message Frame Formats, Bus Arbitration, Message Reception and Filtering,

Reference Architecture of a CAN-Based System: CAN Controller and Bus Adapter, CAN Device Drivers and Interaction Layer. CAN Tools.

MODULE –IV: PCI EXPRESS TECHNOLOGY (9)

PCI Basics, Bus architecture, PCIe architecture overview, configuration overview, Address space and Transaction routing: Base address registers, Base and limit registers, TLP elements: General, Motivation and Details.

MODULE –V: UNIVERSAL SERIAL BUS (USB) (9)

USB Basics, Inside USB Transfers, A Transfer Type for Every Purpose, Enumeration: How the Host Learns about Devices, Control Transfers: Structured Requests for Critical Data, Chip Choices, Device Classes, Matching a Driver to a Device and Detecting Devices

V. TEXT BOOKS:

1. Axelson, J. Serial Port Complete: COM Ports, USB Virtual COM Ports, and Ports for Embedded Systems, ser, 2nd Edition, Complete Guides Series. Lakeview Research 2007.
2. Axelson, Jan. USB complete . Lakeview Research, 2015.
3. Mike Jackson, Ravi Budruk, "PCI Express Technology", Mindshare Press
4. Marco Di Natale, Haibo Zeng, Understanding and Using the
5. Controller Area Network Communication Protocol, 2012.

VI. REFERENCE BOOKS:

1. Serial Front Panel Draft Standard VITA 17.1 – 200x
2. Technical references on www.can-cia.org, www.pcisig.com, www.usb.org

VII. 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