

**KL University**  
**Department of Electronics & Computer Engineering**  
**M.Tech (ES) Elective – I**

**Course No.** : 13-EM-E32  
**Course Title** : Embedded Networking  
**Course Structure** : 3-0-0

**SYLLABUS:**

**UNIT-I**

**EMBEDDED COMMUNICATION PROTOCOLS:** Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming -ISA/PCI Bus protocols – Firewire.

**UNIT-II**

**USB Bus:** Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface

**UNIT-III**

**CAN Bus:** Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

**UNIT-IV**

**EMBEDDED ETHERNET:** Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.

**UNIT-V**

**WIRELESS EMBEDDED NETWORKING:** Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing

**TEXT BOOKS**

1. Frank Vahid, Givargis 'Embedded Systems Design: A Unified Hardware/ Software Introduction', Wiley Publications
2. Jan Axelson, 'Parallel Port Complete', Penram publications
3. Dogan Ibrahim, 'Advanced PIC microcontroller projects in C', Elsevier 2008
4. Jan Axelson 'Embedded Ethernet and Internet Complete', Penram publications
5. Bhaskar Krishnamachari, 'Networking wireless sensors', Cambridge press 2005