

DESIGN OF EMBEDDED COMMUNICATIONS SOFTWARE

III Semester: ECE(ES)

| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
|---------------------|-----------------------|------------------------|---|---|------------------|---------------|-----|-------|
| BESC27 | ELECTIVE | L | T | P | C | CIA | SEE | Total |
| | | 3 | - | - | 3 | 30 | 70 | 100 |
| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | | | Total Classes:45 | | | |

I. COURSE OVERVIEW:

This course provides the basic knowledge over embedded communications systems, specifically those which use a real time operating system, communications software design from the perspective of a designer of embedded systems software. This course is intended to describe the different procedures used in software partitioning, various modules for multi board communication

II. COURSE OBJECTIVES:

The students will try to learn:

I.

Open Systems Interconnect (OSI) model, communication devices, system software includes the RTOS, drivers, buffer/timer management and other infrastructure functions.

II.

Familiarize the concepts of partitioning of software and structures, system and management functions can include buffer and timer management.

III.

Apply various management schemes in communication software design and common multi-board designs used in communications.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

| | | |
|-----|---|------------|
| CO1 | Explain the OSI reference model is used for building communications systems and networks. | Understand |
| CO2 | Outline the real time operating system (RTOS) software platform for communications functionality and applications. | Understand |
| CO3 | Apply the concept of partitioning in communications software, both in terms of functionality and system implementation | Apply |
| CO4 | Distinguish spanning tree protocol (STP) with rapid spanning tree protocol (RSTP) in terms of port roles and states | Analyze |
| CO5 | Explain the buffer management scheme in communications systems is to minimize data copying | Understand |
| CO6 | Examine the components of the management subsystem for an embedded communications device and its implementation | Analyze |

IV. SYLLABUS:

MODULE – I: OSI REFERENCE MODEL

OSI Reference Model – Communication Devices – Communication Echo System – Design Consideration – Host Based Communication – Embedded Communication System – OS Vs RTOS.

MODULE – II:SOFTWARE PARTITIONING

Software Partitioning – Limitation of strict Layering – Tasks & Modules – Modules and Task Decomposition – Switch - Bridges - Routers – Protocol Implementation: STP - RSTP – Management Types (SNMP) – Debugging Protocols.

MODULE – III: DATA STRUCTURES

Tables & other Data Structures – Partitioning of Structures and Tables – Implementation – Speeding Up access.

Table Resizing – Table access routines – Buffer and Timer Management – Third Party Protocol Libraries.

MODULE – IV: MANAGEMENT SCHEMES

Management Software – Device Management – Management Schemes – Router Management – Management of Sub System Architecture – Device to manage configuration – System Start up and configuration.

MODULE – V: MULTI BOARD COMMUNICATION

Multi Board Communication Software Design – Multi Board Architecture – Single control Card and Multiple line Card Architecture – Interface for Multi Board software – Failures and Fault – Tolerance in Multi Board Systems – Hardware independent development – Using a COTS Board – Development Environment – Test Tools.

V. TEXT BOOKS:

1. Sridhar .T, “Designing Embedded Communication Software”, CMP Books, 2003.

VI. REFERENCE BOOKS:

1. Ahmed Amine Jerraya, SungjooYoo, DiederixVeskest and Norbest Whn, “Embedded Software for SOC”, 1st Edition, 2001.
2. Kulwar Academic Publishers, 2004. Comer. D, “Computer Networks and Internet, Prentice Hall, 3rd Edition, 2001.

VII. WEB REFERENCES

1. <https://www.coursera.org/learn/introduction-embedded-systems>

VIII. E-TEXTBOOKS:

1. <http://bookboon.com/en/communication-ebooks-zip>
2. <https://www.routledge.com/Designing-Embedded-Communications-Software>
3. https://ptolemy.berkeley.edu/books/leeseshia/releases/LeeSeshia_DigitalV2_2.pdf