Suggested Teaching Guidelines for

Embedded Linux Platform

PG-DIOT March - 2022

Duration: 30 hours of theory + 34 hours of lab/hands-on

Objective: Learning Linux system programming and using Linux supported target boards as end nodes and gateways in IOT applications.

Prerequisites: Knowledge of computing fundamentals and operating System.

Evaluation method: Theory exam – 40% weightage
Lab exam/case study - 40% weightage
Internal exam - 20% weightage

List of Text Books / Other training material

1. Beginneing Linux Programming WROX PublicationNeil Mathew
2. RaspberryPi Cookbook- 2nd Edition

Reference Books:-

1. Mastering Embedded Linux, Chris Simond, Packe Publishers,

2. Exploring Beagle Bone – Derek Molley

Note : Each session is of 2 hours.

Session 1 & 2:

- Introduction to Linux
- Linux File System
- Command Line overview
- Basic scripting

Session 3 & 4:

- Package Management
- Administration essentials
- Networking essentials

Session 5:

- Introduction to Embedded Linux
- Architecture – Kernel , System Calls

- /proc, /sys interfaces

Session 6 & 7:

- Setting up Linux for target board (Raspberry PI/Beagle Bone Black etc.)
  - Bootloader, Kernel, Rootfs image
- Working with SSH,Serial console,VNC viewer
- Setting up cross toolchain
- Building user space code - static, dynamic linking
- Makefiles – make, automake and auto config

Session 8:

- Working with system calls
- Process Management

Session 9:

- Threading
- Scheduling in linux

Session 10:

- Inter Process Management
  - Synchronization and Data Exchange (Inter process communication)
  - Semaphores, Mutex

Session 11:

  - Shared Memory, Message Queues
  - Pipes, FIFOs, Signals and Signal handling

Session 12:

- File Handling
- Memory Mapping

Session 13, 14 & 15:

- Blinking LEDs on target board
- Peripheral management in Linux using C, Python/Nodejs libraries
  - UART
  - ADC

- GPIO
- SPI
- I2C
- RTC

- Device Tree Bindings for peripheral support