REVISED SYLLABUS ACCORDING TO CBCS NEP2020 SECOND-YEAR OF MASTER OF SCIENCE IN PHYSICS

COURSE TITLE:- REAL TIME OPERATING SYSTEMS (RTOS)
SEMESTER - IV
W.E.F. 2024 - 2025

RECOMMENDED BY THE BOARD OF STUDIES IN PHYSICS
AND
APPROVED BY THE ACADEMIC COUNCIL

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: **dated 19 April 2024**

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Master of Science
Name of the Department	:	Physics
Name of the Class	:	Second Year
Semester	:	Fourth
No. of Credits	:	04
Title of the Course	:	Real Time Operating Systems (RTOS)
Course Code	:	S610PHT
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Second year of M.Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra.
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	PG
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2024 - 2025

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - IV **Paper – Physics Paper - II**

Course Title: Real Time Operating Systems (RTOS) **No. of Credits - 04**

Type of Vertical: Major **COURSE CODE: S610PHT**

Learning Outcomes Based on BLOOM's Taxonomy:

After completing the course, the learner will be able to…

Course Learning Outcome No.	Blooms Taxonomy	Course Learning Outcome
CLO-01	Remember	Appreciate the concept and importance of RTOS
CLO-02	Understand	Understand the architecture and features of Zephyr RTOS
CLO-03	Apply	Explain task scheduling in zephyr
CLO-04	Apply	Explain peripheral handling using device drivers
CLO-05	Create	Design a real world application

Syllabus for First Year of Master of Science in Physics

(With effect from the academic year 2024 - 2025)

SEMESTER - IV **Paper – Physics Paper - II**

Course Title: Real Time Operating Systems (RTOS) **No. of Credits - 04**

Type of Vertical: Major **COURSE CODE: S610PHT**

COURSE CONTENT			
Module	**Content**	**Credits**	**Lectures**
01	**Chapter-1: Introduction to Real-Time Operating Systems (RTOS)** Overview of Real-Time Systems, Characteristics and Requirements of Real-Time Systems, Introduction to RTOS **Ref - DOCS**	**01**	**07**
	Chapter - 2: Basics of Zephyr RTOS Introduction, Understanding Zephyr architecture and components, Setting up Zephyr development environment **Ref - DOCS**		**08**
02	**Chapter 1: Zephyr RTOS Fundamentals** Basic Zephyr application development, Zephyr Kernel features and services **Ref - DOCS**	**01**	**05**
	Chapter 2: Task Scheduling and Management in Zephyr Task scheduling in Zephyr: Cooperative and Preemptive scheduling, Task management APIs in Zephyr, Synchronization and Communication mechanisms in Zephyr, Interrupt handling in Zephyr **Ref - DOCS**		**10**
03	**Device Drivers and Peripheral Handling in Zephyr** Introduction to Device Drivers in Zephyr, Device model and driver APIs in Zephyr, Interfacing peripherals with Zephyr RTOS, Advanced device handling techniques **Ref – DOCS**	**01**	**15**
04	**Real-World Application Development with Zephyr** Building real-world projects using Zephyr, Developing IoT applications with Zephyr, Testing & debugging Zephyr applications, Optimizing Zephyr applications for performance and memory usage **Ref – DOCS**	**01**	**15**
	Total	**04**	**60**

Main Reference:-

DOCS: https://docs.zephyrproject.org/latest/index.html

Supplimentary references:-

DigiKey: https://www.youtube.com/@digikey

JJL: MicroC/OS-II: The Real-Time Kernel" by Jean J. Labrosse

BA: Hands-On RTOS with Microcontrollers: Building Real-time Embedded Systems Using FreeRTOS, STM32 MCUs, and SEGGER Debug Tools by Brian Amos

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.