MANIPAL SCHOOL OF INFORMATION SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

Master of Engineering - ME (Big Data Analytics)

Course File

Course Name	:	Microcontroller and its Applications Lab
Course Code	:	ESD 5153
Academic Year	:	2023 – 24
Semester	:	I
Name of the Course Coordinator	:	Ravikala Kamath
Name of the Program Coordinator	:	Dr. Dinesh Rao

	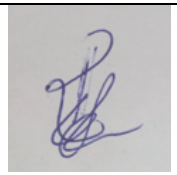
Signature of Program Coordinator with Date	**Signature of Course Coordinator with Date**

Table of Contents

Program Education Objectives (PEOs)

The overall objectives of the Learning Outcomes-based Curriculum Framework (LOCF) for **ME (Embedded Systems)**, program are as follows.

PEO No.	Education Objective
PEO 1	Enable to draw upon fundamental and advanced knowledge to apply analytical and computational approaches to solve technological problems in embedded systems.
PEO 2	Introduce state of art technologies in the area of embedded systems and inculcate ethical practices to make industry-ready professionals.
PEO 3	Promote scientific and societal advancement through research and entrepreneurship.

Program Outcomes (POs)

By the end of the postgraduate program in **ME (Embedded Systems)**, graduates will be able to:

PO1	Independently carry out research /investigation and development work to solve practical problems.
PO2	Write and present a substantial technical report/document.
PO3	Demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
PO4	Develop and implement embedded systems requirements based on theoretical principles and practical knowledge.
PO5	Demonstrate knowledge of the underlying principles and evaluation methods for analyzing data for decision-making.

1. Course Plan

1.1 Primary Information

Course Name	**:**	Microcntroller and Its Applications [ESD 5153]
L-T-P-C	**:**	0-0-3-1
Contact Hours	**:**	36 Hours
Pre-requisite	**:**	Basic Programming with C
Core/ PE/OE	**:**	Core

1.2 Course Outcomes (COs)

CO	At the end of this course, the student should be able to:	No. of Contact Hours	Program Outcomes (PO's)	BL
CO1	**Understand the basic tools available for LPC series and using it**	6	PO3	3
CO2	**Apply** the knowledge for implementing connecting the LED for LPC and simulating	6	PO3	3
CO3	**Analyze** the performance single task applications	6	PO4	4
CO4	**Analyze** the performance of ARM processors architecture by developing the applications using various interfacing devices	9	PO4	4
CO5	**Evaluate** the performance by developing microcontroller applications for embedded communication protocols	9	PO5	5

1.3 Assessment Plan

Components	**Lab Test**	**Flexible Assessments (2 – 3 in number)**	**End semester/ Makeup examination**
Duration	90 minutes	To be decided by the faculty.	180 minutes
Weightage	0.3	0.2	0.5
Typology of questions	Applying; Analyzing.	Applying; Analyzing. Evaluating.	Applying; Analyzing; Evaluating.
Pattern	Answer all the questions. Maximum marks 30.	**Assignment :** 20 marks. [To be decided by the faculty members. May be Assignments, Problem solving, etc.]	Answer all the questions. Maximum marks 50.
Schedule	As per academic calendar.	**Assignment submission:** November 2023	As per academic calendar.

Topics covered	Basic application building	Single taks applications deices etc	Comprehensive examination covering the full syllabus.

1.4 Lesson Plan

L. No.	TOPICS	Course Outcome Addressed
L0	Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO mapping, reference books	---
Lab1	Understanding the tools and installations and specifications	CO1
Lab2	Understanding the hardware layouts and connecting the basic device and running the applications	CO1
Lab3	Applying the knowledge for single task application running.	CO2

Lab4	Analyze the signle tasks	CO3
Lab5	Analyze the performance of single tasks and its performaces	CO4
Lab6	Analyze the performance of interfacing devices	CO4
IT1	Internal lab test	CO1, CO2, CO3
Lab7	Analyze the performance of interfacing the devices	CO4
Lab8	Analyze the performance of communication protocols	CO4
Lab9	Analyze the communication prototocols	CO4
Lab10	Evaluate the performance communication protocols	CO5
Lab11	Evaluate the performance embedded applications	CO5
Lab12	Evaluate the performance of embedded applications	CO5

1.5 References

1. William Hohl, Christopher Hinds,"ARM Assembly Language: Fundamentals and Techniques",2nd Edition, ISBN-13: 978-1482229851, ISBN-10: 1482229854
2. Andrew Sloss, Dominic Symes, Chris Wright,"ARM System Developer's Guide: Designing and Optimizing System Software",1st Edition,The Morgan Kaufmann Series in Computer Architecture and Design, ISBN-13: 978-1558608740, ISBN-10: 1558608745
3. David Seal, "ARM Architecture Reference Manual", 2nd Edition, Addison-Wesley Professional.
4. Steve Furber,"ARM System-on-Chip Architecture",2nd Edition,Addison-Wesley Professional, ISBN-13: 078- 5342675191,ISBN-10: 0201675196
5. Douglas V. Hall,"Microprocessors and Interfacing",Mcgrasw Hill Education ,ISBN-10 1259006158,ISBN-13 9781259006159,2012.
6. Websites & Transaction Papers

1.6 Other Resources (Online, Text, Multimedia, etc.)

1. Web Resources: Blog, Online tools and cloud resources.
2. Journal Articles.

1.7 Course Timetable

1st Semester Embedded Systems				Lab: Embedded System Lab				
	9-10	10-11	11 -12	12-1	1-2	2-3	3-4	4-5
MON		MCA LAB						
TUE								
WED								
THU								
FRI								
SAT								

1.8 Assessment Plan

COs		**Marks & weightage**			
CO No.	CO Name	Lab Test (Max. 30)	Assignment (Max. 20)	End Semester (Max. 50)	CO wise Weightage
CO1	**Understand the basic tools available for LPC series and using it**	0	0	0	**0**
CO2	**Apply** the knowledge for implementing connecting the LED for LPC and simulating	0	5	0	**0.05**
CO3	**Analyze** the performance single task applications	20	5	20	**0.45**
CO4	**Analyze** the performance of ARM processors architecture by developing the applications using various interfacing devices	20	5	10	**0.35**
CO5	**Evaluate** the performance by developing microcontroller applications for embedded communication protocols	-	5	20	**0.25**
	Marks (weightage)	**0.40**	**0.20**	**0.5**	**1.0**

Note:

- In-semester Assessment is considered as the Internal Assessment (IA) in this course for 50 marks, which includes the performances in lab participation, assignment work, lab work, lab tests, quizzes etc.
- End-semester examination (ESE) for this course is conducted for a maximum of 50.
- End-semester marks for a maximum of 50 and IA marks for a maximum of 50 are added for a maximum of 100 marks to decide upon the grade in this course.

Weightage for CO1 = (Lab Test marks for CO1 + Assignment marks for CO1 + ESE marks for CO1) /100
= (5 + 2 +5)/100 = 0.12

1.9 Assessment Details

The assessment tools to be used for the Current Academic Year (CAY) are as follows:

SI. No.	Tools	Weightage	Frequency	Details of Measurement (Weightage/Rubrics/Duration, etc.)
1	Lab Test	0.3	1	• Performance is measured using lab internal test attainment level. • Reference: question paper and answer scheme. • Lab internal test is assessed for a maximum of 30 marks.
2	Assignments	0.2	1	• Performance is measured using assignments attainment level. • Assignment is evaluated for a maximum of 20 marks.
3	ESE	0.5	1	• Performance is measured using ESE attainment level. • Reference: question paper and answer scheme. • ESE is assessed for a maximum of 50 marks.

1.10 Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5
CO1					
CO2			**Y**		
CO3			**Y**	**Y**	
CO4				**Y**	
CO5					**Y**
Average Articulation Level			*	*	*