MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

B. Tech *Computer and Communication Engineering*

COURSE PLAN: Embedded System Design Lab

Department:	**Information and Communication Technology**			
Course Name & code:	**Embedded System Design**		**ICT 3143**	
Semester & branch:	**V**	**CCE**		
Name of the faculty:	**Dr. Rashmi Naveen Raj**			
No of contact hours/week:	**L**	**T**	**P**	**C**
	3	**0**	**0**	**1**

Course Outcomes (COs)

At the end of this course, the student should be able to:		**No. of Contact Hours**	**Marks**
CO1	Develop a Program for an embedded system using ARM controller	15	26
CO2	Solve problems on input/output devices using embedded C	9	28
CO3	Design embedded system application for a given use case scenario to meet the customer requirements	9	26
CO4	Apply appropriate IoT concepts to carry out the mini project	3	20
	Total	**36**	**100**

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2					2					2	2	2
CO2	2	2	2										2	2	2
CO3	2							2	2				2	2	2
CO4	2	2	2					2	2		2		2	2	2
CO5															
Average Articulation Level	2	2	2					2	2		2		2	2	2

ICT Tools used in delivery and assessment

Sl. No	Name of the ICT tool used	Details of how it is used
1	Keil software	Demonstrate the execution of assembly and embedded C programming
2	LPC1768 microcontroller board	To test the embedded program on the kit
3	Flash magic	To download the hex file to the board

Course Outcomes (COs)/Course Learning Outcomes (CLOs) to PO, PSO, LO, BL Mapping

At the end of this course, the student should be able to:		No. of Contact Hours	Marks	Program Outcomes (PO's)	Program Specific Outcomes (PSO)	Learning Outcomes (LOs) **	BL
CO1	Develop a Program for an embedded system using ARM controller	15	26	1,2,3,8	**1,2,3**	2,3,5	3
CO2	Solve problems on input/output devices using embedded C	9	28	1,2,3	**1,2,3**	2,3,5	3
CO3	Design embedded system application for a given use case scenario to meet the customer requirements	9	26	1,8,9	**1,2,3**	5	4
CO4	Apply appropriate IoT concepts to carry out the mini project	3	20	1,2,38,9, 11	**1,2,3**	12,13	3
	Total	**36**	**100**	**1,2,3,8,9, 11**	**1,2,3**	**2,3,5,12,13**	**3,4**

**** Delete this column if not relevant.**

Delivery and assessment Plan of LOs #

Learning Outcome (LO) mapped to the course		**Delivery and assessment Plan**
LO	**LO statement**	
2	Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles	Lecture, Quiz, Test,

3	Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed	Demonstration, Quiz, Test,Exam
5	Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards	Demonstration, Quiz, Test,Exam
12	Use practical laboratory and workshop skills to investigate complex problems	Demonstration, Quiz, Test,Exam
13	Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations	Demonstration, Project Demo, Viva

 # Applicable to IET Accredited Programs

ASSESSMENT PLAN

Components	Continuous Evaluation: Experiments/Open Ended experiments	Mini Project (Optional)	End semester Examination
Duration	3 Hours per week	1 months	120 Minutes
Weightage	40%	20%	40%
Typology of questions	Applying; Analysing. Evaluating.	Applying; Analysing. Evaluating. Creating	Applying; Analysing; Evaluating; Creating
Pattern	Aim, Procedure, Conduction, Analysis, Result discussion, Conclusion.	Synopsis, Demonstration, Viva, Report Submission	One question on embedded C.
Schedule	Weekly	To be decided by the faculty	13th week of the semester
Topics	As per syllabus	Expt 6 to 12.	Experiments/Open ended. Individual
Mode of Conducting	Individual	Group	Individual

Lesson Plan

L No	Topics	Course Outcome Addressed
Exp 1	Introduction to keil software	CLO1
Exp 2	Data transfer programs	CLO1
Exp 3	Arithmetic programs	CLO1
Exp 4	Code conversion programs	CLO1
Exp 5	Sorting, searching and stack	CL01
Exp 6	Introduction to embedded C programming	CL02
Exp 7	LED interfacing	CL02
Exp 8	Multiplexed seven segment interfacing	CLO2
Exp 9	LCD and keyboard interfacing	CLO3
Exp 10	Analog to digital converter	CLO3
Exp 11	Pulse width modulation	CLO3
Exp 12	Miniproject	CLO4

References:

1. Muhammed A. Mazidi, Sarmad N., Sepehr N. and Shujen Chen, ARM Assembly Language Programming & Architecture,Second Edition, 2016

2. UM10360 LPC176xx User manual, Rev 3.1, NXP B. V. 2014

Submitted by: Dr. Rashmi N R

Rashmi

(Signature of the faculty)

Date: 23/07/25

Approved by:

25/7/25

Dr. Smitha N. Pai
Prof. and Assoc. Dean
School of Computer Engineering
M. I. T., Manipal - 576104

(Signature of HOD)

Date:

Faculty members teaching the course (if multiple sections exist):

Faculty	Section	Faculty	Section	Signature
Dr. Pradeep Reddy				
Dr. Santhosh Kamath				
Dr. Rashmi N. R				
Dr. Sameena Pathan				