

MOHAMED SATHAK A J COLLEGE OF ENGINEERING
Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department Electronics and Communication Engineering							
Name of the Subject	EMBEDDED AND REAL TIME SYSTEM			Name of the handling Faculty	S.Sonadevi		
Subject Code	EC8791			Year / Sem	IV/VII		
Acad Year	2022-2023			Batch	2019-2023		
Course Objective							
1. Learn the architecture and programming of ARM processor.							
2. Be familiar with the embedded computing platform design and analysis.							
3. Be exposed to the basic concepts of real time Operating system.							
4. Learn the system design techniques and networks for embedded systems							
5. Learn the operating system and model real time applications							
Course Outcome							
CO1	Describe the architecture and programming of ARM processor.						
CO2	Discuss the concepts of embedded systems and computing Platform Design						
CO3	Explain the basic concepts of real time Operating system design						
CO4	Demonstrate the system design techniques to develop software for embedded systems						
CO5	Operating system and Model real-time applications using embedded-system concepts						
Lesson Plan							
Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc.)	Blooms Level (L1- L6)	CO	PO
UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS							
1	Complex systems and microprocessors	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
2	Embedded system design process-example	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
3	Model train controller	T1,R1	1	BB,PPT	L3	CO1	PO1-PO6
4	Instruction set preliminaries	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
5	ARM processor-CPU:Programming input and output	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
6	Supervisor mode, exceptions and traps.	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
7	Coprocessors	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
8	Memory system mechanisms	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
9	CPU performance	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
10	CPU Power consumption	T1,R1	1	BB,PPT	L2	CO1	PO1-PO6
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any					Assignment on Embedded system Design		
Evaluation method :					Assignments on		
UNIT II-EMBEDDED COMPUTING PLATFORM DESIGN							
11	The CPU bus	T1,R1	1	BB,PPT	L2	CO2	PO1-PO6
12	Memory devices and systems	T1,R1	1	BB,PPT	L2	CO2	PO1-PO6
13	Designing with computing platforms	T1,R1	1	BB,PPT	L3	CO2	PO1-PO6
14	Consumer electronics architecture	T1,R1	1	BB,PPT	L3	CO2	PO1-PO6
15	Platform level performance analysis	T1,R1	1	BB,PPT	L2	CO2	PO1-PO6
16	Components for embedded programs	T1,R1	1	BB,PPT	L3	CO2	PO1-PO6
17	Models of programs	T1,R1	1	BB,PPT	L3	CO2	PO1-PO6
18	Assembly linking and loading	T1,R1	1	BB,PPT	L4	CO2	PO1-PO6
19	Compilation techniques	T1,R1	1	BB,PPT	L4	CO2	PO1-PO6
20	Program level performance analysis	T1,R1	1	BB,PPT	L2	CO2	PO1-PO6
21	Software performance optimization, Program level	T1,R1	1	BB,PPT	L2	CO2	PO1-PO6
22	Analysis and optimization of program size-Program	T1,R1	1	BB,PPT	L4	CO2	PO1-PO6
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any					In-class activity -		
Evaluation method					Tutorials on Models of Program		
UNIT III-PROCESSES AND OPERATING SYSTEMS							
18	Multiple tasks and multiple processes	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
19	Multirate systems	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
20	Pre-emptive real time operating systems.	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
21	Priority based scheduling,interprocess	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
22	Communication mechanisms	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
23	Evaluating operating system performance	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
24	Power optimization strategies for processes	T1,T2,R1	1	BB,PPT	L2	CO3	PO1-PO6
25	Ex:Real time operating systems	T1,T2,R1	1	BB,PPT	L3	CO3	PO1-PO6
26	POSIX	T1,T2,R1	1	BB,PPT	L3	CO3	PO1-PO6
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method					Tutorials on		
UNIT IV SYSTEM DESIGN TECHNIQUES AND NETWORKS							
27	Design methodologies	T1,T2,R1	2	BB,PPT	L2	CO4	PO1-PO6
28	Design flows	T1,T2,R1	2	BB,PPT	L2	CO4	PO1-PO6
29	Requirement Analysis	T1,T2,R1	1	BB,PPT	L4	CO4	PO1-PO6
30	Specifications	T1,T2,R1	1	BB,PPT	L2	CO4	PO1-PO6
31	System Analysis	T1,T2,R1	1	BB,PPT	L4	CO4	PO1-PO6
32	Architecture design	T1,T2,R1	1	BB,PPT	L4	CO4	PO1-PO6
33	Quality Assurance techniques	T1,T2,R1	1	BB,PPT	L2	CO4	PO1-PO6
34	Distributed embedded systems	T1,T2,R1	1	BB,PPT	L3	CO4	PO1-PO6
35	MPSoCs and shared memory multiprocessors	T1,T2,R1	1	BB,PPT	L3	CO4	PO1-PO6

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any											Developed Embedded			
Evaluation method											Assignments on			
UNIT V-CASE STUDY														
36	Case studies-data compressor	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
37	Alarm clock	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
38	Audio player	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
39	Software modem	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
40	Digital still camera	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
41	Telephone answering machine	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
42	Engine control unit	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
43	Video accelerator	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
44	Case studies-data compressor	T1,T2,R4	1	BB,PPT	L3	CO5	PO1-PO6							
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any											Quiz on			
Evaluation method: MCQ/ Quizzes on Data Compressor														
Content Beyond the Syllabus Planned														
1	Arduino Programming and Interfaces													
2	Rasperberry Pi Board													
Text Books														
1	Marilyn Wolf,“Computers as Components-Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint fromElsevier), 2012.													
Reference Books														
1	Cengage Learning, 2012.													
2	Professional, 2007.													
3	Networkingwith C/C++”, Prentice Hall,1999.													
4	C.M.Krishna,Kang G.Shin,“Real-TimeSystems”, International Editions, Mc GrawHill 1997													
5	TechPress,2005.													
Website / URL. References														
1	https://nptel.ac.in/courses/108/105/108105057/													
Blooms Level														
Level 1 (L1) : Remembering		Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing					Higher Order Thinking	Projects / Mini Projects				
Level 2 (L2) : Understanding				Level 5 (L5) : Evaluating										
Level 3 (L3) : Applying				Level 6 (L6) : Creating										
Mapping syllabus with Bloom's Taxonomy LOT and HOT														
Unit No	Unit Name		L1	L2	L3	L4	L5	L6	LOT	HOT	Total			
Unit 1	COMPUTING AND ARM PROCESSORS		0	9	1	0	0	0	10	0	10			
Unit 2	EMBEDDED COMPUTING PLATFORM DESIGN		0	5	4	3	0	0	9	3	12			
Unit 3	PROCESSES AND OPERATING SYSTEMS		0	7	2	0	0	0	9	0	9			
Unit 4	NETWORKS		0	4	2	3	0	0	6	3	9			
Unit 5	CASE STUDY		0	0	9	0	0	0	9	0	9			
Total			0	25	18	6	0	0	43	6	49			
Total Percentage			0.00	51.02	36.73	12.24	0.00	0.00	87.76	12.24	100.00			
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	1	1	-	-	3	3	3	3
CO2	3	3	3	2	2	3	-	-	-	-	2	2	3	3
CO3	3	3	3	3	2	3	-	-	-	-	2	2	3	3
CO4	3	3	3	3	2	3	-	-	-	-	2	2	3	3
CO5	3	3	3	3	3	3	1	1	2	1	3	3	3	3
Avg	3	3	3	2.8	2.4	2.8	0.4	0.4	0.4	0.2	2.4	2.4	3	3
Justification for CO-PO mapping														
CO1	High correlation for PO1-P12 is given as the C01 can be used to Acquire conceptual understanding in embedded systems													
CO2	High correlation for PO1-P12 is given as the C02 can be used to Acquire conceptual understanding in embedded systems													
CO3	High correlation for PO1-P12 is given as the C03 can be used to Process and Operating system													
CO4	High correlation for PO1-P12 is given as the C04 can be used to Acquire conceptual understanding in systems design process													
CO5	High correlation for PO1-P12 is given as the C05 can be used to understand the case syudy													
3	High level				2		Moderate level				1		Low level	
Name & Sign of Faculty Incharge : Mrs. S.Sonadevi														
Name & Sign of Subject Expert : Mr.Syed ali														
Head of the Department : Mr M.Sivakumar														