
	<p>NAGARJUNA COLLEGE OF ENGINEERING AND TECHNOLOGY NAAC Accredited with “A+” grade (An ISO 9001 – 2008 Certified Institution) Affiliated to Visvesvaraya Technological University (VTU) Recognized by Govt. of Karnataka & Approved by A.I.C.T.E. New Delhi DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING</p>	
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COURSE PLAN

(To be submitted before commencement of semester)

Course Title: Embedded System	Course Code: 20ECT71
Course Credit: 4	Semester: 7 th
Course Teacher's: Mr. Sunil T	Academic Year: 2023-24
Lab. Instructor: Mr. Aslam Pasha	Date of Commencement of Class: 19/10/2023

SUBJECT DESCRIPTION:

This course emphasizes the comprehensive treatment of embedded hardware real-time operating systems along with case studies, in tune with the requirements of the industry. The objective of this course is to enable the students to understand embedded-system programming and apply that knowledge to design and develop embedded solutions.

This subject concentrates on firmware designs for real-time environment systems and general-purpose systems. It offers in-depth knowledge of Integrated Development Environment tools, scheduling, compiling, debugging, etc. It gives an insight into the Process, threads message queue, semaphores, and pipes for Interprocess process communication.

PREREQUISITES:

1. BASICS OF EMBEDDED C
2. BASICS OF MICROPROCESSOR & MICROCONTROLLER

LECTURE PLAN:

Topic	Topic Details	Number of Lectures	Prediction	Unit/Chapter Reference	Percentage of Module coverage
	Embedded vs General computing system	1	Week 1	T3 1.1,1.2	20%
	Classification of Embedded systems	2		T3 1.4	
	Application and purpose of ES	3		T3 1.5,1.6	

Module-I Embedded System	Core of an Embedded System	4	Week 2	T3 2.1	
	Memory, Sensors, Actuators,	5		T3 2.2,2.3	
	LED, Optocoupler	6	Week 3	T3 2.3	
	Communication Interface	7		T3 2.4	
	Reset circuits, RTC, WDT, Characteristics	8		T3 3.1	
	Quality Attributes of Embedded Systems	9		T3 3.2	
Cumulative Coverage					20%
Module-II Network Topology and Two port networks	Hardware Software Co-Design	10	Week 4		20%
	Embedded Firmware Design Approaches	11		T3 7.1	
	Computational Models	12		T3 7.2	
	Embedded Firmware Development Languages,	13	Week 5	T3 9.1	
	Integration And Testing of Embedded Hardware and Firmware	14		T3 12.1.12.2	
	Components In Embedded System Development Environment (IDE)	15		T3 13.1	
	Files Generated During Cross Compilation	16		T3 13.2	
	Simulators,	17		T1 13.4	
	Emulators And Debugging	18		Week 6	

	Revision	19			
	Cumulative Coverage				40%
AAT-1		20	Week 7		
Module – III Real-Time Systems and Resources:	Brief history of Real Time	21	Week 8	T1 – 1.2	20%
	System Resources	22		T1 – 2.1	
	Resource Analysis,	23		T1 – 2.2	
	Real-Time Service Utility, Scheduler concepts	24		T1 – 2.3	
	Real-Time OS	25	Week 9	T1 – 2.8	
	State transition Diagrams	26		T1 – 2.8	
	State transition Tables	27		T1 – 2.8	
	Thread Safe Reentrant Functions	28		T1 – 2.9	
	Cumulative Coverage				60%
Module-IV Firmware Components	The firmware components	29	Week 10	T1 – 8.2	20%
	RTOS system software mechanisms	30		T1 – 8.3	
	Software Application components	31		T1 – 8.4	
	Debugging Components	32		T1 – 9.1	
	Exceptions, assert	33	Week 11	T1 – 9.3	
	Checking return codes Single step debugging	34		T1 – 9.4	
	Test access ports	35		T1 – 9.7	
	Cumulative Coverage				80%
AAT-2		36	Week 13		
	Process definition	37	Week 13	T3- 10.3.1	20%
	Process creations	38		T3 – 10.3.2	
	Thread creations	39		T1 – 11.3.4	

Module-V Process and Threads	Programs related to semaphores	40	Week 14	T1 – 11.3.7	
	message queue	41		T1 – 11.3.6	
	Shared buffer applications involving inter-task	42		T1 – 11.3.6	
	Inter process communication using pipe	43	Week 15	T1 – 11.3.8	
	Shared buffer applications involving thread communication	44		T1 – 11.3.8	
	Cumulative Coverage				100%

TEXTBOOKS AND REFERENCE BOOKS:

Book Type	Code	Title & Author	Publication Information		
			Edition	Publisher	Year
Text Books	T1	Sam Siewert, “Real-Time Embedded Systems and Components”	2 nd	Cengage Learning India	2007
	T2	Dr. K.V.K.K Prasad, Embedded/Real Time Systems, Concepts, Design and Programming, Black Book	New edition	Dream Tech Press	2010
	T3	K. V. Shibu, "Introduction to embedded systems	New	TMH education Pvt. Ltd	2009
Reference Books	R1	James K. Peckol, "Embedded systems- A contemporary design tool1”	2 nd	John Wiley	2019
	R2	Andrew N. Sloss, Donimic Symes, Chris Wright, ARM System Developer’s Guide.,	2 nd	Morgan Kaufmann Publishers	2004

COURSE OUTCOMES:

At the end of the course the student will be able to:

CO1	Explain the concepts of Embedded systems, applications and different input output components.
CO2	Illustrate the concepts of Hardware software co design and debugging tool.
CO3	Apply real time systems and scheduling schemes for the real time application.
CO4	Evaluate various Firmware components and Software application components.
CO5	Design and develop task, process and thread for embedded application.

CO-PO MAPPING:

POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C211.1	1	2	3	3	2						1	
C211.2	3	3	3	2	1							
C211.3	3	3	3	3								
C211.4	3	3	2									
C211.5	3	3	3	3	3							

EVALUATION SCHEME:

Component		Weightage (%)		
CIE's	CIE 1 5 th week	40	80	(Best of 2 CIE) 80 marks
	CIE 2 10 th week	40		
	CIE 3 15 th week	40		
AAT's	AAT1 (Quiz)	10	20	20 marks
	AAT2 (Surprise test)	10		
Continuous Internal Evaluation Total Marks: 100. Reduced to 50 Marks				
The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50)				
Semester End Examination (SEE) Total Marks: 100. Reduced to 50 Marks				
The minimum passing mark for the SEE is 40% of the maximum marks (20 marks out of 50)				

Signature of the Course Co-Ordinator

Signature of the HOD

Date:

Note:

1. The Course plan is an attempt to ensure **continuous improvement** in the TLP of the course.
2. The proposed Course Plan is submitted to **DAC** before the commencement of the semester.
3. At the end of the semester, the faculty shall submit the **actual implemented plan**.
4. Calendar of Events included.