Master of Engineering - ME (Embedded Systems)

Course Name : Microcontrollers and its Applications Lab

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Course Code : ESD 5153

Academic Year : 2024 - 25

Semester : I

Name of the Course Coordinator : Mr. RAGHUDATHESH G P

Name of the Program Coordinator : Dr. Dinesh Rao

Course File

//2025 //2025

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Signature of Program Coordinator Signature of Course Coordinator

with Date with Date

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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 in order to apply analytical and computational approach to solve technological problems in embedded systems.
PEO 2	Introduce state of art technologies in the area of embedded system and inculcate ethical practices to make industry ready professional.
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 Acquire in-depth knowledge of embedded system domain, with an ability to discriminate, evaluate, analyze, synthesize the

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existing and new knowledge, and integration of the same for enhancement of knowledge.

PO2 Analyze complex embedded system Eco System critically; apply independent judgement for synthesizing information to

make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.

PO3 Think laterally and originally, conceptualize and solve embedded system Design problems, evaluate a wide range of

potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety,

cultural, societal and environmental factors in the core areas of expertise.

PO4 Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research

methodologies, techniques and tools, design, conduct experiments, analyze and interpret data, demonstrate higher order

skill and view things in a broader perspective, contribute individually/in group(s) to the development of

scientific/technological knowledge in one or more domains of engineering.

PO5 Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction

and modelling, to complex engineering activities with an understanding of the limitations.

1. Course Plan

1.1 Primary Information

Course Name : Microcontrollers and its Applications [ESD 5153]

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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 No. of Contact Program Outcomes BL

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to: Hours (PO's)

CO1 Implement the single tasking applications development 12 PO1 4

using ARM microcontroller.

CO2 Implement microcontroller applications using interface 8 PO2 3

device with ARM microcontrollers.

CO3 Implement microcontroller applications for Embedded 16 PO3 4

Communication Protocols.

1.3 Assessment Plan

Components Lab Test Flexible Assessments End semester/ Makeup

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(2 - 3 in number) 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. Applying; Analyzing.

Pattern Answer all the questions. Maximum Assignment: [To be decided by the faculty members.

May be Assignments, Problem solving, Answer all the questions. Maximum marks 50.

marks 30. etc.]

Schedule As per academic Assignment submission: November As per academic calendar.

calendar. 2024

Topics covered Basic application Single taks applications deices etc Comprehensive examination

building covering the full syllabus.

1.4 Lesson Plan

L. No. TOPICS Course Outcome Addressed

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L0 Course delivery plan, Course assessment plan, Course outcomes, Program outcomes, CO-PO

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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 CO1

applications

Lab3 Applying the knowledge for single task application running. CO1

Lab4 Analyze the signle tasks CO1

Lab5 Analyze the performance of single tasks and its performaces CO2

Lab6 Analyze the performance of interfacing devices CO2

IT1 Internal lab test CO1, CO2

Lab7 Analyze the performance of interfacing the devices CO2

Lab8 Analyze the performance of communication protocols CO3

Lab9 Analyze the communication prototocols CO3

Lab10 Evaluate the performance communication protocols CO3

Lab11 Evaluate the performance embedded applications CO3

Lab12 Evaluate the performance of embedded applications CO3

1.5 References

- 1. Website Scraping with Python: Using BeautifulSoup and Scrapy, Gábor & Hajba, APRESS Publications, 1st Edition, 2018.

- 2. Web Scraping with Python: Collecting More Data from the Modern Web, Ryan Mitchell Shroff, O'Reilly, 2nd Edition, 2018.

- 3. Designing Data Visualizations, Julie Steele and Noah Iliinsky; O'Reilly Media; 1st Edition, 2011.

- 4. Python for Data Analysis, Wes McKinney; Shroff; O'Reilly; 2nd Edition, 2018.

- 5. https://learn.microsoft.com/en-us/certifications/exams/pl-300/

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

- 1. Web Resources: Blog, Online tools and cloud resources.

- 2. Journal Articles.

1.7 Course Timetable

2. 1 st Semester Embedded Room: LG1 LH10 Lab: ES Lab

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8- 9 9 - 10 10 - 11 11 - 12 12 - 1 1-2 2 - 3 3 - 4 4 - 5

MON DS DS LAB SEM ACA

TUE RTOS MCA ELE ELE LAB*

WED DS RTOS LAB SEM ACA

THU RTOS MCA ELE ACA LAB

FRI DS MCA LAB SEM ACA

SAT RTOS MCA ELE Mini Project

3. Advanced Computer Architecture - Ravikala, Data Structures and Algorithms - Dinesh Rao, Microcontrollers and its Applications - Raghudathesh G P

4. Real Time Operating Systems - Keerthana Prasad, ELE - Internet of Things - Samar, ELE - Database Programming in Java - Sathyendranath Malli

4.1 Assessment Plan

COs	Marks & weightage

CO No.	CO Name	Lab Test (Max. 30)	Assignment (Max. 20)	End Semester (Max. 50)	CO wise Weightage
CO1	Implement the single tasking applications development using ARM microcontroller.	20	-	20	0.34
CO2	Implement microcontroller applications using interface device with ARM microcontrollers.	10	-	20	0.14
CO3	Implement microcontroller applications for Embedded Communication Protocols.	-	20	10	0.24
	Marks (weightage)	0.3	0.2	0.5	1

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

4.2 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.)

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- Performance is measured using lab internal test attainment level.

1 Lab Test 0.3 1 - 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.

ESE 0.5 - 1 - Performance is measured using ESE attainment level. Reference: question paper and answer scheme.

3

- ESE is assessed for a maximum of 50 marks.

4.3 Course Articulation Matrix

CO PO1 PO2 PO3 PO4 PO5

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CO1 Y

CO2 Y Y

CO3 Y

Average Articulation Level * * *