

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Embedded Systems			
Periods per week 1 Period is 50 minutes	Lecture	5	
	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	<p>Introduction: Embedded Systems and general purpose computer systems, history , classifications, applications and purpose of embedded systems</p> <p>Core of embedded systems: microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.</p>
Unit-II	<p>Characteristics and quality attributes of embedded systems: characteristics, operational and non-operational quality attributes, application specific embedded system – washing machine, domain specific - automotive.</p>
Unit-III	<p>Programming embedded systems: structure of embedded program, infinite loop, compiling , linking and locating, downloading and debugging</p>
Unit-IV	<p>Embedded Hardware: Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory</p>
Unit-V	<p>Peripherals: Control and Status Registers, Device Driver, Timer Driver- Watchdog Timers, Embedded Operating System, Real-Time Characteristics, Selection Process</p>

Unit-VI	Design and Development: embedded system development environment – IDE, types of file generated on cross compilation, disassembler/ decompiler, simulator , emulator and debugging , embedded product development life-cycle, trends in embedded industry.
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Books:

Programming Embedded Systems in C and C++, First Edition January, Michael Barr ,O' Reilly

Introduction to embedded systems, Shibu K V TataMcGraw-Hill.

References:

Embedded Systems, Rajkamal, TataMcGraw-Hill

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the Syllabus.***

Tutorial: At least three tutorials based on above syllabus must be conducted.

Practical List:

- 1) Configure timer control registers of 8051 and develop a program to generate given time delay.
- 2) Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's
- 3) Serial I / O: Configure 8051 serial port for asynchronous serial communication with serial port of PC exchange text messages to PC and display on PC screen. Signify end of message by carriage return.
- 4) Interface 8051 with D/A converter and generate square wave of given frequency on oscilloscope.
- 5) Interface 8051 with D/A converter and generate triangular wave of given frequency on oscilloscope.
- 6) Using D/A converter generate sine wave on oscilloscope with the help of lookup table stored in data area of 8051.
- 7) Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction.
- 8) Generate traffic signal.
- 9) Temperature controller.
- 10) Elevator control.

Semester IV

Subject	Theory (100)	Term Work (50)				Total
		Practical / Case studies/ Mini Project	Tutorial	Assignment s	Class tests	Total
P1. Software Engineering	Yes (100)	Case studies (15)	Yes (10)	Yes (15)	Yes (10)	100+50
P2. Multimedia	Yes (100)	Mini Project (15)	Yes (10)	Yes (15)	Yes (10)	100+50
P3. Java and Data Structures	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50
P4. Quantitative Techniques	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50
P5. Embedded Systems	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50

- *Tutorials are theory/problems to be solved by the students in the classroom at the end of a practical/Theory session.*
- **Assignments are theory/problems to be solved by the students at home.**
- *Test is conducted in the classroom with due notice. Test could be out of any sum total but is to be converted out of 10. The Record of term work is to be maintained at least for the year after the declaration of the result.*
- **Semesters I, II, III, IV are college examinations. Question papers will be set by the examiners appointed by the Principal/Heads of the affiliated colleges or University Departments.**
- **The Principal/Head of the respective colleges is expected to appoint senior faculty as examiners in each subject.**
- **In respect of I, II, III, IV semesters the assessment will be done by the respective colleges. Moderation and result preparation will be as per existing College / University rules in respect of other similar courses.**
- **ATKT/Failures examination: After 15 to 20 days from the date of declaration of results of the semester in question.**