NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
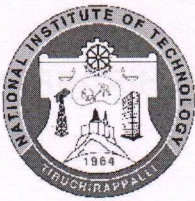
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING

COURSE PLAN – PART I

Name of the programme and specialization	**B TECH (ICE)**
Course Title	**MICROPROCESSORS AND MICROCONTROLLERS**
Course Code	ICPC20 **No. of Credits** 3
Course Code of Pre-requisite subject(s)	
Session	January 2019 **Section (if, applicable)** B
Name of Faculty	V SRIDEVI **Department** ICE
Official Email	sridevi@nitt.edu **Telephone No.** 9443082579
Name of Course Coordinator(s) (if, applicable)	NA
Official E-mail	-- **Telephone No.** --
Course Type (please tick appropriately)	☑ Core course Elective course

Syllabus (approved in BoS)

Introduction to computer architecture and organization, Architecture of 8-bit, 16 bit, 32-bit and 64- bit microprocessors, CISC/RISC design philosophy, bus configurations, CPU module. Embedded system overview.

Introduction to embedded C and assembly language, instruction set of a typical 8-bit and 16-bit microprocessor, subroutines and stacks, energy efficient ultra-low power modes, programming exercises.

Timing diagrams, Memory families, Flash Vs FRAM, on-chip peripherals- working with IO ports, ADC, comparators, timers, PWM, Watchdog, Low power modes.

Architectures of 8 and 16-bit Microcontrollers, comparison, programming exercises, applications of energy efficient systems. Serial and parallel data transfer schemes, interrupts and interrupt service procedure. Internal peripherals of microcontrollers – SPI, I2C UART, USB and DNA. Interfacing with RTC, EEPROM and DAC.

COURSE OBJECTIVES

1. To introduce the architecture of 8, 16 and 32 bit microprocessor and microcontroller.
2. To impart microcontroller programming skills in students.
3. To familiarize the students with data transfer and interrupt services.

MAPPING OF COs with POs

| Course Outcomes: The students are able to understand	Programme Outcomes (PO) (Enter Numbers only)
1. To understand the architecture and function of internal blocks in 8, 16 and 32 bit processors	1, 2, 3,4,5,6
2. To write assembly language programs for 8085 processor	4,5,7
3. To understand the architecture and functions of 8-bit and 16-bit microcontrollers.	1,2,4
4. To develop standalone embedded systems using C and Assembly language	1,2,3,4,5,6,7,10,11,12

COURSE PLAN – PART II

COURSE OVERVIEW

1. This course provide better understanding of architecture and functions of microprocessor and microcontrollers and its usage in application development

2. This course teach the students about design and development of microprocessor and controller based system design and programming in assembly and C language.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 and 2	Introduction to Computer architecture and organization, microprocessor, Different operations of microprocessor	Chalk and board
2.	3	control signals and flow sequence, Pin details of 8085 processor, Bus configuration, Data-address bus demultiplexing	Chalk and board
3.	4	control signal generation for memory and IO devices, 8085 Instruction set	Chalk and board
4.	5	Instruction sets, Assembly language programming exercises, 8085 simulator DEMO	Chalk and board
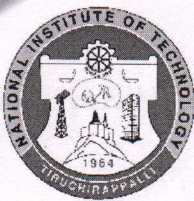
5.	6	Timing diagrams, subroutines and stacks, timing diagram, delay programs, programmable peripheral interfaces	Chalk and board
		WRITTEN EXAM I	
6.	7	memory interfacing, configuration and programming the external peripherals	Chalk and board
7.	8	Introduction to 8 bit microcontroller, architecture, memory organization, Pin details and features	Chalk and board
8.	9	C-language programming-8051 microcontroller, data types, header file and directives	Chalk and board
9.	10	Design of clock circuit, C programming- IO ports, Timer, counter, Interrupt controller programming,	Chalk and board
		WRITTEN EXAM II	
10.	11	LCD interface, ADC interface, DAC interface	Chalk and board
11.	12	16 bit Mixed signal processor architecture and features	Theory and Hands-on
		END SEMESTER EXAMINATION	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Programming Assignment I	After 5 weeks (out-of-class)	--	10
2	Written Exam I	After 6 weeks	45 minutes	15
3	Programming Assignment II	After 8 weeks (out-of-class)	--	10
4	Written Exam II	After 10 weeks	45 minutes	15
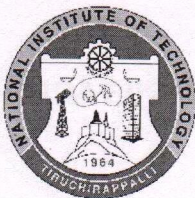
CPA	Compensation Assessment*	--	--	
5	Project	--	--	20
6	Final Assessment *	End of the semester	90 minutes	30
	Reassessment Exam	Beginning of next semester		

*mandatory; refer to guidelines on page 4

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Anonymous feedback through questionnaire.
2. Direct feedback from the students by having face-to-face meeting individually and as the class as a whole.
3. Feedback from the students during the class committee meetings.

COURSE POLICY (including compensation assessment to be specified)

Attendance

The students are encouraged to attend all the classes without absence or at least to maintain the sufficient attendance i.e. 75% to be eligible to write the end semester examination. In circumstances with reasonable cause for nonattendance, the students should inform the faculty within one week after their absence or feasibly in a week prior. When there is excused attendance, the students will be given the opportunity to make-up missed classes or written exam I or II.

Academic honesty

The students have the freedom to do their work meanwhile; they have to obey the institute academic rules. Apart from this, a major significant issue is classroom decorum and behavior and the students should have the decorum inside the classroom with the presence of faculty and the students by-passing this will be sent-out by faculty before the closing time and the attendance for that class will be denied.

The students should not be involved plagiarizing other student's assignment work, neighboring peer's examination answer sheet and any mode of copying other's work. The students involved in these activities are penalized and their name list will be sent to the office of Dean (Academic) for legal action.

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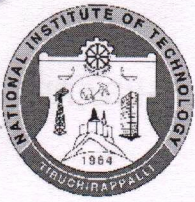
Grading

The relative grading will be followed for awarding grade and, the passing minimum shall be as per the regulations. The student who was absent or failed in the end semester examination should appear for reassessment examination which will be conducted during first week of next semester. If the student passes this special exam, he/she will get 'E grade. Otherwise the student should appear for Formative assessment during summer/winter vacation to pass the subject.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

> At least 75% attendance in each course is mandatory.

> A maximum of 10% shall be allowed under On Duty (OD) category.

> Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

> Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.

> Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.

> The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

> The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

The students are advised to clarify their doubts can discuss during the lecture. Other than, for out-of-class discussion, prior permission must be required through email: sridevi@nitt.edu.

FOR APPROVAL

Course Faculty _____ CC- Chairperson _____28/1/19___ HOD ___28/1/19___
(V SRIDEVI)   (Dr. G UMA)   (Dr.B VASUKI)