



GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	MICROCONTROLLER PROGRAMMING
Course Code	EC/2020/007
Course Duration	60 Hours
Minimum Eligibility Criteria	10 th /+2 /ITI/Diploma/Graduate
Pre-requisites (if any)	Knowledge of Digital Electronics
Course Objectives	Training module has been designed for the participants to • Understand the Architecture of 8051 microcontroller • Learn the addressing modes, Instruction set and Registers of 8051 Microcontroller. • Practice on Developing ALP for arithmetic operation using Microcontroller 8051. • Interfacing of different I/O devices
Course Outcomes	At the end of training, the trainees will be able to • Explain the architecture of Microcontroller • Develop ALP for real time application of Microcontroller. • Interface different Input/Output devices with Microcontroller • Fabricate mini project using 8051 Microcontroller
Expected Job Roles	Microcontroller Programmer

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
EC/2020/007	MICROCONTROLLER PROGRAMMING	Theory	24	10	20	3 Hours
		Practical	36	40	80	
		Total	60	50	100	

DETAILED SYLLABUS

Unit No	Modules	No.of.Hours	
		Theory	Practical
I	Introduction to Microcontroller & Software Requirements	10 Hours	
1.1	Definition - Difference between Microprocessor & Microcontroller	07	03
1.2	Instruction Set of 8051 microcontroller		
1.3	Addressing modes of 8051 microcontroller		
1.4	Practical: Software Installation & Steps – Keil, Flash Magic (Down loader), USB-UART converter driver, visio (Flow chart)		
II	Assembly Language Program I	13 Hours	
2.1	Data communication through all the ports(Port 0 to Port3)	05	08
2.2	Practical: Simple Arithmetic programs (ADD, SUB, MUL & DIV)		
2.3	Practical: Simple Arithmetic programs: 1’s Complement, 2’s Complement, Toggle and SWAP		
2.4	Practical: Program to demonstrate the various logical operations OR, ANL, XOR, RL, RLC, RR, RRC.		
III	Assembly Language Program II & registers	13 Hours	
3.1	Program to find Biggest / Smallest number among ‘n’ numbers, Ascending / Descending order	05	08
3.2	Practical: Program to arrange Ascending / Descending order of ‘n’ numbers		
3.3	Practical: Simple Code conversion (Hexa decimal to Decimal and vice versa)		
3.4	Discuss about PSW, TMOD, TCON registers.		
3.5	Discuss about IE, IP registers.		
3.6	Discuss about SCON, PCON, SBUF registers.		
IV	Practical: Interfacing with Input and Output Devices	12 Hours	
4.1	Program to Interface with Switch and LED	03	09
4.2	Program to interface with Seven segment display		
4.3	Program to Interface with matrix type Keyboard		
4.4	Program to interface with LCD		

V	Case Studies	12 Hours	
5.1	Steps for ADC	04	08
5.2	Practical: Program to interface with Temperature Sensor with 8051		
5.3	Practical: Program to interface with DC motor & Stepper motor		
5.4	Practical: Program to interface with Stepper motor		
5.5	Practical: Mini Project Ideas.		
Total theory / Practical Hours		24	36
Total hours		60	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1	PC / LAPTOP
2	8051 Development Board
3	Power supply Adapter
4	UART – USB Board
5	Female – Female Connector
6	DC Motor Kit, Stepper motor kit
7	2x16 LCD&ADC 0808

SOFTWARE REQUIREMENT

S.NO	LIST OF SOFTWARE
1	Keil μ vision 2
2	Flashmagic / Nuvoton
3	USB – UART converter
4	visio

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	8051 Microcontroller Architecture, Programming and Applications	Keneth J. Ayala	West, 1991
2	Microcontroller, Principles and Application	Ajit pal	PHI Learning PVT Limited
3	8051 Microcontroller and Embedded Systems using Assembly and C	Mazidi, Mazidi and D.Mackinlay	PEARSON

ASSESSMENT AND CERTIFICATION

S.No	Criteria for assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max. Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Objective and Program	20
	b)Procedure and Connections / Execution	20
	c)Result and Viva	20
	d)Record	20
Total Marks		100

THEORY MODEL QUESTION PAPER

EC/2020/007 -MICROCONTROLLER PROGRAMMING

(Maximum Marks: 20)

(N.B: Answer any Twenty questions)

20x1= 20 Marks

1. What is Microcontroller?
2. List out the instruction set of 8051?
3. What are the ports used in 8051 Microcontroller?
4. Mention the addressing modes of 8051.
5. Write any two Data Transfer instructions.
6. Write the instructions used for multiplication and division operation.
7. What are the special function registers used in 8051?
8. What is the purpose of PSW register?
9. What are the interrupts available in 8051?
10. What is meant by Assembler Directives?
11. List out the registers associated with Timer/Counter.
12. What is machine cycle?
13. Mention the operating modes of Timer/Counter.
14. What is the function of C/ $\bar{T}$ in TMOD register?
15. Expand TMOD and TCON.
16. What is SCON register?
17. What is the function of PCON register?
18. Name the 9th data bit used to transmit and receive data.
19. What is the use of IP and IE registers?
20. What is the function of 8255 used in 8051?
21. What is ADC?
22. Which technique is used in ADC 0808?
23. What is stepper motor?
24. Mention the temperature sensors used with the interfacing of 8051.
25. Which technique is used to control the speed of DC motor?