

Techno India NJR Institute of Technology



Course File Microcontroller (4EC4-05)

For Techno India NJR Institute of Technology
पंकज पोरवाल
Dr. Pankaj Kumar Porwal
(Principal)

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Department of ECE



RAJASTHAN TECHNICAL UNIVERSITY, KOTA

SYLLABUS

II Year - IV Semester: B.Tech. (Electronics & Communication Engineering)

4EC4-05: Microcontrollers

Credit: 3

Max. Marks: 150(IA:30, ETE:120)

3L+0T+0P

End Term Exam: 3 Hours

SN	Contents	Hours
1	Introduction: Objective, scope and outcome of the course.	1
2	Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors (with examples of 8085 and 8086);	10
3	Interfacing with peripherals - timer, serial I/O, parallel I/O, A/D and D/A converters; Arithmetic Coprocessors; System level interfacing design;	8
4	Concepts of virtual memory, Cache memory, Advanced coprocessor Architectures- 286, 486, Pentium; Microcontrollers: 8051 systems,	10
5	Introduction to RISC processors; ARM microcontrollers interface designs.	11
Total		40

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Course Overview:

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. Interaction with peripheral devices. Identify hardware and software components to build an embedded system.

Course Outcomes:

CO.NO.	Cognitive Level	Course Outcome
1	Comprehension	Basic knowledge of assembly language and C language.
2	Application	Use interfacing circuit for peripherals like, I/O, A/D, D/A, timer etc
3	Analysis	Categorize different types of microcontrollers on the basis of speed, power consumption and response time.
4	Synthesis	Design and develop interfacing circuit for memory organization.
5	Evaluate	Compare RSIC architecture with CICS architecture based systems.

Prerequisites:

1. Fundamentals knowledge of binary number system.
2. Fundamentals knowledge of digital electronics.
3. Fundamentals knowledge of sequential and combinational circuit.

Course Outcome Mapping with Program Outcome:

Course Outcome	Program Outcomes (PO's)											
	Domain Specific					Domain Independent						
CO. NO.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	0	3	0	0	0	0	0	0	0	0	0
CO2	0	0	3	0	1	0	0	0	0	0	0	0
CO3	1	2	3	0	0	0	0	0	0	0	0	0
CO4	3	2	1	0	0	0	0	0	0	0	0	0
CO5	0	0	3	2	1	0	0	0	0	0	0	0

1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)

Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	1	ZERO LECTURE
2	2	OVERVIEW OF MICROCOMPUTER SYSTEMS AND THEIR BUILDING BLOCKS
3	2	Overview of microcomputer systems and their building blocks
4	2	Memory interfacing
5	2	Memory interfacing
6	2	Concepts of interrupts
7	2	Direct Memory Access
8	2	Direct Memory Access
9	2	Instruction sets of microprocessors (with examples of 8085 and 8086)
10	2	Instruction sets of microprocessors (with examples of 8085 and 8086)
11	2	Instruction sets of microprocessors (with examples of 8085 and 8086)
12	3	INSTRUCTION SETS OF MICROPROCESSORS (WITH EXAMPLES OF 8085 AND 8086)
13	3	Interfacing with peripherals
14	3	Timer
15	3	Serial I/O
16	3	Parallel I/O
17	3	A /D and D/A converters
18	3	A /D and D/A converters
19	3	Arithmetic Coprocessors
20	4	SYSTEM LEVEL INTERFACING DESIGN
21	4	Concepts of virtual memory, Cache memory
22	4	Concepts of virtual memory, Cache memory

23	4	Advanced coprocessor Architectures- 286, 486, Pentium
24	4	Advanced coprocessor Architectures- 286, 486, Pentium
25	4	Advanced coprocessor Architectures- 286, 486, Pentium
26	4	Microcontrollers: 8051 systems
27	4	Microcontrollers: 8051 systems
28	4	Microcontrollers: 8051 systems
29	4	Microcontrollers: 8051 systems
30	5	MICROCONTROLLERS: 8051 SYSTEMS
31	5	Introduction to RISC processors
32	5	Introduction to RISC processors
33	5	Introduction to RISC processors
34	5	ARM microcontrollers interface designs
35	5	ARM microcontrollers interface designs
36	5	ARM microcontrollers interface designs
37	5	ARM microcontrollers interface designs
38	5	ARM microcontrollers interface designs
39	5	Spill Over Classes
40	5	Spill Over Classes

TEXT and Reference Book

1. Microprocessor Architecture: Programming and Applications with the 8085/8080A, R. S. Gaonkar, Penram International Publishing, 1996
2. Computer Organization and Design The hardware and software interface D A Patterson and J H Hennessy, Morgan Kaufman Publishers.

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3. Microprocessors Interfacing, Douglas Hall, Tata McGraw Hill, 1991.

The 8051 Microcontroller, Kenneth J. Ayala, Penram International Publishing, 1996.

QUIZ Link

1. <https://www.onlineinterviewquestions.com/microcontroller-mcq/>
2. <https://www.sanfoundry.com/microcontroller-mcqs-introduction/>
3. <https://www.indiabix.com/digital-electronics/the-8051-microcontroller/>

NPTEL COURSES LINK

1. <https://nptel.ac.in/courses/117/104/117104072/>

Faculty Notes Link

1. https://drive.google.com/drive/folders/1L6NtNyjJPFWpA0ewsewVbkr0a_p0XEV?usp=sharing

Assessment Methodology:

1. Practical exam using Keil Compiler.
2. Two Midterm exams where student have to showcase subjective learning.
3. Final Exam (subjective paper) at the end of the semester.

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4E1220

Roll No. _____

Total No of Pages: **2**

4E1220
B. Tech. IV-Sem. (Back) Exam., Oct.-Nov. - 2020
Electronics & Communication Engineering
4EC4 – 05 Microcontrollers
EC, EI

Time: 2 Hours

Maximum Marks: 82
Min. Passing Marks: 29*Instructions to Candidates:**Attempt all ten questions from Part A, four questions out of seven questions from Part B and two questions out of five from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL _____

2. NIL _____

PART – A**(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- ~~Q.1~~ Name three features of the 8051.
- Q.2 What is the major difference between the 8051 and 8052 microcontrollers?
- ~~Q.3~~ What is the size of the SP register?
- ~~Q.4~~ How does an instruction differ from a directive?
- Q.5 Which program produces the "Obj" file?
- ~~Q.6~~ Why do we need subroutines?
- Q.7 When LCALL is executed? How many bytes of the stack are used?
- ~~Q.8~~ Define Cache memory.
- ~~Q.9~~ Which pins are assigned to V_{cc} and GND?
- ~~Q.10~~ What is the error in the following instruction- MOV A, @R2?

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<https://www.studypedia.com>

PART - B

(Analytical/Problem solving questions)

[4×8=32]

Attempt any four questions

- Q.1 Show how to put value 99H into RAM location F6H of upper RAM in the 8052?
- Q.2 Show how would you check whether the P flag is high?
- Q.3 Which version of the 8051 does not have on-chip ROM? How many parallel and serial port lines the 8051 has?
- Q.4 Examining the stack, show the contents of the registers and SP after execution of the following instructions. All values are in hex.
POP 3 ; POP stack into R3
POP 5 ; POP stack into R5
POP 2 ; POP stack into R2
- Q.5 Discuss the role (need) of timers in microcontrollers.
- Q.6 What do you mean by Arithmetic Coprocessors?
- Q.7 Multiply 25 by 10 using the technique of repeated addition.

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

[2×15=30]

Attempt any two questions

- Q.1 Name and explain the working of all instructions available in 8051 assembly language.
- Q.2 Draw and explain block diagram of 8051 microcontroller.
- Q.3 Discuss ARM microcontrollers interface designs with suitable diagram.
- Q.4 Explain the working of A/D and D/A converters.
- Q.5 Define Interrupts. Give the role of interrupts in programming of microcontrollers. Give suitable example in support of your answer.

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