**Course File**

***Subject Title/Subject Code: Microcontrollers/4EC4-05***

Semester: IV Year: II

|  |  |  |
| --- | --- | --- |
| Name of the Faculty: Ms. Akansha Suthar |  | |
|  |  | |
| E-mail id: akansha.suthar@technonjr.org |  |

**Class Schedule**

**Total Number of Lectures:** 40

i**)Course Objective**

**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.**

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**VISSION & MISSION OF INSTITUTE**

## Vision

Empowering student with recent and emerging technologies to create innovative technical leaders capable of contributing to industrial and societal needs for betterment of mankind across the globe.

## Mission

**M1**: To provide dynamic learning environment to students by providing constant exposure to latest technologies by linking closely with the industries.

**M2**: To establish effective interface with industry to obtain live problems to enhance critical thinking and problem solving skills among students and consultancy projects for faculty.

**M3**: To provide avenues and opportunities to faculty for domain specific trainings and qualification upgradation.

**M4**: To develop ethical leaders with strong communication skills.

**VISION & MISSION OF DEPARTMENT**

**Department Vision**

To increase student’s learning of fundamentals of programming and latest technologies of IOT through industry-aligned project-based learning transforming students to be good Embedded and IT Professionals leading to innovation and incubation of new ideas.

**Department Mission**

**M1:** To create experimental learning through solving problems of Government, Society, Smart Cities, Industry and other entities.

**M2:** To teach the latest technologies of IOT and Programming Skills to the students as beyond the syllabus activity so that they are updated and industry ready.

**M3:** To enable engineering students understand industry-aligned technologies and learn to find solutions from their early engineering days and this is the only way to produce globally relevant engineers solving real-life problems applying current technologies.

**M4:** To enable students to generate projects through problem faced by and requirement of Smart cities, industry, Government and other entities whereby those outlined problem statements are to be studied deeply by a group of faculty members to convert them into real-time project format.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEOs1:** Core Knowledge Development: Be competent in applying electronics and communication engineering principles to develop socially and environmentally acceptable engineering solutions.

**PEOs2:** Professional development: Have fulfilling career in electronic and communication engineering or associated industries or higher education and research, or as entrepreneurs.

**PEOs3:** Attitude towards lifelong learning: Enhance the ability and attitude to adapt to evolving technological and social challenges.

**PROGRAM SPECIFIC OUTCOMES (PSO's)**

**PSO1**: To be aware of and initiate some work on programming and new developments which may impact future embedded and IT industry jobs.

**PSO2**: Design and development of Embedded and IOT based systems.

**PSO3**: Get exposure to Embedded and IT Industry work culture

**PROGRAMME OUTCOMES (POs)**

**A student will develop:**

**PO01. ENGINEERING KNOWLEDGE:** Acquire the knowledge of mathematics, science, engineering fundamentals, and electronics and communication engineering, with an ability to understand, analyze and apply to the solution of engineering problems..

**PO02. PROBLEM ANALYSIS:** Identify, formulate, research literature, analyse and solve electronics and communication engineering problems.

**PO03. DESIGN/ DEVELOPMENT OF SOLUTION:** Design solutions for electronics and communication engineering problems with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO04. CONDUCTION OF INVESTIGATION OF COMPLEX PROBLEMS:** Design and conduct experiments, analyse and interpret data, and synthesize information to provide valid conclusions.

**PO05. MODERN TOOL USAGE:** Apply appropriate techniques, resources, and modern hardware and software engineering tools to solve electronics and communication engineering problems.

**PO06. THE ENGINEERING AND SOCIETY:** Apply reasoning to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO07. ENVIRONMENT & SUSTAINABILITY:** Demonstrate the understanding of the impact of the professional engineering solutions in societal and environmental contexts, and need for sustainable development.

**PO08. ETHICS:** Demonstrate the knowledge of professional and ethical responsibilities..

**PO09. INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. COMMUNICATION:** Comprehend and communicate confidently and effectively in both verbal and written form.

**PO11. PROJECT MANAGEMENT & FINANCE:** Apply the engineering and management principles for efficient project management.

**PO12. LIFE-LONG LEARNING:** Recognize the need and acquire confidence for independent and life-long learning.

**COURSE OUTCOMES (COs) OF THE SUBJECT**

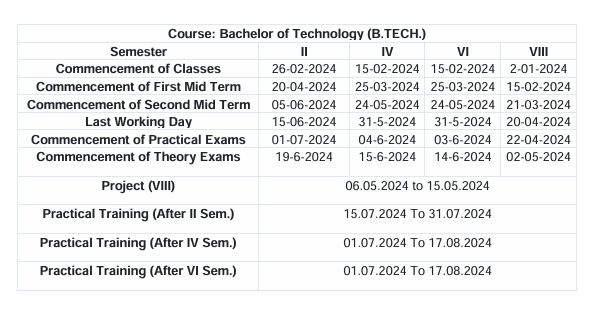
|  |  |  |
| --- | --- | --- |
| CO No. | Mapping | Statement |
| CO24405.1 | **Comprehension** | Students will get basic knowledge of assembly language programming skills. |
| CO24405.2 | **Applying** | Students will be able to build interfacing of peripherals like I/O, A/D, D/A, timer etc. |
| CO24405.3 | **Analysis** | Students will be able to categorize different types of microcontrollers on the basis of speed, power consumption and response time. |
| CO24405.4 | **Synthesis** | Students will be able to design and develop interfacing circuit for memory organization. |
| CO24405.5 | **Evaluate** | Students will be able to compare RSIC architecture with CISC architecture based systems and design ARM microcontroller based system. |

**COS MAPPING WITH POs AND PSOs**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Outcome** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 0 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **CO2** | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| **CO3** | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 0 |
| **CO4** | 2 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| **CO5** | 0 | 0 | 2 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 |

**UNIVERSITY ACADEMIC CALENDAR**

Academic Calendar for Even Semester for Session



**Evaluation Scheme**

FACULTY DETAILS:

Name of the Faculty : Ms. Akansha Suthar

Designation : Assistant Professor

Department : Electronics and Communication Engineering

1. TARGET

a) Percentage Pass : 95%

b) Percentage I class : 60 %

2. METHOD OF EVALUATION

2.1. Continuous Assessment Examinations (Mid-Term 1, Mid-Term 2)

2.2. Assignments / Seminars

2.3. Mini Projects

2.4. Quiz

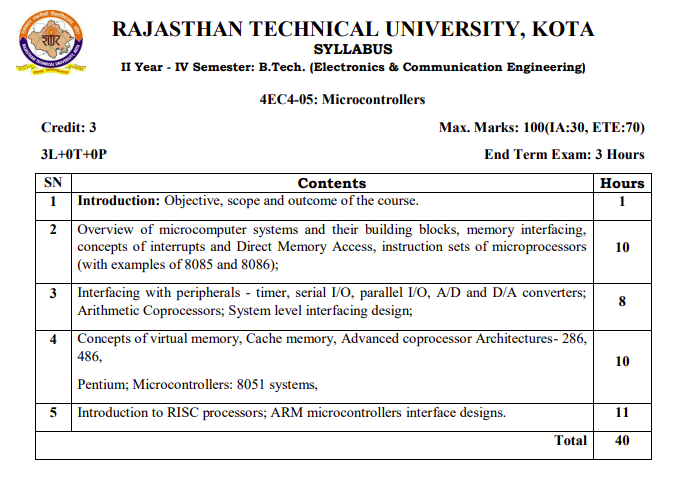
2.5. Semester Examination Others\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this Semester.

1. Take the help of creative tools to stimulate creativity. Include slide presentations, demonstration or forms of visual exercises that will excite the young minds and capture their interest.

Signature of Faculty: **Signature of HOD**

**UNIVERSITY SYLLABUS**

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**PRESCRIBED BOOKS**

1. Microprocessor Architecture: Programming and Applications ith 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.
3. Microprocessors Interfacing, Douglas Hall, Tata McGraw Hill, 1991.

**WEEKLY TIME TABLE OF THE TEACHER**

First Time Table: with effect from (Date): 20-2-2024

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Day** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| Monday |  |  |  |  |  |  |  |
| Tuesday |  |  |  |  |  |  |  |
| Wednesday |  |  | MC |  |  |  |  |
| Thursday | MC |  |  |  |  |  |  |
| Friday |  |  | MC |  |  |  |  |
| Saturday |  |  |  |  |  |  |  |

Revision: 1 with effect from (Date): 29-04-2024

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Day** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| Monday |  |  |  |  |  |  |  |
| Tuesday |  |  | MC |  |  |  |  |
| Wednesday |  |  |  |  |  |  |  |
| Thursday | MC |  |  |  |  |  |  |
| Friday |  | MC | MC |  |  |  |  |
| Saturday |  |  |  |  |  |  |  |

**COURSE-PLAN**

|  |  |  |  |
| --- | --- | --- | --- |
| UNIT | Lect.  No. | TOPICS | **Teaching Methods/ Teaching Aids** |
| **1** | **1** | **ZERO LECTURE** | White Board |
| 2 | 2 | **OVERVIEW OF MICROCOMPUTER SYSTEMS AND THEIR BUILDING BLOCKS** | White Board, PPT |
| 2 | 3 | Overview of microcomputer systems and their building blocks | White Board, PPT |
| 2 | 4 | Memory interfacing | White Board, PPT |
| 2 | 5 | Memory interfacing | White Board, PPT |
| 2 | 6 | Concepts of interrupts | White Board, PPT |
| 2 | 7 | Direct Memory Access | White Board, PPT |
| 2 | 8 | Direct Memory Access | White Board, PPT |
| 2 | 9 | Instruction sets of microprocessors (with examples of 8085 and 8086) | White Board, PPT |
| 2 | 10 | Instruction sets of microprocessors (with examples of 8085 and 8086) | White Board, PPT |
| 2 | 11 | Instruction sets of microprocessors (with examples of 8085 and 8086) | White Board, PPT |
| 2 | 12 | Instruction sets of microprocessors (with examples of 8085 and 8086) | White Board, PPT |
| 3 | 13 | **INTERFACING WITH PERIPHERALS** | White Board, PPT |
| 3 | 14 | Timer | White Board, PPT |
| 3 | 15 | Serial I/O | White Board, PPT |
| 3 | 16 | Parallel I/O | White Board, PPT |
| 3 | 17 | A /D and D/A converters | White Board, PPT |
| 3 | 18 | A /D and D/A converters | White Board , PPT |
| 3 | 19 | Arithmetic Coprocessors | White Board, PPT |
| 4 | 20 | **SYSTEM LEVEL INTERFACING DESIGN** | White Board, PPT |
| 4 | 21 | Concepts of virtual memory, Cache memory | White Board, PPT |
| 4 | 22 | Concepts of virtual memory, Cache memory | White Board, PPT |
| 4 | 23 | Advanced coprocessor Architectures- 286, 486, Pentium | White Board, PPT |
| 4 | 24 | Advanced coprocessor Architectures- 286, 486, Pentium | White Board, PPT |
| 4 | 25 | Advanced coprocessor Architectures- 286, 486, Pentium | White Board, PPT |
| 4 | 26 | Microcontrollers: 8051 systems | White Board, PPT |
| 4 | 27 | Microcontrollers: 8051 systems | White Board, PPT |
| 4 | 28 | Microcontrollers: 8051 systems | White Board, PPT |
| 4 | 29 | Microcontrollers: 8051 systems | White Board, PPT |
| 4 | 30 | Microcontrollers: 8051 systems | White Board, PPT |
| 5 | 31 | **INTRODUCTION TO RISC PROCESSORS** | White Board, PPT |
| 5 | 32 | Introduction to RISC processors | White Board, PPT |
| 5 | 33 | Introduction to RISC processors | White Board, PPT |
| 5 | 34 | ARM microcontrollers interface designs | White Board, PPT |
| 5 | 35 | ARM microcontrollers interface designs | White Board, PPT |
| 5 | 36 | ARM microcontrollers interface designs | White Board, PPT |
| 5 | 37 | ARM microcontrollers interface designs | White Board, PPT |
| 5 | 38 | ARM microcontrollers interface designs | White Board, PPT |
| 5 | 39 | Spill Over Classes | White Board, PPT |
| 5 | 40 | Spill Over Classes | White Board, PPT |

**Signature of Faculty: Signature of HOD**

**Assignment – 1**

1. State the difference between MOV and MOVX command. (CO1)
2. Write an ALP to move immediate data 35H to external RAM locations 20H-29H. (CO1)
3. What is stack? Describe stack operation of 8051 with one example. (CO2)
4. Write the results for each instructions: (CO2)

MOV A, #58H

ADD A, #0FCH

SUBB A, B

1. What is the difference between microprocessor and microcontroller? Explain the black diagram of 8085 microprocessor. (CO3)
2. Write a program to find the sum of elements in an array. (CO3)

**Assignment – 2**

1. What are immediate and direct addressing modes? Explain with examples. (CO4)
2. What is microcontroller? Explain the block diagram of 8051 microcontroller? (CO4)
3. Explain the internal RAM structure of 8051? (CO4)
4. Explain the interfacing of ADC0804 with 8051 microcontroller. (CO5)
5. Which are the different serial communication modes? Explain. (CO5)
6. Differentite RISC and CISC processor.(CO5)

**SAMPLE QUIZ QUESTIONS**

1. Which of the following should a microcontroller at-least should consist of?  
   a) CPU, ROM, I/O ports, and timers  
   b) RAM, ROM, I/O ports, and timers  
   c) CPU, RAM, I/O ports, and timers  
   d) CPU, RAM, ROM, I/O ports, and timers
2. Which of the following buses are present in a microcontroller for transferring data from one place to another?  
   a) data bus only  
   b) data bus, address bus  
   c) address bus only  
   d) address bus, data bus, control bus
3. Which of the following architecture is followed by general-purpose microprocessors?

a) Von Neumann architecture  
b) Harvard architecture  
c) None of the mentioned  
d) All of the mentioned

4. Which of the following microcontroller doesn’t match with its architecture below?

a) ARM7 – Von Neumann  
b) Microchip PIC – Harvard  
c) ARM9 – Harvard  
d) MSP430 – Harvard

5. When the microcontroller executes some arithmetic operations, then the flag bits of which of the following register are affected?  
a) DPTR  
b) PSW  
c) PC  
d) SP

6. Which of the following steps have to be followed for interfacing a sensor to a microcontroller 8051?  
a) interface sensor with ADC and ADC with 8051  
b) interface sensor with the MAX232, send now to microcontroller, analyse the results  
c) make the appropriate connections with the controller, ADC conversion, analyse the results  
d) none of the mentioned

7. Which of the following devices are specifically being used for converting serial to parallel and from parallel to serial respectively?

a) microcontroller  
b) timers  
c) counters  
d) registers

8. Why are solid-state relays advantageous over electromechanical relays?  
a) they need less voltage to be energised  
b) they need zero voltage circuit  
c) they need less current to be energised  
d) none of the mentioned

9. The total space for the data memory available in the AVR-based microcontroller is?  
a) FFFH  
b) FH  
c) FFFFH  
d) FFFFFFFH

10. Which of the following is correct about BRNE instruction in avr microcontrollers?  
a) it is used to jump to the given mentioned label when the zero flag accounts to 0  
b) it is used to check the zero flag  
c) it is used to compare two registers  
d) it is used to compare two values

11. In AVR, which of the following registers are there for the I/O programming of ports?  
a) PIN  
b) DDR  
c) PORT  
d) All of the mentioned

12. The 8255 is a \_\_\_\_\_\_ chip.  
a) Digital to analog  
b) Input/Output  
c) Analog to Digital  
d) None of the mentioned

13.Does 8255 have handshaking capability?  
a) depends on the conditions  
b) cant be said  
c) yes  
d) no

.14. Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?  
a) CPU off  
b) Z  
c) N  
d) Reserved

15. To improve the efficiency of an MSP430 based microcontroller, for one register  
a) there are two values for each addressing mode  
b) there is only one value for all addressing modes  
c) there are 4 values for four addressing modes  
d) there are 2 values for four addressing modes

16. Which of the following is the basic functions of a timer?  
a) it can control the compare, capture mode  
b) it provided a time delay  
c) it can act as a counter  
d) all of the mentioned

17.Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?  
a) CPU off  
b) Z  
c) N  
d) Reserved

18. Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?  
a) CPU off  
b) Z  
c) N  
d) Reserved

19.Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?  
a) CPU off  
b) Z  
c) N  
d) Reserved

20. Which of the following bit/s of the status register that allows the microcontroller to operate in its low power mode?  
a) CPU off  
b) Z  
c) N  
d) Reserved

**QUIZ ANSWER KEY**

**Q1**. d **Q2.** d **Q3.** a **Q4.** d **Q5.** b **Q6.** a **Q7.** d **Q8.** c **Q9.** c **Q10.** a

**Q11.** d **Q12.** b **Q13.** c **Q14.**a **Q15.**a **Q16.**c **Q17.**a **Q18.**b **Q19.**c **Q20.**c

**Mid Term Paper-I**

**TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR**

**B. TECH 2nd – YEAR (IV SEM.) – MT-I**

Microcontrollers (4EC4-05)

**Time:** 2 Hr **Max. Marks:** 70

**Note:**

1. The paper is divided into 2 parts: Part-A and, Part-B.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

Part- A (20 Marks)

|  |  |  |
| --- | --- | --- |
|  | Explain different types of interrupt in 8085. | CO1 |
|  | What is the difference between microprocessor and microcontroller? | CO1 |
|  | Why AD0-AD7 lines are multiplexed? | CO1 |
|  | What are vectored and non vectored interrupt? | CO1 |
|  | Give names of addressing modes of 8085 microprocessors. | CO1 |
|  | Name three features of the 8086. And what is the major difference between 8085 and 8086? | CO1 |
|  | Explain SIM instruction. | CO2 |
|  | What is flag register in 8085? | CO2 |
|  | Explain address decoding techniques. | CO2 |
|  | What is the role of timer in microprocessors? | CO2 |

Part- B (50 Marks)

|  |  |
| --- | --- |
| 1. Define Interrupts. Give the classification of interrupt for 8085 microprocessor. | CO1 |
| Or |  |
| 1. Explain data movement instruction for 8086 microprocessor with examples. | CO1 |

|  |  |
| --- | --- |
| 1. Draw the architecture diagram of 8085 microprocessor | CO1 |
| Or |  |
| 2. How instruction sets are classified in 8085 microprocessor? | CO1 |

|  |  |
| --- | --- |
| 1. Design a microprocessor system for the 8085 such that it shoud contain 16 kbyte of EPROM and 4 kbyte of RAM using two 8 kbyte EPROMs and two 2 kbyte RAM. | CO1 |
| Or |  |
| 3 Interface two 8K×8 EPROMs and two 8K×8 RAM chips with the 8086 using logic gates, such that the memory address ranges assigned to them are FC000H-FFFFFH and 00000H-03FFFH, respectively. | CO1 |

|  |  |
| --- | --- |
| 1. Explain DMA 8257 in detail. | CO2 |
| Or |  |
| 1. Explain the block diagram of programmable peripheral interface 8255. | CO2 |

|  |  |
| --- | --- |
| 5. Explain the architecture and signal description of 8253 timer. | CO2 |
| Or |  |
| 5. Explain SIM and RIM instruction in detail. | CO2 |

**Marks and Gap Analysis of Mid-Term 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Roll Number** | **Student Name** | **Mid-Term 1**  **MM-70** | **Remark**  **( Remedial Class need or not – Y/N )** |
| 1 | 22ETCEC001 | Aziz Bohra | 56 | Y |
| 2 | 22ETCEC002 | Gaurav Sharma | 70 | N |
| 3 | 22ETCEC005 | Ms kritika Saini | 58 | Y |
| 4 | 22ETCEC006 | Lakshya Bhavsar | 63 | N |
| 5 | 22ETCEC007 | Nilesh Suthar | 65 | N |
| 6 | 22ETCEC008 | Piyush Chordiya | 61 | Y |
| 7 | 22ETCEC009 | Plaksha Priya | 63 | N |
| 8 | 22ETCEC010 | Msvaishali Pujari | 63 | N |
| 9 | 22ETCEC011 | Msvidhi Soni | 68 | N |
| 10 | 22ETCEC012 | Vinayak Meghwal | 68 | N |
| 11 | 22ETCEC013 | Vipin Jain | 63 | N |
| 12 | 22ETCEC014 | Vishnu Suthar | 56 | Y |
| 13 | 22ETCEC015 | Vishwas Prajapat | 70 | N |

**\***(Y, if obtained marks are <=70%)

**Signature of Faculty: Signature of HOD**

**Remedial Action Taken to Remove the Gaps (After Mid- Term 1)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.no. | University Roll no. | Name of Student | Topics to be discussed in Remedial Class | Schedule Date of Remedial Class | Outcome  Achieved |
|  | 22ETCEC001 | Aziz Bohra | Direct Memory Access, Interfacing with peripherals like serial I/O, parallel I/O and timer | **10/04/2024** | CO1,CO2,CO3 |
|  | 22ETCEC005 | Ms kritika Saini |
|  | 22ETCEC008 | Piyush Chordiya |
|  | 22ETCEC014 | Vishnu Suthar |

**Signature of Faculty: Signature of HOD**

**TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR**

**B. TECH 2nd – YEAR (IV SEM.) – MT-II**

Microcontrollers (4EC4-05)

**Time:** 3 Hr **Max. Marks:** 70

**Note:**

1. The paper is divided into 2 parts: Part-A and, Part-B.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

**Part- A (20 Marks)**

|  |  |  |
| --- | --- | --- |
|  | Explain parity flag in 8085. | CO1 |
|  | What are maskable and non-maskable interrupt? | CO1 |
|  | Distinguish between Harvard and Von Neumann architecture | CO2 |
|  | What is the difference between SIM and RIM instructions? | CO2 |
|  | Define cache memory. | CO3 |
|  | Explain stack. | CO3 |
|  | Explain PSEN pin of 8051 microcontrollers. | CO4 |
|  | Name five features of the 8051. | CO4 |
|  | Explain current program status register (CPSR) | CO5 |
|  | How many phases are there in compilation process? | CO5 |

**Part- B (20 Marks)**

|  |  |
| --- | --- |
| 1. Draw the PIN diagram of 8051 microcontroller and explain in brief. | CO1 |
| Or |  |
| 1. Draw the architecture diagram of 8085 microprocessor. | CO1 |

|  |  |
| --- | --- |
| 1. Explain DMA 8257 in detail. | CO2 |
| Or |  |
| 1. Explain the Organization of Internal RAM of 8051. | CO2 |

|  |  |
| --- | --- |
| 1. What do you mean by Arithmetic Coprocessor? | CO3 |
| Or |  |
| 3. How instructions set are classified in 8086 microprocessor? | CO3 |

|  |  |
| --- | --- |
| 1. Explain the D/A converter. Also explain its interfacing with 8085 | CO4 |
| Or |  |
| 4. Give the comparison between full and partial decoding techniques. Interface 8kbytes of EPROM and 8kbytes of RAM to 8085. | CO4 |

|  |  |
| --- | --- |
| 5. Differentiate RISC and CISC. Also explain RISC architecture in detail. | CO5 |
| Or |  |
| 1. Discuss ARM microcontroller in detail. | CO5 |

**Mid Term Exam – II**

**Marks and Gap Analysis of Mid-Term II**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Roll Number** | **Student Name** | **Mid-Term 1**  **MM-70** | **Remark**  **( Remedial Class need or not – Y/N )** |
| 1 | 22ETCEC001 | Aziz Bohra | 58 | Y |
| 2 | 22ETCEC002 | Gaurav Sharma | 68 | N |
| 3 | 22ETCEC005 | Ms kritika Saini | 61 | Y |
| 4 | 22ETCEC006 | Lakshya Bhavsar | 65 | N |
| 5 | 22ETCEC007 | Nilesh Suthar | 61 | N |
| 6 | 22ETCEC008 | Piyush Chordiya | 56 | Y |
| 7 | 22ETCEC009 | Plaksha Priya | 65 | N |
| 8 | 22ETCEC010 | Msvaishali Pujari | 65 | N |
| 9 | 22ETCEC011 | Msvidhi Soni | 68 | N |
| 10 | 22ETCEC012 | Vinayak Meghwal | 63 | N |
| 11 | 22ETCEC013 | Vipin Jain | 63 | N |
| 12 | 22ETCEC014 | Vishnu Suthar | 51 | Y |
| 13 | 22ETCEC015 | Vishwas Prajapat | 70 | N |

**\***(Y, if obtained marks are <=70%)

**Signature of Faculty: Signature of HOD**

**Remedial Action Taken to Remove the Gaps (After Mid- Term 1I)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.no. | University Roll no. | Name of Student | Topics to be discussed in Remedial Class | Schedule Date of Remedial Class | Outcome  Achieved |
|  | 22ETCEC001 | Aziz Bohra | Advanced coprocessor Architectures- 286, 486, ARM microcontrollers interfacing | 13/06/2024 | CO3,CO4,CO5 |
|  | 22ETCEC005 | Ms kritika Saini |
|  | 22ETCEC008 | Piyush Chordiya |
|  | 22ETCEC014 | Vishnu Suthar |

**Signature of Faculty: Signature of HOD**

**Model Question Paper**

**TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR**

**B. TECH 2nd – YEAR (IV SEM.)**

**Microcontrollers (4EC4-05**)

**Time:** 2 Hr **Max. Marks:** 70

**Note:**

1. The paper is divided into 2 parts: Part-A, Part-B and Part-C.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 7 questions. Each question carries 4 marks each. Attempt any 5 Questions
4. Part-C contains 5 questions. Each question carries 10 marks each. Attempt any 3 Questions

Part- A (20 Marks)

|  |  |  |
| --- | --- | --- |
|  | Define instruction cycle. | CO1 |
|  | What are the different types of addressing modes of 8086 instruction set? | CO1 |
|  | What is assembly level programming? | CO2 |
|  | What is a stack? | CO2 |
|  | How is the stack top address calculated? | CO3 |
|  | What are macros? | CO3 |
|  | What will happen if a label within a macro is not declared local? | CO4 |
|  | Explain PSEN pin of 8051 microcontrollers. | CO4 |
|  | Name five features of the 8051. | CO5 |
|  | Explain current program status register (CPSR) | CO5 |

Part- B (20 Marks)

|  |  |
| --- | --- |
| 1. Explain the architecture of 8086. | CO1 |
| 1. Write an assembly language program in 8086 to search the largest data in the array | CO1 |

|  |  |
| --- | --- |
| 1. Define interrupts and their types. Write in detail about interrupt service routine. | CO2 |
| 1. Discuss the various operating modes of 8253 timer with necessary control words | CO3 |

|  |  |
| --- | --- |
| 1. Explain the operation of 8255 PPI Port A programmed as input and output in Mode 1 with necessary handshaking signals. | CO4 |
| 1. Describe the functions of the following signals in 8051. RST, EA, PSEN and ALE. | CO4 |

|  |  |
| --- | --- |
| 1. With neat sketch explain the functions of 8255 PPI. | CO5 |

**Part C** (30 Marks)

|  |  |
| --- | --- |
| 1. Explain SIM and RIM instruction in detail. | CO1 |
| 1. Write a note on virtual memory and cache memory | CO2 |
| 1. What do you mean by Arithmetic Coprocessor? | CO3 |
| 1. Differentiate RISC and CISC. Also explain RISC architecture in detail. | CO4 |
| 1. Discuss ARM microcontroller in detail. | CO5 |

**STUDENT PERFORMANCE REPORT**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ROLL NO.** | **NAME** | **I-MID** | **II-MID** | **AVG** | **ASSIGNMENT** | **OUT OF MARKS 50** |
| 22ETCEC001 | Aziz Bohra | 24 | 25 | 25 | 15 | 40 |
| 22ETCEC002 | Gaurav Sharma | 30 | 29 | 30 | 20 | 50 |
| 22ETCEC005 | Ms kritika Saini | 25 | 26 | 26 | 16 | 42 |
| 22ETCEC006 | Lakshya Bhavsar | 27 | 28 | 28 | 15 | 43 |
| 22ETCEC007 | Nilesh Suthar | 28 | 26 | 27 | 14 | 41 |
| 22ETCEC008 | Piyush Chordiya | 26 | 24 | 25 | 18 | 43 |
| 22ETCEC009 | Plaksha Priya | 27 | 28 | 28 | 19 | 47 |
| 22ETCEC010 | Ms Vaishali Pujari | 27 | 28 | 28 | 16 | 44 |
| 22ETCEC011 | Ms Vidhi Soni | 29 | 29 | 29 | 20 | 49 |
| 22ETCEC012 | Vinayak Meghwal | 29 | 27 | 28 | 19 | 47 |
| 22ETCEC013 | Vipin Jain | 27 | 27 | 27 | 20 | 47 |
| 22ETCEC014 | Vishnu Suthar | 24 | 22 | 23 | 15 | 38 |
| 22ETCEC015 | Vishwas Prajapat | 30 | 30 | 30 | 20 | 50 |

**Signature of Faculty: Signature of HOD**

**RESULT ANALYSIS**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S.NO.** | **RTU ROLL NUMBER** | **NAME OF STUDENT** | **END TERM MARKS** | **SESSIONAL MARKS** | **TOTAL** |
|  |  |  | **70** | **30** | **100** |
|  |  | **Set Target Level** | **60%** | **75%** |  |
| **1** | 22ETCEC001 | Aziz Bohra |  | 25 |  |
| **2** | 22ETCEC002 | Gaurav Sharma |  | 30 |  |
| **3** | 22ETCEC005 | Ms kritika Saini |  | 26 |  |
| **4** | 22ETCEC006 | Lakshya Bhavsar |  | 28 |  |
| **5** | 22ETCEC007 | Nilesh Suthar |  | 27 |  |
| **6** | 22ETCEC008 | Piyush Chordiya |  | 25 |  |
| **7** | 22ETCEC009 | Plaksha Priya |  | 28 |  |
| **8** | 22ETCEC010 | Ms Vaishali Pujari |  | 28 |  |
| **9** | 22ETCEC011 | Ms Vidhi Soni |  | 29 |  |
| **10** | 22ETCEC012 | Vinayak Meghwal |  | 28 |  |
| **11** | 22ETCEC013 | Vipin Jain |  | 27 |  |
| **12** | 22ETCEC014 | Vishnu Suthar |  | 23 |  |
| **13** | 22ETCEC015 | Vishwas Prajapat |  | 30 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TOTAL | PASS | FAIL | ABSENT | PASS % |
|  |  |  |  |  |

**Indirect Assessment:**

**Overall Teacher Self Assessment (at the completion of course) in terms of course objective and outcomes**

**Course Objectives:**

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**:

Students will get basic knowledge of assembly language programming skills

Students will be able to build interfacing of peripherals like I/O, A/D, D/A, timer etc.

Students will be able to categorize different types of microcontrollers on the basis of speed, power consumption and response time.

Students will be able to design and develop interfacing circuit for memory organization.

Students will be able to compare RSIC architecture with CISC architecture based systems and design ARM microcontroller based system.

**Methodology to identify bright student**

Considered a range of criteria, including academic performance, creativity, critical thinking, problem-solving skills, and enthusiasm for learning. Bright students often excel in multiple areas. Observed how students perform in the classroom. In terms of active participation, engagement in discussions, leadership, and the ability to grasp complex concepts.

**Efforts to keep students engaged**

1. Active Learning:
   * Incorporate active learning strategies, such as group discussions, problem-solving activities, and hands-on projects. Active participation keeps students engaged and encourages critical thinking.
2. Varied Teaching Methods:
   * Use a variety of teaching methods, including lectures, group work, multimedia presentations, and interactive activities to cater to different learning preferences.
3. Technology Integration:
   * Leverage technology, such as online platforms, educational apps, and interactive software, to make lessons more engaging and interactive.

Some extra learning for bright students

1. <https://www.sanfoundry.com/microcontroller-mcqs-introduction/>
2. <https://archive.nptel.ac.in/courses/108/105/108105102/>
3. <https://onlinecourses.nptel.ac.in/noc22_ee12/preview>

**Methodology to identify weakstudent**

Considered a range of criteria, including classroom observation, formative assessment, summative assessment, assignment review e.t.c. Weak students are struggling students with sensitivity and a desire to support their learning. Some measures, such as additional tutoring, personalized assignments, or alternative assessment methods, to help students succeed.

**Targeted inventions for weak student**

**1. Additional Resources**

Offer supplementary learning materials, such as textbooks, online resources, or multimedia content, to provide alternative explanations and reinforce key concepts.

**2. Remedial classes**

Establish a tutoring program where students can receive extra help from teachers.

**3. Flipped classroom**

Students are assigned pre-class learning materials, often in the form of videos, readings, or online modules, to cover the foundational concepts before coming to class.

Some additional resources or links for student to improve their understanding for topic

1. <https://archive.nptel.ac.in/courses/108/105/108105102/>
2. <https://www.sanfoundry.com/1000-microcontroller-questions-answers/>