INSTITUTE VISION

To promote excellence in technical education and scientific research for the benefit of the society.

INSTITUTE MISSION

- To provide quality technical education to fulfill the aspiration of the student and to meet the needs of the Industry.
- To provide holistic learning ambience.
- To impart skills leading to employability and entrepreneurship.
- To establish effective linkage with industries.
- To promote Research and Development activities.
- To offer services for the development of society through education and technology.

CORE VALUES

- Quality
- Commitment
- Innovation
- Team work
- Courtesy

QUALITY POLICY

- To provide Quality technical education to the students
- To produce competent professionals and contributing citizens
- To contribute for the upliftment of the society

DEPARTMENT VISION

- To promote excellence in producing competent IT professionals to serve the society through technology and research.

DEPARTMENT MISSION

- Producing Competent Professionals in Information and Communication Technologies
- Educating the Students with the State of Art Computing Environment and Pedagogical Innovations
- Encouraging Entrepreneurship and Imparting Skills for Employability
- Establishing Collaboration with IT and Allied Industries
- Promoting Research in Information and Communication Technology to Improve the Quality of Human Life
- Offering Beneficial Service to the Society by Inculcating Knowledge and Providing IT Solutions

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1	Exhibit Proficiency in Analyzing, Designing and Developing IT Based Solutions to Cater to the Business and Societal Needs. **{Technical Competence}**
PEO 2	Provide Professional Expertise to the Industry and Society with Effective Communication and Ethics. **{Professionalism}**
PEO 3	Engage in Lifelong Learning for Professional Development and Research. **{Life-Long Learning}**

PROGRAM SPECIFIC OUTCOMES	
PSO – 1	Design Software Solutions Using Programming Skills and Computing Technologies.
PSO – 2	Design and Implement Data Communication System Using Various IT Components.

PROGRAM OUTCOMES	
1.	Apply the knowledge of Mathematics, Basic Science, Computer and communication Fundamentals to solve complex problems in Information Technology. **[Engineering Knowledge]**
2.	Identify, formulate, review research literature and analyze complex problems reaching concrete conclusions using principles of mathematics, Engineering sciences and Information Technology. **[Problem Analysis]**
3.	Design solution for complex information and communication engineering problems and design system components or processes that meet with realistic constraints for public health and safety, cultural, societal and environment considerations. **[Design/Development of Solutions]**
4.	Conduct investigations of complex Information technology related problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data to provide valid conclusions through synthesis of information. **[Conduct investigations of complex problems]**
5.	Create, select and apply appropriate techniques, resources and modern IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **[Modern Tool Usage]**
6.	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to professional engineering practice. **[The Engineer and**

	Society]
7.	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development. **[Environment and sustainability]**
8.	Apply ethical principles and commit to professional ethics and responsibilities through the norms of professional engineering practice. **[Ethics]**
9.	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. **[Individual and Team Work]**
10.	Communicate effectively with the engineering community and the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions. **[Communication]**
11.	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member /or leader in a team, to manage projects in multi-disciplinary environment. **[Project Management and Finance]**
12.	Recognize the need for, and have the preparation and ability to engage in independent and Life-long learning in broadest context of technological change. **[Life-long Learning]**

R21UIT406	MICROPROCESSOR BASED SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- The student will learn the internal organization of popular 8086/8051 microprocessors / micro controllers.
- The student will learn hardware and software interaction and integration.
- The students will learn the design of microprocessors/microcontrollers- based systems..

UNIT I	8086 MICROPROCESSOR	9

Introduction to 8086 Microprocessor architecture – Addressing modes – Assembly language programming -Instruction set and assembler directives — Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II	8086 SYSTEM BUS STRUCTURE	9

IO programming-Introduction to Multiprogramming-System Bus Structure -Multiprocessor configurations – Coprocessor-Closely coupled and loosely Coupled configurations

UNIT III	I/O INTERFACING	9

Memory Interfacing and I/O interfacing – Serial communication interface - Parallel communication interface — D/A and A/D Interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control- Keyboard display interface.

UNIT IV	MICROCONTROLLER	9

Architecture of 8051 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.

UNIT V	INTERFACING MICROCONTROLLER	9

Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing –DAC , ADC & Sensor Interfacing – External Memory Interface- Stepper Motor generation.

Total: 45 Periods

Content Beyond Syllabi

CORTEX Processor and its architecture

8096 Microcontroller

Course Outcomes

At the end of the course the student will be able to

CO No	COURSE OUTCOMES	LEVEL	Domain	PO & PSO Mapping
CO1	Understand the fundamentals and basic internal design of 8086 Microprocessors and 8051 Microcontroller	Understand	Cognitive	-
CO2	Apply knowledge in various basic configurations by executing new assembly language programs using instruction sets of Microprocessors and Microcontroller	Apply	Cognitive	PO1, PSO2
CO3	Analyze various addressing modes, instruction set and interfacing devices using Microprocessors & microcontrollers for various applications	Analyze	Cognitive	PO2, PSO2
CO4	Design and validate various real time application using Microprocessor I/O ports, Time Delay, Timer/Counter for interfacing the processors and instruction	Design	Cognitive	PO3,PO5, PSO2
CO5	Evaluate assembly language programs for real world problems using a microprocessor / Microcontroller.	Evaluate	Cognitive	PO4, PSO2
CO6	Work individually or in teams and demonstrate the solutions to the given exercises through presentation.	Individual and Team Work	Value	PO9,PO10 / PSO2

TEXT BOOKS:

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture,Programming and Design", Second Edition, Prentice Hall of India, 2007.

2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson Education, 2011

3.Krishna Kant, " Microprocessors and Microcontrollers Architecture, Programming and system design 8085,8086,8051,8096,PHI,2011

REFERENCE BOOKS:

1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware: TMH, 2012
2. Frank Vahid ,"Digital System Design" John Wiley & Sons ,Second Edition,2010
3. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
4. D. V. Hall, "Microprocessor and Interfacing Programming and Hardware", McGraw Hill, II Edition, 1999
5. B. B. Brey, "The Intel Microprocessors 8086/8088, 80186/ 80188, 80286, 80386, 80486 and Pentium and Pentium Pro Processor", Prentice Hall of India, V Edition, 2006.

LESSON PLANNING SHEET

Lecture Schedule for the Course 21UIT406 – MICROPROCESSOR BASED SYSTEM DESIGN

SNo	Unit	Topic	Book	Page .No	Teaching
UNIT 1 : 8086 MICROPROCESSOR					
1.	I	Introduction to 8086 Microprocessor architecture	T1	25,26 – 33	Mind Mapping
2.	I	Addressing modes	T1	35 – 39	
3.	I	Addressing modes	T1	59 – 120	
4.	I	Assembly language programming - Instruction set and assembler directives	T1	39 – 318	Lab Visit
5.	I	Assembly language programming Instruction set and assembler directives	T1	141 – 143	
6.	I	Modular Programming – Linking and Relocation – Stacks – Procedures	T1	143 – 151	
7.	I	Modular Programming – Linking and Relocation – Stacks – Procedures	T1	155 – 169	
8.	I	Interrupts and interrupt service routines - Macros	T1	169 – 173	
9.	I	Byte and String Manipulation.	T1	205 – 226	
UNIT 2 :8086 SYSTEM BUS STRUCTURE					
10.	II	IO programming	T1	308 – 310	
11.	II	IO programming	T1	310 – 324	
12.	II	Introduction to Multiprogramming	T1	324 – 329	
13.	II	System Bus Structure	T1	310 - 329	Model Presentation
14.	II	System Bus Structure	T1	310 - 329	
15.	II	Multiprocessor configurations - Coprocessor	T1	450 – 477	
16.	II	Multiprocessor configurations - Coprocessor	T1	520	

17.	II	Closely coupled and loosely Coupled configurations	T1		
18.	II	Closely coupled and loosely Coupled configurations	T1		
UNIT 3: 8086 SYSTEM BUS STRUCTURE					
19.	III	Memory Interfacing and I/O interfacing	T1	423 – 444	
20.	III	Serial communication interface	T1	349 – 361	Mind Mapping
21.	III	Parallel communication interface- D/A and A/D Interface	T1	369 – 374	
22.	III	Timer – Keyboard /display controller – Interrupt controller	T1	380 – 388 , 387 – 395	
23.	III	Timer – Keyboard /display controller – Interrupt controller	T1	380 – 383 387 - 395	
24.	III	DMA controller	T1	395 – 401	
25.	III	Programming and applications Case studies: Traffic Light control	T1	383 – 387	
26.	III	Programming and applications Case studies: Traffic Light control	T1	383 – 387	Lab Visit - Visualization
27.	III	Keyboard display interface	T1	383 - 387	
UNIT 4: MICROCONTROLLER					
28.	IV	Architecture of 8051	T2	23 – 28	
29.	IV	Special Function Registers(SFRs)	T2	113- 114	Visualization PPT
30.	IV	Special Function Registers(SFRs)	T2	113- 114	
31.	IV	I/O Pins Ports and Circuits	T2	93 - 100	Visualization LCD
32.	IV	Instruction set	T2	139 – 167	
33.	IV	Addressing modes	T2	109 – 131	
34.	IV	Addressing modes	T2	109 - 131	
35.	IV	Assembly language programming	T2	37 – 55	

36.	IV	Assembly language programming	T2	37 – 55	
UNIT 5: INTERFACING MICROCONTROLLER					
37.	V	Programming 8051 Timers — Serial Port Programming	T2	239 – 260	
38.	V	Interrupts Programming	T2	277 – 306	
39.	V	LCD	T2	317 – 340	Lab Visit - Visualization
40.	V	LCD	T2	317 – 340	
41.	V	Keyboard Interfacing	T2	351 – 363	Lab Visit - Visualization
42.	V	DAC	T2	373 - 403	
43.	V	ADC &Sensor Interfacing	T2	373 - 403	
44.	V	External Memory Interface	T2	411 – 440	
45.	V	Stepper Motor	T2	493 - 498	

CONTINUOUS INTERNAL ASSESSMENT APPORTIONMENT

Component	Number of Assessment tools	Assessment Details	Weightage
Periodical Test	2	PT-I,PT-II	60
Individual Assignment / Case Study / Seminar / Mini Project/Network enabled test	2	2 Assignment	40 + 60
Total (converted to 40)	**40**		

QUESTION PATTERN (PERIODICAL TEST & END SEMESTER EXAMINATION)

QUESTION PATTERN - PERIODICAL TEST 1 & 2

Part A : 2Marks

10*2=20

Part B: 16 Marks

5*16=80

QUESTION PATTERN - ENDSEMESTER EXAM

Part A : 2Marks

10*2=20

Part B: 16 Marks

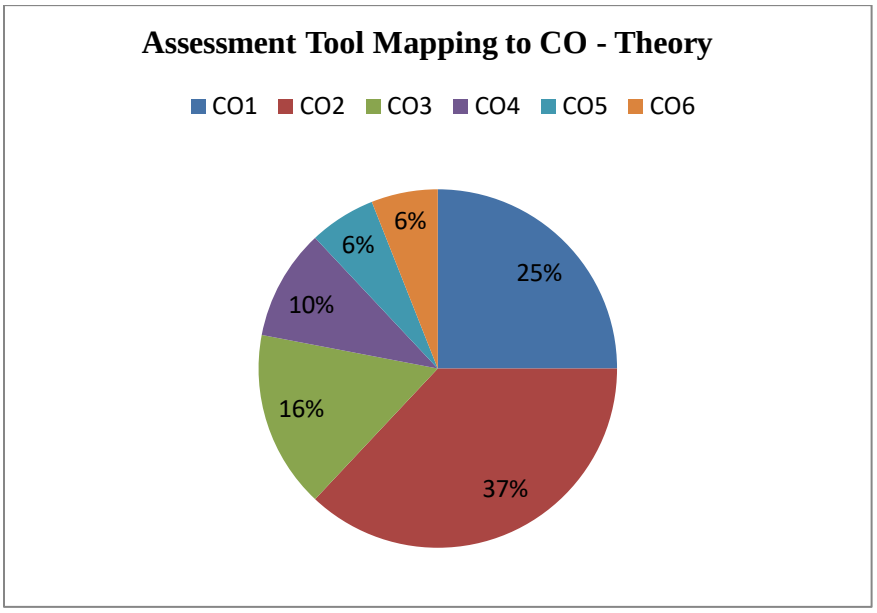
5*16=80

MICRO-LEVEL AUDIT OF ASSESSMENT TOOL(S) USED - ASSESSMENT TOOL(S) USED

		R/U	APPLY	ANALYZE	DESIGN	EVALUATE	TEAM WORK	TOTAL MARKS
		CO1	CO2	CO3	CO4	CO5	CO6	
Test -I	1	2						2
	2	2						2
	3	2						2
	4		2					2
	5		2					2
	6		2					2
	7		2					2
	8			2				2
	9			2				2
	10			2				2
	11	16						16
	12	16						16
	13		16					16
	14		16					16
	15		16					16
Test-II	1	2						2
	2	2						2
	3	2						2
	4		2					2
	5		2					2
	6		2					2
	7		2					2
	8			2				2
	9			2				2
	10			2				2
	11	16						16
	12	16						16
	13		16					16
	14		16					16
	15			16				16
Ass_ 1			10	10	10	10	10	50
Ass_2				10	20	10	10	50
Total		76	106	48	30	20	20	300
		25	36	16	10	6	6	100

Assessment Tool Mapping to CO - Theory

	CO1	CO2	CO3	CO4	CO5	CO6	Total
Test–I	38	56	6				100
Test-II	38	40	22				100
Assignment 1		10	10	10	10	10	50
Assignment 2			10	20	10	10	50
Total Marks	76	106	48	30	20	20	300
Percentage	25	37	16	10	6	6	100



PERFORMANCE INDICATORS

Competency addressed in the Course and Corresponding Performance Indicators

PO	Competency	Performance Indicators
PO1	1.6 Demonstrate competence in engineering fundamentals 1.7 Demonstrate competence in specialized engineering knowledge to the program	1.6.1 Apply engineering fundamentals 1.7.1 Apply theory and principles of computer science engineering to solve an engineering problem
PO2	2.1 Demonstrate an ability to identify and formulate complex engineering problem 2.6 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem 2.8 Demonstrate an ability to execute a solution process and analyze results	2.5.1 Evaluate problem statements and identifies objectives 2.6.2 Identify functionalities and computing resources 2.6.3 Identify existing solutions/methods to solve the problem, including forming justified approximations and assumptions 2.6.5 Compare and contrast alternate solution processes to select the best process 2.8.3 Identify the limitations of the solutions and sources/causes 2.8.4 Arrive at conclusions with respect to the objectives
PO3	3.5 Demonstrate an ability to define a complex open ended problem in engineering terms	3.5.1 Able to define a precise problem statement with objectives and scope 3.5.6 Able to develop software requirement specifications
	3.6 Demonstrate an ability to generate a diverse set of alternative design solutions	3.6.1 Able to explore design alternatives 3.6.3 Identify suitable non functional requirements for evaluation of alternate design solutions
	3.8 Demonstrate an ability to advance an engineering design to defined end state	3.8.1 Able to refine architecture design into a detailed design within the existing constraints 3.8.2 Able to implement and integrate the modules 3.8.3 Able to verify the functionalities and

		validate the design
PO4	4.4 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.4.1 Define a problem for purposes of investigation, its scope and importance 4.4.2 Able to choose appropriate procedure/algorithm, dataset and test cases. 4.4.3 Able to choose appropriate hardware/software tools to conduct the experiment.
	4.5 Demonstrate an ability to design experiments to solve open-ended problems	4.5.1 Design and develop appropriate procedures/methodologies based on the study Objectives
PO9	9.4Demonstrateanabilitytoforma Team and defined role for each member	9.4.2 Implement the norms of practice of effective team work, to accomplish a goal
	9.5 Demonstrate effective individual and team operations, communications ,problem solving, conflict solution and leadership skills	9.5.1Demonstrateeffectivecommunication,problem solving , conflict resolution and leadership skills 9.5.3 Listen too there members
	9.6 Demonstratesuccessinateam Based project	9.6.1Presentresultsasateam,withsmooth Integration of contributions from all individual
PO 10	10.5.2 Deliver effective oral presentations to technical and non-technical audiences	PO 10.5: Demonstrate competence in listening, speaking, and presentation

CO-PO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1														
CO 2	**3**													
CO 3		**3**												
CO 4			**3**		**2**									**2**
CO 5				**2**										**2**
CO 6									**2**	**2**				
	3	**3**	**3**	**2**	**2**				**2**	**2**				**2**

Indicate strength of mapping (1/2/3) with justification

SL.NO	Percentage questions towards GA Attribute (50 MARKS)	Level (Weight)
1	>=12% of total marks (50)	3
2	>=6% and <=11% of total marks (50)	2
3	<=5% of total marks (50)	1