

# MICROPROCESSOR AND MICROCONTROLLERS

Subject Code : EC602PC  
Regulations : R18 - JNTUH  
Class : III Year B.Tech EEE II Semester



**Department of Electrical and Electronics and Engineering**

**BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY**

Ibrahimpattam - 501 510, Hyderabad

**MICROPROCESSOR AND MICROCONTROLLERS (EC602PC)  
COURSE PLANNER**

\* **NPTEL COURSE:** <https://nptel.ac.in/courses>

### I. COURSE OVERVIEW:

To teach the Microprocessor& Microcontrollers course on with subject code (EC602PC) as prescribed by the JNTUH to fulfill the requirements for the 3rd year 2<sup>nd</sup> semester ECE students.

To make the students understand Microprocessors and Microcontrollers in order to equip them with the necessary tools for the analysis of Electronic equipment in the field of Microprocessors & Embedded systems to be used in industries, research field and in commercial field applications.

### II. PREREQUISITS:

- ☐ Computer Organization basics.
- ☐ Computer Networks basics.
- ☐ Number systems & digital logic design concepts.
- ☐ Basic compilation process.

### III. COURSE OBJECTIVES:

1	Understand the concept of microprocessors and microcontrollers.
2	Understand the various microprocessor chips.
3	Understand the Machine & Assemble level language program.
4	Understand the interfacing of microprocessors with external devices.

### IV. COURSE OUTCOMES:

S.No	Description	Bloom's Taxonomy Level
1.	Understands the internal architecture and organization of 8086, 8051.	Knowledge, Understand (Level1, Level2)
2.	Understands the internal architecture and organization of ARM processors/controllers.	Knowledge, Understand (Level1, Level2)
3.	Understands the interfacing techniques to 8086 and 8051.	Knowledge, Understand (Level1, Level2)
4.	To develop assembly language programming to design microprocessor/ micro controller based-systems	Apply, Create (Level 3, Level 6)
5.	Can interface various devices to Processors & Controllers.	Analyze (Level 4)

### V. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (PO)		Level	Proficiency assessed by
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems related to Electronics & Communication and Engineering.	3	Assignments, Exercises
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems related to Electronics & Communication Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Assignments
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems related to Electronics & Communication Engineering and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	2	Assignments, Exercises

Program Outcomes (PO)		Level	Proficiency assessed by
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	Assignments
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	Assignments, Seminars
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Electronics & Communication Engineering professional engineering practice.	2	Seminars
PO7	<b>Environment and sustainability:</b> Understand the impact of the Electronics & Communication Engineering professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	1	Assignments, Seminars
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	-	-
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	1	Oral Discussions
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with 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.	2	Document Preparation, Presentation
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	1	Assignments
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	2	Assignments

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) - : None

#### VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO 1	<b>Professional Skills:</b> An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.	2	Lectures, Assignments
PSO 2	<b>Problem-Solving Skills:</b> An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.	3	Tutorials

PSO 3	<b>Successful Career and Entrepreneurship:</b> An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.	2	Seminars, Projects
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**1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) - : None**

## **VII. SYLLABUS:**

### **UNIT I:**

**8086 Architecture:** 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

**Instruction Set and Assembly Language Programming of 8086:** Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

### **UNIT II:**

**Introduction to Microcontrollers:** Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

**8051 Real Time Control:** Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

### **UNIT – III**

**I/O And Memory Interface:** LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

**Serial Communication and Bus Interface:** Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

### **UNIT – IV**

**ARM Architecture:** ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

### **UNIT – V**

**Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

### **TEXT BOOKS:**

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2<sup>nd</sup> Edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3<sup>rd</sup> Ed.
3. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

### **REFERENCE BOOKS:**

1. Microprocessors and Interfacing, D. V. Hall, MGH, 2<sup>nd</sup> Edition 2006.
2. Introduction to Embedded Systems, Shibu K.V, MHE, 2009
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.

**NPTEL Web Course: AVAILABLE.**

**NPTEL Video Course: AVAILABLE.**

**NPTEL URL:** <https://nptel.ac.in/courses/108105102/>

**ONLINE COURSEURL:** [https://onlinecourses.nptel.ac.in/noc18\\_ec03](https://onlinecourses.nptel.ac.in/noc18_ec03).

**GATE SYLLABUS: UNIT- I & II.**

**IES SYLLABUS: -NA-**

**VIII. COURSE PLAN (WEEK-WISE):**

Lecture No.	Unit No.	Date	Topics to be covered	Link for PPT	Link for PDF	Link for Small Projects/ Numericals(if any)	Course learning outcomes	Teaching Methodology	Reference
1	1		Unit 1: Introduction to Microprocessors and Microcontrollers	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To understand the microprocessors and controllers	PPT	<b>Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006.</b>
2			8086 Architecture- Functional diagram	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To understand the 8086 Architecture	PPT	
3			Register Organization	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To study various registers of 8086	PPT	
4			Register Organization	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To study various registers of 8086	PPT	
5			Memory Segmentation	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To understand Memory Organisation	Chalk and Talk	
6			Programming Model	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To understand Programming Model	Chalk and Talk	

				<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">mDJ6Ed35dRtI_n/view?usp=sharing</a>			
7		Physical Memory Organisation	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand and analyze the Physical Memory Organization	Chalk and Talk	
8		Signal descriptions of 8086	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To evaluate pins of 8086	Chalk and Talk	
9		Interrupts of 8086	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand and analyze the interrupts of 8086	PPT	
10		Instruction formats	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand and analyze the Instruction formats	PPT	
11		Addressing modes	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand Addressing modes	PPT	
12		Instruction Set	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To evaluate Instruction Set	PPT	
13		Assembler Directives	<a href="https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing">https://drive.google.com/file/d/1mIjpx6iSLsCnGgPIQ5pPysr-p5uo0ObB/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing">https://drive.google.com/file/d/1t_ry_i6sSTxgXeNRvxmDJ6Ed35dRtI_n/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand Assembler Directives	PPT	



			qfN3fqQO/view?usp=sharing	1LDCc4bdHbIOBzlYrA1L/view?usp=sharing		g Modes of 8051	
23		Instruction set of 8051		https://drive.google.com/file/d/1xUuNMQnS1Rf-1LDCc4bdHbIOBzlYrA1L/view?usp=sharing	https://drive.google.com/file/d/1ixBTcbJiAO5K914O0TetB06AuTp6kezY/view?usp=sharing	To Understand the Instruction set of 8051	Chalk and Talk
24		<b>Bridge Class-I</b>	https://drive.google.com/file/d/19QYEm3ODa82CmKqSUBjsv0ziVwJDctz-/view?usp=sharing				
25		8051 Real Time Control : Programming Timer Interrupts	https://drive.google.com/file/d/19QYEm3ODa82CmKqSUBjsv0ziVwJDctz-/view?usp=sharing	https://drive.google.com/file/d/1hGZlBdvBtUwJaPjHsc005PvNOl6DrVPo/view?usp=sharing	<b>Small Projects/Numericals(if any) Link</b>	To know how to write program on Timer interrupts	PPT
26		Programming External Hardware Interrupts	https://drive.google.com/file/d/19QYEm3ODa82CmKqSUBjsv0ziVwJDctz-/view?usp=sharing	https://drive.google.com/file/d/1hGZlBdvBtUwJaPjHsc005PvNOl6DrVPo/view?usp=sharing	<b>Small Projects/Numericals(if any) Link</b>	To know Programming External Hardware	PPT
27		Serial Communication	https://drive.google.com/file/d/19QYEm3ODa82CmKqSUBjsv0ziVwJDctz-/view?usp=sharing	https://drive.google.com/file/d/1hGZlBdvBtUwJaPjHsc005PvNOl6DrVPo/view?usp=sharing	<b>Small Projects/Numericals(if any) Link</b>	To know how to Programming the Serial Communication Interrupts	Chalk and Talk
28		Programming 8051 Timers /counters		https://drive.google.com/file/d/1hGZlBdvBtUwJaPjHsc005PvNOl6DrVPo/view?usp=sharing	<b>Small Projects/Numericals(if any) Link</b>	Understand timer programming	Chalk and Talk
29		<b>Bridge Class-II</b>					
30		<b>Student Presentations</b>					
31			https://drive.google.com/file/d/1CVAB_XJWglVKoU				



				WseyyOEKAhfpi URtif/view?usp= sharing					
32	3		UNIT 3 : I/O And Memory Interface:	<a href="https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing">https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1UsOwj-V_NKHTiiKv0bkOzhL7C0S6H9HW/view?usp=sharing">https://drive.google.com/file/d/1UsOwj-V_NKHTiiKv0bkOzhL7C0S6H9HW/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link		PPT	
33			External Memory RAM and ROM interface		<a href="https://drive.google.com/file/d/1UsOwj-V_NKHTiiKv0bkOzhL7C0S6H9HW/view?usp=sharing">https://drive.google.com/file/d/1UsOwj-V_NKHTiiKv0bkOzhL7C0S6H9HW/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	Undersatnd Memory Interfacing	PPT	
I Mid Examina tions				<a href="https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing">https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing</a>					
34			LCD Interface	<a href="https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing">https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing</a>	<a href="https://www.electronicshub.org/water-level-indicator/">https://www.electronicshub.org/water-level-indicator/</a>	To know how to Interface LCD	PPT	
35			Keyboard Interface	<a href="https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing">https://drive.google.com/file/d/1CVAB_XJWg1VKoUWseyyOEKAhfpiURtif/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing</a>	<a href="https://www.electronicshub.org/water-level-indicator/">https://www.electronicshub.org/water-level-indicator/</a>	To know how to Interface Keyboard	PPT	
36			ADC and DAC interface	<a href="https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing">https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing</a>	<a href="https://www.electronicshub.org/water-level-controller-using-8051-microcontroller/">https://www.electronicshub.org/water-level-controller-using-8051-microcontroller/</a>	To understand ADC and DAC interfacing	Chalk and Talk	
37	3		Serial Communication and Bus Interface: Serial Communication Standards	<a href="https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing">https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkxGnB8Ri9/view?usp=sharing</a>	Small Projects/ Numericals(if any) Link	To understand Serial Communi cation Standards	PPT	

The 8051  
Microcontro  
ller,  
Kenneth. J.  
Ayala,  
Cengage  
Learning,  
3rd Ed.

38			On-Board Communication Interfaces-I2C Bus	<a href="https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing">https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand the Interfaces-I2C Bus	PPT	
39			SPI Bus	<a href="https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing">https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand the SPI Bus	PPT	
40			UART	<a href="https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing">https://drive.google.com/file/d/1cfd7PO_CvQGLagyf0-QAwQOxBYLxVrTX/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand UART	PPT	
41			External Communication Interfaces-RS232,USB		<a href="https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing">https://drive.google.com/file/d/1ssHvHdaZuhhTyAD1Qg0dV4zkkGnB8Ri9/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand Interfaces-RS232,USB	PPT	
40			<b>Bridge Class-III</b>						
41			<b>Student Presentations</b>						
42				<a href="https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing">https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing</a>					
43			Unit4:ARM Processor fundamentals	<a href="https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing">https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1YX1fcN-NrJxjJiSCXC7q8ySbMK9slrQH/view?usp=sharing">https://drive.google.com/file/d/1YX1fcN-NrJxjJiSCXC7q8ySbMK9slrQH/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand ARM Processor fundamentals	Chalk and Talk	
44			ARM Registers	<a href="https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing">https://drive.google.com/file/d/1eo2_oABcTfRZumNYeZdbFV-vf8CC7B1C/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1YX1fcN-NrJxjJiSCXC7q8ySbMK9slrQH/view?usp=sharing">https://drive.google.com/file/d/1YX1fcN-NrJxjJiSCXC7q8ySbMK9slrQH/view?usp=sharing</a>	<b>Small Projects/Numericals(if any) Link</b>	To understand the ARM Register	Chalk and Talk	<b>ARM System Developers guide, Andrew N SLOSS, Dominic</b>



54	5		UNIT 5 : Introduction to CORTEX Processor	<a href="https://drive.google.com/file/d/1bQKAGmc9_21bdHfBqJlQf4us8_tavbbA/view?usp=sharing">https://drive.google.com/file/d/1bQKAGmc9_21bdHfBqJlQf4us8_tavbbA/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing">https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To Understan d the CORTEX Processor	Chalk and Talk
53			CORTEX Processor architecture	<a href="https://drive.google.com/file/d/1bQKAGmc9_21bdHfBqJlQf4us8_tavbbA/view?usp=sharing">https://drive.google.com/file/d/1bQKAGmc9_21bdHfBqJlQf4us8_tavbbA/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing">https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To Understan d the architectur e	PPT
54			CORTEX Processor architecture	<a href="https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing">https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing">https://drive.google.com/file/d/10w3nn-paglVeYNK5DUcIM23vwdy8PHfI/view?usp=sharing</a>	<b><a href="https://www.electronicshub.org/arm-based-projects/">https://www.electronicshub.org/arm-based-projects/</a></b>	To Understan d the architectur e	PPT
55			OMAP Processor	<a href="https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing">https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1fAfiwAtSYeEZe4J3ArdirNRz4kWE9o7S/view?usp=sharing">https://drive.google.com/file/d/1fAfiwAtSYeEZe4J3ArdirNRz4kWE9o7S/view?usp=sharing</a>	<b><a href="https://www.electronicshub.org/arm-based-projects/">https://www.electronicshub.org/arm-based-projects/</a></b>	To Understan d the OMAP Processor	PPT
56			OMAP Processor Architecture	<a href="https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing">https://drive.google.com/file/d/1UOFZIST97A4R4fsFqsRcCUL-YSa0I2Bi/view?usp=sharing</a>	<a href="https://drive.google.com/file/d/1fAfiwAtSYeEZe4J3ArdirNRz4kWE9o7S/view?usp=sharing">https://drive.google.com/file/d/1fAfiwAtSYeEZe4J3ArdirNRz4kWE9o7S/view?usp=sharing</a>	<b>Small Projects/ Numericals(if any) Link</b>	To Understan d the OMAP Processor Architectu re	PPT
57			<b>Student Presentations</b>					
58			<b>Student Presentations</b>					

## II Mid Examinations

<b>* Topics beyond Syllabus</b>									
<b>TEXT BOOKS:</b>									

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.

3. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012										
FACULTY SIGN									ACADEMIC I/C	

**IX. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:**

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	2	-	-	-	3	3	2	2	3	2
CO2	3	3	2	3	2	3	-	-	-	-	2	2	2	3	2
CO3	1	1	2	2	1	-	2	-	2	3	1	3	1	1	1
CO4	3	3	2	3	3	1	1	-	-	2	1	-	2	3	2
CO5	3	3	2	3	-	2	1	-	2	-	-	3	2	3	1
Average	2.6	2.6	2	2.8	1.6	1.6	0.8	0	0.8	1.6	1.4	2	1.8	2.6	1.6
Average (Rounded)	3	3	2	3	2	2	1	0	1	2	1	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) - : None

**X. QUESTION BANK (JNTUH):**

**UNIT - I**

**Long Answer Questions:**

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Explain the architecture of 8086 with block diagram.	Remember	1
2	Explain the register organization of 8086.	Remember	1
3	Draw the pin diagram of 8086 and explain the function of each pin. (Common function signals, minimum mode and maximum mode signal.)	Understand	1
4	Differentiate minimum and maximum modes of operation of 8086.	Remember	1
5	Draw the timing diagram of memory write in minimum and maximum modes of 8086.	Understand	1
6	Explain the different general purpose registers of 8086	Understand	1
7	Explain briefly the addressing modes of 8086 with an example each	Understand	1
8	Explain the different Data copy / Transfer instructions of 8086 with an example	Understand	1
9	Explain different assembler directives and operators of 8086 in brief	Understand	1

10	Explain the different string manipulation operations of 8086 with a example each	Understand	1
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### Short Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Explain various groups of instructions of 8086 with examples.	Understand	1
2	What is an addressing mode? Explain various addressing modes of 8086 with examples.	Understand	1
3	What is an assembler directive? State the functions of assembler directives. Explain various assembler directives of 8086.	Understand	1
4	Write 8086 ALP for the following:	Apply	1
	(i) 8-bit, 16-bit addition, subtraction, multiplication, division.		
	(ii) Searching Largest & Smallest number in an array.		
5	Write 8086 ALP for the following:	Apply	1
	(i) Sorting in Ascending & Descending Order.		
	(ii) Block Transfer of Data		
6	Write a program to move a string of data words from offset 2000H to offset 3000H the length of the string is 0FH	Understand	1
7	Write an ALP to Add the contents of memory location 2000H:5000H to contents of 3000H:0600H and store the result in 5000H:0700H	Understand	1
8	Write an ALP to arrange a given series of hexadecimal bytes in ascending order	Understand	1
9	Explain with a neat diagram the Maximum mode 8086 system and timings	Understand	1
10	Interface two 4K X 8 EPROMs and two 4K X 8 RAM chips with 8086. Select suitable maps.	Understand	1

## UNIT - II

### Long Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
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1	Draw the block diagram of 8051 microcontroller and explain the architecture.	Remember	2
2	Explain about I/O ports of 8051. (Ports – 0, 1, 2, 3)	Remember	2
3	Explain various addressing modes of 8051 with examples.	Understand	2
4	Explain various groups of instructions/ instruction set of 8051 with examples	Remember	2
5	Draw the pin diagram of 8051 and explain the function of each pin	Understand	2
6	With a neat diagrams explain the interfacing of an DAC7523 with 8086	Understand	2
7	Explain the interrupt cycle of 8086	Remember	2
8	Explain (i) NMI (ii) INTR	Remember	2
9	Explain with a neat diagram the architecture of 8251	Understand	2
10	Write an ALP to transmit 100 bytes of data string starting at location 2000:5000H	Understand	2

#### Short Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Write 8051ALP for the following:	Apply	2
	8-bit addition, subtraction, multiplication, division.		
2	Explain the following SFRs:	Apply	2
	(i) TMOD (ii) TCON (iii) SCON (iv) PCON		
3	Write 8051ALP for the following:	Apply	2
	Shift Right, Shift Left, Rotate Right, Rotate Left		
4	Explain about serial communication Interrupts	Understand	2
5	Explain about 8051 Timing Diagram	Understand	2
6	Explain with neat diagram the operation of 8051 in each of the timer modes	Understand	2
7	What is an interrupt? What is the role of interrupts in 8051?	Understand	2
8	Explain with a neat diagram the structure of interrupt operation in 8051	Understand	2
9	Explain with a neat diagram the memory addressing of 8051	Understand	2
10	What is the necessity to have different registers for serial communications and Timer / Counter operations?	Understand	2

#### UNIT - III

#### Long Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Draw the block diagram for the following chips and explain: (i) 8255 PPI (ii) 8259 PIC (iii) 8251 USART.	Remember	3
2	Explain various operating modes of 8255 PPI.	Remember	3
3	Draw the control word format of 8255 PPI and explain	Understand	3
4	Explain the interfacing of the following with 8086 with neat sketches: (i) D/A Converter (ii) A/D Converter (iii) Keyboard.	Remember	3
5	Write short notes on Vector interrupt table and Interrupt Service Routines.	Remember	3
6	Explain in detail with a neat diagram the internal architecture of 8255 PIO	Understand	3
7	Explain in detail the different modes of operation of 8279 and also explain the different command words of 8279.	Understand	3
8	Explain with block, pin and timing diagrams the functionality of ADC 0808	Understand	3
9	Explain the different pins of a dual slop 12-bit ADC 7109 and draw the individual block diagrams of analog and digital sections for the same.	Understand	3
10	Explain the different modes of operation in 8255	Understand	3

#### Short Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Explain about UART.	Understand	3
2	Explain about RS232 Cable	Apply	3
3	Explain about Memories.	Understand	3
4	Explain about I2C Bus.	Apply	3
5	Explain about interface of 8051.	Understand	3
6	State the features of 8051	Understand	3
7	List the alternate functions of various pins of port 3 of 8051.	Understand	3
8	Explain with a neat diagram the external I/O interfacing for 8051	Understand	3
9	Explain the different registers of 8051	Understand	3
10	Explain the transfer of control during execution of an ISR	Understand	3

#### UNIT - IV

#### Long Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
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1	Explain about ARM Processor Architecture	Understand	4
2	Explain about ARM instructions set.	Understand	4
3	Explain about different Registers in ARM based architecture.	Understand	4
4	Explain about different types of Interrupts	Understand	4
5	Write a simple program using Thumb Instructions.	Understand	4
6	Write a simple program using Branch & Load Instructions.	Understand	4
7	How Pipeline is used in ARM processor	Understand	4
8	What is PSR, explain in detail.	Understand	4
9	Differentiate between ARM processor & other real time processor	Understand	4
10	Explain Pin diagram of ARM.	Understand	4

#### Short Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Design interrupt Vector table of ARM.	Understand	4
2	What are software interrupts?	Understand	4
3	How data p[rocessing is done in ARM processor	Understand	4
4	What are conditional interrupts	Understand	4
5	State minimum 5 features of ARM Processor	Understand	4
6	What is CPSR	Understand	4
7	What are different types of instructions used in ARM processor	Understand	4
8	Write simple program for Memory allocation in ARM processor	Understand	4
9	How memory allocation is used for data processing	Understand	4
10	Write a simple program using Thumb instruction.	Understand	4

#### UNIT - V

#### Long Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Differentiate between different ARM processors	Understand	5
2	Explain about CORTEX processor.	Understand	5
3	Design Architecture of CORTEX processor	Understand	5
4	Design block diagram for CORTEX processor	Understand	5
5	Explain about OMAP processor.	Understand	5
6	Design Architecture of OMAP processor	Understand	5
7	Design block diagram for OMAP processor	Understand	5
8	Brief about interrupts in CORTEX processor	Understand	5
9	Brief about interrupts in OMAP processor	Understand	5

10	Write Simple Program using Instructions of CORTEX processor	Understand	5
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### Short Answer Questions:

S.No.	Question	Blooms Taxonomy Level	Course Outcome
1	Explain instructions of Cortex processor	Understand	5
2	Explain pin diagram of Cortex processor	Understand	5
3	Explain registers used in Cortex Processor	Understand	5
4	Explain register formats used for data processing in Cortex processor	Understand	5
5	Explain instructions of OMAP processor	Understand	5
6	Explain pin diagram of OMAP processor	Understand	5
7	Explain registers used in OMAP Processor	Understand	5
8	Explain register formats used for data processing in OMAP processor	Understand	5
9	Explain Memory processing and commands used in OMAP processor	Understand	5
10	Explain Memory processing and commands used in Cortex processor	Understand	5

## XI: OBJECTIVE QUESTIONS:

### UNIT-I

- A microprocessor is a \_\_\_\_\_ chip integrating all the functions of a CPU of a computer.  
A. Multiple B. single C. double D. triple
- Microprocessor is a/an \_\_\_\_\_ circuit that functions as the CPU of the compute  
A. electronic B. mechanic C. integrating D. processing
- Microprocessor is the \_\_\_\_\_ of the computer and it perform all the computational tasks  
A. main B. heart C. important D. simple
- The purpose of the microprocessor is to control \_\_\_\_\_  
A. memory B. switches C. processing D. tasks
- The first digital electronic computer was built in the year \_\_\_\_\_  
A. 1950 B. 1960 C. 1940 D. 1930
- In 1960's texas institute invented \_\_\_\_\_  
A. integrated circuits B. microprocessor C. vacuum tubes D. transistors
- The intel 8086 microprocessor is a \_\_\_\_\_ processor  
A. 8 bit B. 16 bit C. 32 bit D. 4 bit
- The microprocessor can read/write 16 bit data from or to \_\_\_\_\_  
A. memory B. I/O device C. processor D. register
- In 8086 microprocessor , the address bus is \_\_\_\_\_ bit wide  
A. 12 bit B. 10 bit C. 16 bit D. 20 bit
- The work of EU is \_\_\_\_\_  
A. encoding B. decoding C. processing D. calculations

### UNIT-II

- \_\_\_\_\_destination inverts each bit of destination  
A. B. NOR C. AND D. OR
- The JS is called as \_\_\_\_\_  
A. jump the signed bit B. jump single bit C. jump simple bit D. jump signal it
- Instruction providing both segment base and offset address are called \_\_\_\_\_

- A. below type      B. far type      C. low type      D. high type
4. The conditional branch instruction specify \_\_\_\_\_ for branching  
A. conditions      B. instruction      C. address      D. memory
5. The microprocessor determines whether the specified condition exists or not by testing the \_\_\_\_\_  
A. carry flag      B. conditional flag      C. common flag      D. sign flag
6. The LES copies to words from memory to register and \_\_\_\_\_  
A. DS      B. CS      C. ES      D. DS
7. The \_\_\_\_\_ translates a byte from one code to another code  
A. XLAT      B. XCHNG      C. POP      D. PUSH
8. The \_\_\_\_\_ contains an offset instead of actual address  
A. SP      B. IP      C. ES      D. SS
9. The 8086 fetches instruction one after another from \_\_\_\_\_ of memory  
A. code segment      B. IP      C. ES      D. SS
10. The BIU contains FIFO register of size 6 bytes called \_\_\_\_\_.  
A. queue      B. stack      C. segment      D. register

### UNIT-III

1. The \_\_\_\_ bus controller device decodes the signals to produce the control bus signal  
A. internal      B. data      C. external      D. address
2. A \_\_\_\_ Instruction at the end of interrupt service program takes the execution back to the interrupted program  
A. forward      B. return      C. data      D. line
3. The main concerns of the \_\_\_\_\_ are to define a flexible set of commands  
A. memory interface      B. peripheral interface      C. both (A) and (B)      D. control interface
4. Primary function of memory interfacing is that the \_\_\_\_\_ should be able to read from and write into register  
A. multiprocessor      B. microprocessor      C. dual Processor      D. coprocessor
5. To perform any operations, the Mp should identify the \_\_\_\_\_  
A. register      B. memory      C. interface      D. system
6. The Microprocessor places \_\_\_\_\_ address on the address bus  
A. 4 bit      B. 8 bit      C. 16 bit      D. 32 bit
7. The Microprocessor places 16 bit address on the add lines from that address by \_\_\_\_\_ register should be selected  
A. address      B. one      C. two      D. three
8. The \_\_\_\_\_ of the memory chip will identify and select the register for the EPROM  
A. internal decoder      B. external decoder      C. address decoder      D. data decoder
9. Microprocessor provides signal like \_\_\_\_ to indicate the read operation  
A. LOW      B. MCMW      C. MCMR      D. MCMWR
10. To interface memory with the microprocessor, connect register the lines of the address bus must be added to address lines of the \_\_\_\_\_ chip.  
A. single      B. memory      C. multiple      D. triple

### UNIT-III

1. The 8051 microcontroller is of \_\_\_\_ pin package as a \_\_\_\_\_ processor.  
a) 30, 1 byte      b) 20, 1 byte      c) 40, 8 bit      d) 40, 8 byte
2. The SP is of \_\_\_\_ wide register. And this may be defined anywhere in the \_\_\_\_\_.  
a) 8 byte, on-chip 128 byte RAM.      b) 8 bit, on chip 256 byte RAM.  
c) 16 bit, on-chip 128 byte ROM      d) 8 bit, on chip 128 byte RAM.
3. After reset, SP register is initialized to address \_\_\_\_\_.  
a) 8H      b) 9H      c) 7H      d) 6H
4. What is the address range of SFR Register bank?  
a) 00H-77H      b) 40H-80H      c) 80H-7FH      d) 80H-FFH
5. Which pin of port 3 is has an alternative function as write control signal for external data memory?  
a) P3.8      b) P3.3      c) P3.6      d) P3.1
6. What is the Address (SFR) for TCON, SCON, SBUF, PCON and PSW respectively ?

- a) 88H, 98H, 99H, 87H, 0D0H.                      b) 98H, 99H, 87H, 88H, 0D0H  
 c) 0D0H, 87H, 88H, 99H, 98H                      d) 87H, 88H, 0D0H, 98H, 99H
7. Serial port interrupt is generated, if \_\_\_\_ bits are set  
 a) IE    b) RI, IE   c) IP, TI                      d) RI, TI
8. In 8051 which interrupt has highest priority?  
 a) IE1   b) TF0   c) IE0   d) TF1
9. Intel 8096 is of \_\_\_\_ bit microcontroller family called as \_\_\_\_\_.  
 a) 8, MCS51   b) 16, MCS51   c) 8, MCS96   d) 16, MCS96
10. What is the function of watchdog timer?  
 a) The watchdog Timer is an external timer that resets the system if the software fails to operate properly.  
 b) The watchdog Timer is an internal timer that sets the system if the software fails to operate properly.  
 c) The watchdog Timer is an internal timer that resets the system if the software fails to operate properly.  
 d) None of them

### **UNIT-V**

1. In 8051, the stack pointer is a  
 a. 4 bit register    b. 8 bit register    c. 16 bit register    d. 32-bit register
2. In 8051 microcontroller \_\_\_\_\_ is not addressable  
 a. program counter    b. data pointer    c. stack pointer    D. PSW
3. \_\_\_\_\_ of 8051 microcontroller has only one function  
 a. Port 0    b. Port 1                      C. Port 2                      d. Port 3
4. The instruction MOV A, 55H is an example of \_\_\_\_ mode in 8051.  
 a. Immediate addressing    b. direct addressing    C. register direct    d. register indirect
5. During serial transmission using 8051 microcontroller the baud rate can be altered by changing the value in  
 a. TLO                      B. TLI                      c. THO                      d. THI
6. The Clock frequency of the 8051 microcontroller is \_\_\_\_\_  
 (A) 3 KHz (B) up to 16 MHz (C) ) up to 15 MHz (D) none
7. Which 8051 ports needs pull-up resistor to function as I/O ports.....  
 (A) Port-0 (B) Port-1 (C) ) Port-2 (D) Port-3
8. The 8051 has \_\_\_\_\_ I/O ports  
 (A) 1                      (B) 2                      (C) ) 3                      (D) 4
9. The RI+TI is a \_\_\_\_\_ interrupt.  
 (A) Serial                      (B) Timer                      (C) Hardware                      (D) Software
10. The Timer-1 is a \_\_\_\_\_ bit timer.  
 (A) 8                      (B) 16                      (C) 32                      (D) 64

### **XII. WEBSITES:**

1. <https://www.mpmcguide.com>
2. <https://www.oreilly.com/library/view/microprocessor.>
3. <https://electronicengineering/controller/wikipedia.>

### **XIII. EXPERT DETAILS:**

1. Mr. S. Srinivasan, Professor, Indian Institute of Technology, Madras
2. Dr. L. Behera, IIT, Karagpur
3. Dr. S. P. Das, IIT, Karagpur
4. Dr. K. Chandra Bhushana Rao (JNTUK)
5. Dr. V. Sumalatha (JNTUA)
6. Dr. M. N. Giriprasad (JNTUA)

### **XIV. JOURNALS:**

#### **INTERNATIONAL:**

1. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

2. International Journal of Embedded Systems
3. IEEE Transactions.

**NATIONAL:**

1. ICTACT Journal On Communication Technology
2. IETE Journal of Research
3. Journal of Electrical Engineering and Electronic Technology

**XV. LIST OF TOPICS FOR STUDENT SEMINARS:**

- 1) Explain Pin and Block diagram of 8086.
- 2) Explain Timing diagram of 8051.
- 3) Explain about ARM Processor and its advantages.
- 4) Explain about new Advanced ARM processor and its features with Applications.

**XVII. CASE STUDIES / SMALL PROJECTS:**

- 1) Implement a simple 8-bit ALU using 8086.
- 2) Implement a 4kx8 memory using 8086.
- 3) Using ARM processor implement 4-bit HUB controller
- 4) Using ARM processor implement serial communications with less instruction.