Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY, BANGALORE

COURSE PLAN

Academic Year 2019-20

Program:	B E – ELECTRICAL AND ELECTRONICS Engineering
Semester :	5
Course Code:	17EE52
Course Title:	80051 MICROCONTROLLER
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	Mrs.SYEDA N

Academic Evaluation and Monitoring Cell

No. 29, Chimney hills, Hesaraghatta Road, Chikkabanavara
BANGALORE-560090, KARNATAKA , INDIA
Phone / Fax :+91-08023721315/23721477, Web: www.skit.org.in

Table of Contents

Note : Remove "Table of Content" before including in CP Book
    Each Course Plan shall be printed and made into a book with cover page
    Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	EE
Year / Semester :	3/5	Academic Year:	2019-20

Course Title:	Microcontroller	Course Code:	17EE52
Credit / L-T-P:	4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	60
CIA Marks:	40	Assignment	10
Course Plan Author:	Mrs.Syeda N	Sign	Dt:
Checked By:		Sign	Dt:
CO Targets	CIA Target : ……. %	SEE Target:	……. %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	Inside the Computer, Microcontrollers and Embedded Processors, Block Diagram of 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of8051, IO Port Usage in 8051, Types of Special Function Registers and their uses in 8051, Pins Of 8051.Memory Address Decoding, 8031/51 Interfacing With External ROM And RAM.8051 AddressingModes .	10	8051 Hardware Architecture Memory Interfacing	L2 L4
2	Introduction to 8051 assembly programming,Assembling and running an 8051 program, Data types and Assembler directives, Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming.	10	Assembly Programing Basics 8051 Instruction Set	L2 L2
3	Data types and time delay in 8051C, IO programming in 8051C, Logic operations in 8051 C, Data conversion program in 8051 C, Accessing code ROM space in 8051C, Data serialization using 8051C. Programming 8051 timers, Counter programming, Programming timers 0 and 1 in 8051 C	10	C Programing Basics Timer Programing	L4 L4
4	Basics of serial communication, 8051 connection to RS232, 8051 serial port programming in assembly, serial port programming in 8051 C. 8051 interrupts, Programming timer, external hardware, serial communication interrupt, Interrupt priority in 8051/52, Interrupt programming in C.	10	Serial Communication Programing Interupt Programing	L4 L4
5	LCD interfacing, Keyboard interfacing ADC 0808 interfacing to 8051, Serial ADC Max1112 ADC interfacing to 8051, DAC interfacing, Sensor interfacing and signal conditioning.Relays and opt isolators, stepper motor interfacing, DC motor interfacing and PWM Programming the 8255, 8255 interfacing, C programming for 8255	10	I/O Device and Converter Interface Motor and 8255 Interfacing	L4 L4
-	**Total**	**50**	-	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).
1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	-	-
1,2,3,4,5	The 8051 Microcontroller and Embedded Systems Using Assembly and C 8051 Muhammad Ali Mazadi Pearson 2 nd Edition, 2008.	In Lib and dept	In Lib / In Dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	-	-
1,2,3,4,5	The 8051 Microcontroller Kenneth Ayala Cengage Learning 3 rd Edition, 2005	In Lib and dept	In Lib
1,2,3,4	The 8051 Microcontroller and EmbeddedSystems Manish K Patel McGraw Hill 2014	In Lib	In Lib
1,2,3,4,5	Microcontrollers: Architecture,Programming, Interfacing and System Design Raj Kamal Pearson 1 st Edition, 2012	In Lib	In Lib
C	**Concept Videos or Simulation for Understanding**	-	-
C1	https://www.electronicshub.org/8051-microcontroller-architecture	1	Internet
C2	http://www.zseries.in/embedded %20lab/8051%20microcontroller/memory%20mapping.php#.XbaHV-YzbIU	1	Internet
C3	https://www.tutorialspoint.com/addressing-modes-of-8051	2	Internet
C4	https://www.youtube.com/watch?v=9VY6d6oJr7s	2	Internet
C5	https://www.youtube.com/watch?v=t9NrRkdGaME	3	Internet
C6	https://www.electronicwings.com/8051/8051-timers	3	Internet
C7	https://www.gadgetronicx.com/serial-communication-in-8051-microcontroller/	4	Internet
C8	https://www.elprocus.com/types-of-interrupts-in-8051-microcontroller-and-interrupt-programming	4	Internet
C9	*https://www.academia.edu/6174081/8051_Interfacing_and_Applications_Microcontroller*	5	Internet
C10	https://circuitdigest.com/microcontroller-projects/stepper-motor-interfacing-with-8051	5	Internet
D	**Software Tools for Design**		
1	Keil Micro vision tool		
2	Flash Magic tool		
E	**Recent Developments for Research**	-	-
1	MSP 430		
2	ARM processor		
F	**Others (Web, Video, Simulation, Notes etc.)**	-	-
1	https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers/22	internet	L1-L3
2	*https://www.elprocus.com/8051-microcontroller-architecture-and-applications*	internet	L1-L4

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	17ELN15/25	Basic Electronics	Microcontroller Architecture and stepper motor Interface	2		

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	8051 Hardware Architecture	Computer Hardware	Required for Higher Education, Entrepreneurship	L2, L4
2	Assembly Programing Basics 8051 Instruction Set	IO interfacing	Industry & profession requirements	L2
3	C Programing BasicsTimer Programing	External hardware interfaces	Industry & profession requirements	L2, L4
4	Serial Communication Programing Interrupt Programing	Storage devices	Industry	L2,L3
5	I/O Device and Converter Interface Motor and 8255 Interfacing	Embedded Systems	Industry & profession requirements	L2

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	17EE52.1	Understand the features and internal architecture of 8051 using block diagram	05	8051 Architecture	Lecture/ PPT	Test and Assignment	L2 Understand
1	17EE52.2	Analyze the interfacing of RAM and ROM memories with 8051 using connection diagram		Memory Interfacing	Lecture	Test and Assignment	L4 Analyse
2	17EE52.3	Understand the syntax, rules of and execution procedure of assembly language.	05	Assembly Programing Basics	Lecture	Test and Assignment	L2 Understand
2	17EE52.4	Understand data transfer, arithmetical , logical, loop, jump and call instructions		8051 Instruction Set	Lecture	Test and Assignment	L2 Understand
3	17EE52.5	Develop programs for time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language	05	C Programing	Lecture/ PPT	Test and Assignment	L4 Analyse
3	17EE52.6	Develop programs for timer/counter -0/1 using assembly and C language		Timer Programing	Lecture/ PPT	Test and Assignment	L4 Analyse
4	17EE52.7	Develop programs for serial data communication of 8051 to RS232 using assembly and C language	05	Serial Communication Programing	Lecture / PPT	Test and Assignment	L4 Analyse

4	17EE52.8	Develop program for interrupt handling for timer interrupt, external interrupt and serial communication interrupt using assembly and C language		Interrupt Programing	Lecture/ PPT	Test and Assignment	L4 Analyse
5	17EE52.9	Develop program for LCD, Keyboard, ADC , DAC chip and sensor interface with 8051 using assembly and C language	05	I/O Device and Converter Interface	Lecture/ PPT	Test and Assignment	L4 Analyse
5	17EE52.10	Develop program for motor and 8255 chip interface with 8051 using assembly and C language		Motor and 8255 Interfacing	Lecture/ PPT	Test and Assignment	L4 Analyse
-	-	**Total**	**50**	-	-	-	-

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Washing machine, Microwave oven etc..	CO1	L2
2	Design of SOC	CO2	L4
3	Use for typical device drivers, low level embedded systems coding.	CO3	L2
4	Use for writing assembly programs	CO4	L2
5	Use for writing computer applications	CO5	L4
6	Use for generating precise time delays in many electronic equipment such as CPU, washing Machine and microwave oven	CO6	L4
7	Serial communication	CO7	L4
8	Use for multitasking	CO8	L4
9	Use for cell phone, computer	CO9	L4
10	Use for door opening and closing, cd driver , arm position of robots and automatic guided vehicles	CO10	L4

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Modules	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	CO	PO	-	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	-
1	CO1	PO1	L2	knowledge of features and internal architecture of 8051 microcontroller is required in developing a code in assembly langauge	L2
1	CO1	PO2	L3	Analysis of code requires knowledge of features and internal architecture of 8051 microcontroller	L3
1	CO1	PO11	L4	knowledge of features and internal architecture of 8051 microcontroller is applied in developing a code for final year project work.	L4
1	CO2	PO1	L2	knowledge of memory interface is required in developing an hardware application	L2
1	CO2	PO2	L3	Analysis of problem in a hardware application may require knowledge of memory interface	L3
1	CO2	PO3	L4	Devoloping an hardware application such as SOC requires knowledge of memory interface	L4
1	CO2	PO11	L4	Devoloping an hardware application such as SOC requires knowledge of memory interface	L4
1	CO3	PO1	L4	knowledge of syntax rules of 8051 microcontroller is required in developing a code in assembly langauge	L4

1	CO3	PO2	L2	Analysis of problem in code requires knowledge of syntax rules of 8051 microcontroller	L2
1	CO3	PO3	L4	Developing a assembly code needs 8051 syntax rules	L4
1	CO3	PO11	L3	Developing a assembly code for final yea r project needs 8051 syntax rules	L3
1	CO4	PO1	L4	knowledge of 8051 instruction set is required in writing assembly level programs	L4
1	CO4	PO2	L4	Analysis of assembly level program requires 8051 instruction set	L4
2	CO4	PO3	L2	knowledge of time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language is required in developing programs	L2
2	CO4	PO11	L4	knowledge of instructions of 8051 microcontroller is applied in developing a code for final year project work.	L4
2	CO5	PO1	L3	Analysis of C programs requires knowledge of time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization	L3
2	CO5	PO2	L4	Developing a program may requires knowledge of time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization.	L4
2	CO5	PO3	L2	The knowledge of timer/counters in time delay generation code of electronic appliances such as oven, washing machine etc.	L2
2	CO5	PO11	L4	knowledge of time delay generation and code conversion can be applied in developing a code for final year project work.	L4
2	CO6	PO1	L3	Knowledge of Timer programming is required in timer based applications.	L3
2	CO6	PO2	L4	Analysis of timer based applications requires knowledge of Timers/counters	L4
2	CO6	PO3	L4	Developing time delay code using Timer-0/1 is part of timer based applications.	L4
2	CO6	PO11		Developing time delay code using Timer-0/1 can be part of final year project .	
2	CO7	PO1	L2	serial data communication programming is required in establishing the serial communication between 8051 micro controller and peripheral devices	L2
2	CO7	PO2	L3	Analysis of serial communication between 8051 micro controller and peripheral devices requires knowledge of serial data communication programming.	L3
3	CO7	PO3	L4	Developing serial communication code is part of establishing the serial communication between 8051 micro controller and peripheral devices.	L4
3	CO7	PO11	L4	Developing serial communication code can be part of final year project.	L4
3	CO8	PO1	L4	Interrupts programming is required in multitasking applications.	L4
3	CO8	PO2	L2	Analysis of multitasking in an application requires knowledge of interrupt programming	L2
3	CO8	PO3	L3	Developing interrupt service routine for different interrupts in multitasking application	L3
3	CO8	PO11	L4	Developing interrupt service routine for different interrupts in final year project.	L4
3	CO9	PO1	L4	Developing programs which do the LCD, Keyboard, ADC , DAC chip and sensor interface with 8051 is required in applications such as data acquisition system, waveform generator and so on	L4
3	CO9	PO2	L4	Analysis of problem in applications requires knowledge of peripheral interface programming	L4
3	CO9	PO3	L2	Developing peripheral interface programs is part of building an application	L2
3	CO9	PO11	L3	Developing peripheral interface programs can be part of final year project.	L3
3	CO10	PO1	L4	Developing programs which do the DC motor, stepper motor and 8255 interface with 8051 is required in applications such as automatic door opening and closing, cd driver movement , arm position of robots and automatic guided vehicles and so on	L4
	CO10	PO2	L4	Analysis of problem in applications requires knowledge of peripheral	L4

				interface programming	
4	CO10	PO3	L4	Developing peripheral interface programs is part of building an application	L4
4	CO10	PO11	L4	Developing peripheral interface programs is part of final year project.	L4

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes															-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	Level	PSO2	PSO3	Level
1	17EE52.1	Understand the features and internal architecture of 8051 using block diagram	**2**	**2**									**2**					L2
1	17EE52.2	Analyze the interfacing of RAM and ROM memories with 8051 using diagram	**2**	**2**	**3**								**2**					L4
2	17EE52.3	Understand the syntax, rules of and execution procedure of assembly language.	**2**	**2**									**2**					L2
2	17EE52.4	Understand data transfer, arithmetical , logical, loop, jump and call instructions	**2**	**2**	**3**								**2**					L2
3	17EE52.5	Develop programs for time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language	**2**	**2**	**3**								**2**					L4
3	17EE52.6	Develop programs for timer/counter -0/1 using assembly and C language	**2**	**2**	**3**								**2**					L4
4	17EE52.7	Develop programs for serial data communication of 8051 to RS232 using assembly and C language	**2**	**2**	**3**								**2**					L4
4	17EE52.8	Develop program for interrupt handling for timer interrupt, external interrupt and serial communication interrupt using assembly and C language	**2**	**2**	**3**								**2**					L4
5	17EE52.9	Develop program for LCD, Keyboard, ADC , DAC chip and sensor interface with 8051 using assembly and C language	**2**	**2**	**3**								**2**					L4
5	17EE52.10	Develop program for motor and 8255 chip interface with 8051 using assembly and C language	**2**	**2**	**3**								**2**					L4
-	**CS501PC**	**Average attainment (1, 2, or 3)**																-
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Mod ules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Mod ules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Mod ules	Title	Teach. Hours	CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE	CO	Levels
			No. of question in Exam							
1	8051 Microcontroller Basics	10	2	-	-	1	-	2	CO1, CO2	L1, L2
2	Assembly programming and instruction of 8051	10	2	-	-	1	-	2	CO3, CO4	L2, L2
3	8051 programming in C 8051 Timer programming in Assembly and C	10	-	2	-	1	1	2	CO5, CO6	L4, L4
4	8051 serial port programming in assembly and C 8051 Interrupt programming in assembly and C	10	-	2	-	1	1	2	CO7, C08	L4, L4
5	Interfacing ADC, DAC and sensor interfacing Motor control 8051 interfacing with 8255	10	-	-	4	1	1	2	CO9, CO10	L4, L4
-	**Total**	**50**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Mod ules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	30	CO1, CO2, CO3, CO4	L2, l2, l2, l2
3, 4	CIA Exam – 2	30	CO5, CO6, CO7, C08	L4, L4, L4, L4
5	CIA Exam – 3	30	CO9, CO10	L4, L4

1, 2	Assignment - 1	10	CO1, CO2, CO3, CO4	L2, l2, l2, l2
3, 4	Assignment - 2	10	CO5, CO6, CO7, CO8	L4, L4, L4, L4
5	Assignment - 3	10	CO9, CO10	L4, L4
1, 2	Seminar - 1	-	-	-
3, 4	Seminar - 2	-	-	-
5	Seminar - 3	-	-	-
1, 2	Other Activities – define – Slip test	-	-	-
3, 4	**Final CIA Marks**		**-**	**-**
5	Quiz - 3		-	-
1 - 5	Other Activities – Mini Project	-	-	-
	Final CIA Marks	**40**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:	**8051 Microcontroller Basics**		Appr Time:	10Hrs
a	***Course Outcomes***		-	**Blooms**
-	**8051 Microcontroller Basics**		-	**Level**
1	Understand the features and internal architecture of 8051 using block diagram		CO1	L2
2	Analyze the interfacing of RAM and ROM memories with 8051 using connection diagram		CO2	L3
b	***Course Schedule***		-	-
Class No	**Module Content Covered**		**CO**	**Level**
1	Inside the Computer		C01	L2
2	Inside the Computer		C01	L2
3	Micro-controllers and Embedded Processors		C01	L2
4	Block Diagram of 8051		C01	L2
5	PSW and Flag Bits, 8051 Register Banks ,internal Memory Organization of 8051		C01	L2
6	Stack		C01	L2
7	IO Port Usage in 8051,		C01	L2
8	Types of Special Function Registers and their uses in 8051		C01	L2
9	Types of Special Function Registers and their uses in 8051		C01	L2
10	Pins Of 8051		C01	L2
11	Memory Address Decoding		C02	L3
12	8031/51 Interfacing With External ROM		C02	L3
13	8031/51 Interfacing With External RAM		C02	L3
14	8051 Addressing Modes		C02	L3
15	8051 Addressing Modes		C02	L3
c	**Application Areas**		**CO**	**Level**
1			CO1	L3
2			CO2	L4
d	**Review Questions**		-	-
1	List the tree components of a computer system		CO1	L1
2	Wiht does CPU stands for? Explain its function in a computer		CO1	L2
3	Litst the types of buses and their purpose in computer system		CO1	L1
4	What does ALU stand for ? What is its purpose ?		CO1	L2
5	What is the purpose of program counter and instruction decoder ?		CO1	L2
6	List the features of 8051		CO1	L1
7	What are the major difference among 8051, 8052 and 8031.		CO1	L2

8	Which is the flag register in 8051 and what is the size of of it ?	CO1	L2
9	On power up , 8051 uses bank ------ for registers R0 - R7	CO1	L1
10	What is the size of the SP register ?	CO1	L1
11	On power up, 8051 uses RAM location ------ as the first location of stack	CO1	L1
12	Find the organization and chip capacity of following ROM with indicated address and data pins 1) 14 address, 8 data 2) 16 address, 8 data 3) 12 address, 8 data	CO2	L3
13	Find the capacity and number of pins set aside for address and data for memory chips with the following organization 1) 16K x 4 SRAM 2) 32K x 8 EPROM 3) 1M X 1 DRAM	CO2	L3
e	**Experiences**	-	-
1			
2			
3			
4			
5			

Module – 2

Title:	Assembly programming and instruction of 8051	Appr Time:	10 Hrs
a	*Course Outcomes*	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Understand the syntax, rules of and execution procedure of assembly language.	CO3	L2
2	Understand data transfer, arithmetical, logical, loop, jump and call instructions	CO4	L2
b	*Course Schedule*	-	-
Class No	**Module Content Covered**	**CO**	**Level**
16	Introduction to 8051 assembly programming	CO3	L2
17	Assembling and running an 8051 program, Data types	CO3	L2
18	Assembler directives(Basic)	CO3	L2
19	Arithmetic instructions(Derived)	CO4	L2
20	Arithmetic programs	CO4	L2
21	Logic instructions	CO4	L2
22	Logic programs	CO4	L2
23	Jump instructions	CO4	L2
24	loop and call instructions	CO4	L2
25	IO port programming	CO4	L2
c	**Application Areas**	**CO**	**Level**
1	Use for typical device drivers, low level embedded systems coding.	CO3	L2
2	Use for writing assembly programs	CO4	L2
d	**Review Questions**	-	-
1	What is the purpose of pseudo - instructions	CO3	L2
2	------- are traslated by assembler into machine code, whereas ---- are not.	CO3	L1
3	What is the extension of source file in assembly /	CO3	L1
4	Which is the file produced by an 8051 assembler ?	CO3	L1
5	Which directive is always used for ASCII strings?	CO3	L2
6	What is the the advantage in using the EQU directive to define a constant value ?	CO3	L2
18	How many bytes are used by the following ? DATA_1: DB "INDIA"	CO3	L2
19	Why is the following ADD instruction illegal ? ADD R1, R2	CO4	L2
20	Where lower byte and upper byte of multiplication result will be stored ?	CO4	L2
21	Where quotient and remainder of division result will be stored ?	CO4	L2

22	To mask certain bits of the accumulator we must ANL it with -----	CO4	L2
23	To set certain bits of the accumulator to 1 we must ORL it with ---	CO4	L2
24	XRLing an operand with itself results in ------	CO4	L2
e	**Experiences**	-	-
1			
2			
3			
4			
5			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17EE52	Sem:5	I	Marks:	20	Time:	75 minutes			
Course:	Design and Analysis of Algorithms									
-	**-**	**Note: Answer any 3 questions, each carry equal marks.**					**Marks**		**CO**	**Level**
1	a	Compare microprocessor with Microcontroller.					05		CO1	L1
	b	With neat diagram,explain the internal architecture of 8051					05		CO1	L2
	c	Show the neat schematic interface 8K external data RAM to 8051					05		CO2	L3
		OR								
2	a	Explain flag register of 8051 Microcontroller					05		CO1	L2

	b	Explain the operation of following code with respect to stack.
		MOV SP, #10h
		PUSH SP
		POP 0E0h
		ADD A,#10h
							03		CO1	L3

	c	Interface 8051 to external 8K RAM and 32K ROM and explain how 8051 access them?					07		CO2	L3
3	a	Explain any seven addressing modes of 8051.Give an example for each of them and mention limitations of each.					20		CO3	L1
	b	Differentiate between JUMP and CALL instructions.							CO4	L2
	c	Write a program in 8051 to find the sum of 20 data bytes stored in array of external RAM starting with address 2000H. Store the 16 bit sum at the end of array.							CO4	L3
4	a	Explain the following instructions with their function and bytes used. 1) CJNE dest, source, raddr 2) ACALL target 3) SWAP A 4) RRC A 5) DJNZ Rn, reladdr.					20		CO4	L2
	b	Explain syntax of 8051 Microcontroller instruction.							CO3	L2
	c	Write a program to toggle all bits of of P1 continuously.							CO4	L3

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions									
Crs Code:	17ee52	Sem:	5	Marks:	10 / 10	Time:	90 – 120 minutes		
Course:	8051 microcontroller								
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.									
SNo	**USN**		**Assignment Description**				**Marks**	**CO**	**Level**
1	1KT16E0E03		Compare microprocessor with Microcontroller.				10	CO1	L2
2	1KT16EE034		What is microcontroller? List out the difference between CISC and RISC				10	CO1	L2

3	1KT16EE011	With neat diagram,explain the internal architecture of 8051	10	CO1	L2
4	1KT16EE013	Explain the 8051 block diagram and its features	10	CO1	L2
5	1KT16EE017	Explain flag register of 8051 Microcontroller	10	CO1	L2
6	1KT16EE402	Explain memory organization of 8051 microcontroller with neat diagram.	10	CO1	L2
7	1KT16EE404	With the neat diagram, explain the internal structure of port P1.0	10	CO1	L2
8	1KT17EE001	Discuss the need for stack memory in microcontroller. Explain with examples the PUSH and POP instructions.	10	CO1	L2
9	1KT17EE003	Explain the operation of following code with respect to stack. MOV SP, #10h PUSH SP POP 0E0h ADD A,#10h	10	CO1	L3
10	1KT17EE004	Explain pin configuration of 8051.	10	CO1	L2
11	1KT17EE005	Explain different memory decoding methods.	10	CO2	L2
12	1KT17EE006	Explain the following pins and its function in 8051 microcontrollers 1) ALE 2) PSEN 3)EA 4)RD 5)WR	10	CO1	L2
13	1KT17EE007	Interface 8051 to external 8K RAM and 32K ROM and explain how 8051 access them?	10	CO2	L4
14	1KT17EE013	Show the neat schematic interface 8K external data RAM to 8051	10	CO2	L4
15	1KT17EE014	With the help of neat diagram, explain how to interface external 64Kbytes RAM memory with 8051.	10	CO2	L4
16	1KT17EE016	Explain any seven addressing modes of 8051.Give an example for each of them and mention limitations of each.	10	CO2	L2
17	1KT17EE019	Explain syntax of 8051 Microcontroller instruction.	10	CO3	L2
18	1KT17EE020	Explain assembling and running a 8051 program with flowchart.	10	CO3	L2
19	1KT17EE021	Define assembler directive. Explain ORG, EQU, DB and END directive.	10	CO3	L2
20	1KT17EE023	Explain following instructions mentioning their addressing mode and byte size. i)XCHD A,@R0 ii)MOVC A, @A+DPTR iii) SUBB A,#55h iv) DA A v) ORL C, 100 h	10	CO4	L2
21	1KT17EE025	Explain the following instructions with their function and bytes used. 1) CJNE dest, source, raddr 2) ACALL target 3) SWAP A 4) RRC A 5) DJNZ Rn, reladdr.	10	CO4	L2
22	1KT17EE026	With the relevant figure, write a sequence of events that occur in 8051 microcontroller when the CALL and RET instructions are executed.	10	CO4	L2

D2. TEACHING PLAN - 2

Module – 3

Title:	Data types and Timers				Appr Time:	10 Hrs
a	***Course Outcomes***				-	**Blooms**
-	The student should be able to:				-	**Level**
1	Develop programs for time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language				CO5	L4

2	Develop programs for timer/counter -0/1 using assembly and C language	CO6	L4
b	*Course Schedule*		
Class No	**Module Content Covered**	**CO**	**Level**
1	Data types	CO5	L3
2	time delay in 8051C	CO5	L3
3	IO programming in 8051C	CO5	L4
4	Logic operations in 8051 C,	CO5	L4
5	Accessing code ROM space in 8051C	CO5	L3
6	Data conversion program in 8051 C	CO5	L4
7	Data serialization using 8051C	CO5	L4
8	Programming 8051 timers	CO6	L4
9	Programming 8051 timers	CO6	L4
10	Programming 8051 timers	CO6	L4
11	Counter programming	CO6	L4
12	Counter programming	CO6	L4
13	Programming timers 0 and 1 in 8051 C	CO6	L4
14	Programming timers 0 and 1 in 8051 C	CO6	L4
c	**Application Areas**	**CO**	**Level**
1	Use for writing computer applications	CO1	L3
2	Use for generating precise time delays in many electronic equipment such as CPU, washing Machine and microwave oven	CO2	L4
d	**Review Questions**	-	-
1	Give the magnitude of the signed char, unsigned char, signed int and unsigned int data types	CO5	L1
2	Give the three factors that can affect the delay size	CO5	L2
3	Write the address of port0, port1, port2 and port3	CO5	L1
4	Write a short program that toggles all bits of P2.	CO5	L4
5	Write a short program that toggles only bit P1.0	CO5	L4
6	For the following decimal numbers, give the packed BCD and unpacked BCD representation.	CO5	L2
7	Why is the use of packed BCD preferable to ASCII ?	CO5	L2
8	Which one takes memory space: packed BCD or ASCII ?	CO5	L2
9	An ADC provides an input of 0010 0110.What happens if we output that to the screen.	CO5	L2
10	In 8051 C, we should not use more than 100 bytes of the RAM data space for variables. Why ?	CO5	L4
11	How many timers do we have in 8051 ?	CO6	L1
12	Is TMOD register is a bit addressable register ?	CO6	L1
13	Who provides the clock pulses to 8051 timers if C/T = 0 ?	CO6	L1
14	Who provides the clock pulses to 8051 timers if C/T = 1 ?	CO6	L1
15	Indicate the selection made in the statement " TMOD = 0X20"	CO6	L2
16	In the statement "TH1 = -200", find the hex value for the TH register.	CO6	L3
e	**Experiences**	-	-
1			
2			
3			
4			
5			

Module – 4

Title:	Serial Communication and Interrupts	Appr Time:	10 Hrs
a	*Course Outcomes*	-	**Blooms**

-		The student should be able to:	-	Level
1		Develop programs for serial data communication of 8051 to RS232 using assembly and C language	CO7	L4
2		Develop program for interrupt handling for timer interrupt, external interrupt and serial communication interrupt using assembly and C language	CO8	L4
b		*Course Schedule*		
Class No		Module Content Covered	CO	Level
1		Basics of serial communication	CO7	L2
2		8051 connection to RS232	CO7	L2
3		8051 serial port programming in assembly	CO7	L4
4		8051 serial port programming in assembly	CO7	L4
5		8051 serial port programming in 8051 C	CO7	L4
6		8051 interrupts	CO8	L2
7		8051 interrupts	CO8	L2
8		Programming timer interrupts (Basics)	CO8	L3
9		Programming timer interrupts (programs)	CO8	L4
10		Programming external hardware interrupts (Basics)	CO8	L3
11		Programming external hardware interrupts (programs)	CO8	L4
12		Programming serial communication interrupts (Basics)	CO8	L3
13		Programming serial communication interrupts (programs)	CO8	L4
14		Interrupt priority in 8051/52	CO8	L3
15		Interrupt programming in C.	CO8	L4
c		**Application Areas**	CO	Level
1		Serial communication	CO8	L4
2		Use for multitasking	CO7	L4
d		**Review Questions**	-	-
1		Which communication is fastest and expensive among serial and parallel communication ?	CO7	L2
2		Find overhead due to framing ?	CO7	L2
3		Is RS232 is TTL compatible ?	CO7	L2
4		Is sending data to printer is duplex ?	CO7	L2
5		Which pins are set aside for serial communication and what are their functions ?	CO7	L1
6		Which timer of 8051 is used to set the baud rate ?	CO7	L2
7		Which mode of the timer is used to set the baud rate ?	CO7	L2
8		To transfer a byte of data serialy, it must be placed in register ------	CO7	L2
9		SCON stand for ---- and it is a ----- bit register	CO7	L2
10		When TI raised ?	CO7	L2
11		Of the interrupt and polling methods, which one avoids tying down the micro controller ?	CO8	L2
12		Beside reset, how many interrupts do we have in the 8051 ?	CO8	L1
e		**Experiences**	-	-
1				
2				
3				
4				
5				

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17EE52	Sem:		5	Marks:		30	Time:		80 minutes		
Course:	8051 MICROCONTROLLER											
-	-	**Note: Answer any 2 questions, each carry equal marks.**								**Marks**	**CO**	**Level**
1	a	Give the bit size and data range details for widely used seven C data								5	CO5	L1

			Marks	CO	Level
		types of 8051 C.			
	b	Write a 8051 C program to toggle all the bits of P0,P1 and P2 continuously with 250ms delay. Use sfr keyword to declare the port addresses.	5	CO5	L4
	c	Explain the different modes of operation of Timer/Counter of 8051 with relevant block diagram and steps to program the modes.	5	CO6	L2
		OR			
2	a	Explain the difference between counter mode and timer mode of operation. With necessary format, explain the various bits of TMOD –SFR.	5	CO6	L2
	b	Write an 8051 C program to find the checksum byte of data stream 30H,4AH,65H and 10H.Convert the binary value of checksum into decimal and display the value of the BCD digits om ports P0, P1 and P2	5	CO5	L4
	c	Assume that a 1-HZ external clock is being fed into pin T1(P3.5).Write a C program for counter 1 in mode 2 to count up and disllay the state of TL1 count on P1.start the count at 00H.	5	CO6	L4
3	a	List the advantages of serial communication over parallel communication.	5	CO7	L2
	b	Explain the format of SCON register in details	5	CO7	L2
	c	Write a program for 8051 to transfer the message "GOOD LUCK" serially at baud rate of 9600, 8bit data with 1 stop bit. Do this continuously	5	CO7	L4
		OR			
4	a	Define interrupt, and mention the difference between interrupt and polling method.	5	CO8	L2
	b	Explain IE register formats	5	CO8	L2
	c	Write 8051 interupt program to do the following: 1) Recieve data serialy P2 and sent it to P1 continuously. 2) Make timer 0 to generate a square wave of 5KHZ frequency at port Po.1.Assume crystal frequency as 11.0592HZ at baude rate of 9600.	5	CO8	L4

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
Crs Code:	17EE52	Sem:	5	Marks:	10	Time:	80 minutes	
Course:	8051 MICROCONTROLLER							

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT16E0E03	Give the bit size and data range details for widely used seven C data types of 8051 C.	10	CO5	L2
2	1KT16EE034	Write a 8051 C program to toggle all the bits of P0,P1 and P2 continuously with 250ms delay. Use sfr keyword to declare the port addresses.	10	CO5	L3
3	1KT16EE011	Write a 8051 C program to toggle all the bits of P0,P1 and P2 continuously with 250ms delay. Use the EX-OR operator.	10	CO5	L4
4	1KT16EE013	Explain with an example , bit wise logical operators for 8051 C.	10	CO5	L3
5	1KT16EE017	Write an 8051 C program to find the checksum byte of data stream 30H,4AH,65H and 10H.Convert the binary value of checksum into decimal and display the value of the BCD digits om ports P0, P1 and P2.	10	CO5	L4
6	1KT16EE402	Write a 8051 C program to convert packed BCD number 0x29 to ASCII and display the result on port1 and port2.	10	CO5	L4
7	1KT16EE404	Write a C program to convert a given hex data 0FF into its equivalent decimal data and display the result digits on P0, P1 and P2.	10	CO5	L4
8	1KT17EE001	What is data serialization ? Explain different types with examples	10	CO5	L2
9	1KT17EE003	Explain the difference between counter mode and timer mode of operation. With necessary format, explain the various bits of TMOD.	10	CO6	L2
10	1KT17EE004	Explain the different modes of operation of Timer/Counter of	10	CO6	L2

		8051 with relevant block diagram and steps to program the modes.			
11	1KT17EE005	Explain the various bits of TCON register.	10	CO6	L2
12	1KT17EE006	Assuming that XTAL = 11.0592MHZ, find the TH1, TL1 value to generate a time delay of 2ms.Timer 1 is programmed in mode 1.	10	CO6	L4
13	1KT17EE007	Assuming that XTAL = 11.0592MHZ, find the TH1, TL1 value to generate a time delay of 5ms.Timer 1 is programmed in mode 1.	10	CO6	L4
14	1KT17EE013	Write an ALP in 8051 which generates a square wave of frequency 10 kHz on pin P1.2, using timer-1, mode 1. Assume XTAL frequency as 11.0592 MHz. What is the minimum frequency that can be generated?	10	CO6	L4
15	1KT17EE014	Write a program to generate a symmetric square wave of frequency 2Khz in Temer 1 Mode 1, if crystal of frequency 11.0592MHz is used	10	CO6	L4
16	1KT17EE016	write an ALP to generate square wave of 3KHZ frequency with 50% duty cycle on Pin P2.1 using timer 1 mode 1 operation, Assume XTAL=12MHZ in Temer 1 Mode 1,and show the delay calculation.	10	CO6	L4
17	1KT17EE019	Write an ALP to generate a frequency of 100 KHZ on pin P2.3.Use Timer 1 in Mode 1. Assume crystal frequency of 11.0592MHZ.	10	CO6	L4
18	1KT17EE020	Write an ALP to generate a square with an ON time of 3ms and OFF time of 10ms on all pins of port 0.Assume crystal frequency of 11.0592MHZ.	10	CO6	L4
19	1KT17EE021	Write an ALP to generate a pulse train of 2 seconds period on pin P2.4. Use Timer 1 in Mode 1.	10	CO6	L4
20	1KT17EE023	Write a program to generate the following waveform as shown in fig ..Assume crystal frequency of 11.0592MHZ. Show the delay calculations. This waveform should be generated continuously.	10	CO6	L4
21	1KT17EE025	A switch is connected to pin P1.2. Write a C program to monitor the switch and create the following frequencies on pin P1.7 1) When SW = 0; 500HZ 2) When SW = 1; 750HZ Use timer-0 mode 1 for both of them.	10	CO6	L4
22	1KT17EE026	Find the delay for XTAL = 11.0592MHZ, if the program segment for timing is MOV TMOD, #01 MOV TH0, #OFFH MOV TL0, #00 SETB TR0	10	CO6	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	INTERFACING			Appr Time:	10 Hrs
a	*Course Outcomes*			-	Blooms
-	The student should be able to:			-	Level
1	Develop program for LCD, Keyboard, ADC , DAC chip and sensor interface with			CO9	L4

		8051 using assembly and C language		
2		Develop program for motor and 8255 chip interface with 8051 using assembly and C language	CO10	L4
b		*Course Schedule*		
Class No		**Module Content Covered**	**CO**	**Level**
1		LCD interfacing	CO9	L4
2		Keyboard interfacing	CO9	L4
3		DC 0808 interfacing to 8051,	CO9	L4
4		A Serial ADC Max1112 ADC interfacing to 8051	CO9	L4
5		DAC interfacing	CO9	L4
6		Sensor interfacing and signal conditioning.	CO9	L4
7		Relays and opt isolators interfacing with 8051	CO10	L4
8		stepper motor interfacing with 8051	CO10	L4
9		DC motor interfacing PWM interfacing with 8051	CO10	L4
10		Programming the 8255	CO10	L4
11		8255 interfacing, C programming for 8255	CO10	L4
c		**Application Areas**	**CO**	**Level**
1		Use for cell phone, computer	CO10	L4
2		Use for door opening and closing, cd driver , arm position of robots and automatic guided vehicles	CO9	L4
d		**Review Questions**	-	-
1		The RS pin is an ------(input, output) pin for the LCD.	CO9	L1
2		The E pin is an ------(input, output) pin for the LCD.	CO9	L1
3		Indicate the steps to detect the key press.	CO9	L2
4		In readins columns of a keyboard matrix, if no key is pressed we should get all -------(1s, 0s)	CO9	L2
5		In the ADC0804, the INTR signal is an -------(input, output)	CO9	L2
6		Is transducer must be connected to the signal conditioning circuitry before it is sent to the ADC ?	CO9	L2
7		Why do we place a driver between the microcontroller and the relay ?	CO10	L2
8		Give the 4 – step sequence of a stepper motor if we start with 0110.	CO10	L2
9		Why do we use the MOVX instruction to access the ports of 8255 ?	CO10	L2
10		What is the function of data pins D0 – D7 in the 8255	CO10	L2
11		What special features does the bit set/reset feature of 8255 ?	CO10	L2
e		**Experiences**	-	-
1				
2				
3				
4				
5				

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17EE52	Sem:		5	Marks:		30	Time:		75 minutes		
Course:	8051 MICROCONTROLLER											
-	-	**Note: Answer any 2 questions, each carry equal marks.**								**Marks**	**CO**	**Level**
1	a	Show the interfacing circuit and functional pins of LCD								5	CO9	L2
	b	Explain the registers and pins of LCD and write an ALP to display " HELLO" at LCD displays.								5	CO9	L4
	c	How does the LCD distinguish between data and command?								5	CO9	L2
2	a	Interface a 4 X 4 matrix keyboard to 8051.Write the required block schematic and assembly program.								12	CO9	L4

	b	How does the busy flag aid in making the LCD program more efficient ?	3	CO9	L2
3	a	Draw the block schematic of DAC 0808 interfaced to 8051 at port P1 and write an 8051 program to generate sine wave.	5	CO9	L4
	b	Interface stepper motor to 8051 and write a program to rotate it continously.	5	CO10	L4
	c	With a block diagram explain the features of 8255 PPI chip and its mode of operation.	5	CO10	L2
4	a	Explain DAC interface with diagram and also write a C program to generate stair case waveform.	5	CO9	L4
	b	Interface an ADC to 8051 and write an ALP to convert analog input to digital.	5	CO9	L4
	c	Howl to interface the DC motor to 8051 microcontroller using opto isolator ? Write a c Program to move DC motor with 25% dutu cycle pulse.	5	CO10	L4

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions								
Crs Code:	17EE52	Sem:	5	Marks:	30	Time:	75 minutes	
Course:	8051 MICROCONTROLLER							

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT16E0E03	Show the interfacing circuit and functional pins of LCD	5	CO9	L2
2	1KT16EE034	Which are the control pins of the LCD? What are their functions?	3	CO9	L2
3	1KT16EE011	How does the LCD distinguish between data and command?	2	CO9	L3
4	1KT16EE013	How does the busy flag aid in making the LCD program more efficient ?	2	CO9	L3
5	1KT16EE017	Indicate the steps to detect the key press.	3	CO9	L2
6	1KT16EE402	Interface a 4 X 4 matrix keyboard to 8051.Write the required block schematic and assembly program.	5	CO9	L4
7	1KT16EE404	Explain the registers and pins of LCD and write an ALP to display " HELLO" at LCD displays.	7	CO9	L4
8	1KT17EE001	With necessary interface diagram, write a program to display "VTU2018" on a LCD interface.	7	CO9	L4
9	1KT17EE003	Interface LCD display to 8051 and write an ALP to display the message "VERY GOOD".	7	CO9	L4
10	1KT17EE004	Indicate the steps to identify the key press.	4	CO9	L2
11	1KT17EE005	Interface an ADC to 8051 and write an ALP to convert analog input to digital.	7	CO9	L4
12	1KT17EE006	Set up a circuit to generate a sine wave using 8051 and DAC 808.Explain how a sine wave can be generated using a suitable example.	7	CO9	L4
13	1KT17EE007	Draw the block schematic of DAC 0808 interfaced to 8051 at port P1 and write an 8051 program to generate sine wave.	7	CO9	L4
14	1KT17EE013	Explain with diagram, how the DAC 0808 can be interfaced to 8051 microcontroller. Write an 8051 C program to generate the triangular waveform.	7	CO9	L4
15	1KT17EE014	Explain DAC interface with diagram and also write a C program to generate stair case waveform.	7	CO9	L4
16	1KT17EE016	Interface 8051 to stepper motor and write an ALP to rotate the motor first +4 steps and then -6 steps.	7	CO10	L4
17	1KT17EE019	Explain stepper motor with diagram and also write a C program if a motor takes 90 steps to make one complete revoiution and show the calculation.(Both clockwise and anticlockwise).	7	CO10	L4
18	1KT17EE020	Interface stepper motor to 8051 and write a program to rotate	7	CO10	L4

19	1KT17EE021	it continously.			
19	1KT17EE021	Howl to interface the DC motor to 8051 microcontroller using opto isolator ? Write a c Program to move DC motor with 25% dutu cycle pulse.	7	CO10	L4
20	1KT17EE023	Describe 8051 connection to stepper motor and write an ALP to rotate the motor clockwise for 180 degree. Assume motor specifications 1.8 degree/step.	7	CO10	L4
21	1KT17EE025	Explain the various modes of 8255 and find the control word for the following configurations : l) All ports of A,B and C are output ports (mode 0). ii)PA = IN , PB = OUT, PCL = OUT and PCH = OUT.	7	CO10	L3
22	1KT17EE026	Explain 4 modes of operation 8255 along with control word format.	8	CO10	L3

F. EXAM PREPARATION

1. University Model Question Paper

Course:		8051 MICROCONTROLLER					Month / Year		May /2018		
Crs Code:		15EE52		Sem:		5	Marks:	100	Time:		180 minutes
-	**Note**	Answer all FIVE full questions. All questions carry equal marks.						**Marks**	**CO**	**Level**	
1	a	What is microcontroller? List out the difference between CISC and RISC						5	CO1	L2	
	b	Explain the 8051 block diagram and its features						5	CO1	L2	
	c	Explain the PSW Register.						5	CO1	L2	
		OR									
-	a	With the help of neat diagram, explain how to interface external 64Kbytes RAM memory with 8051						5	CO2	L3	
	b	Explain the following addressing modes with an examples. i) Indirect Addressing Mode ii) Indexed Addressing Mode iii) Direct Addressing Mode.						5	CO2	L2	
	c	Explain PUSH and POP instruction with an example.						5	CO1	L2	
2	a	List out and explain different assembler directives used in an ALP.						10	C03	L2	
	b	Explain the following instructions with an example i) SWAP A ii) RRC A iii) DIV AB iv) XCHD A,@Ri v) DA A						10	CO4	L2	
		OR									
	a	Write an ALP to convert unpacked BCD to Packed BCD Number						5	CO3	L4	
	b	Explain Checksum byte in ROM, with an example						5	CO3	L2	
	c	Name the addressing modes of the following instructions i) MOV F0H, #29H ii) ADD A, 30H iii) MOV 35H,@R0 iv) SUBB A, R1 v) XRL A,@R1						5	CO4	L2	
3	a	Give the bit size and Data range details for the widely used C Data types of 8051.						5	CO5	L2	
	b	Write an 8051 C program to toggle all the bits of P1 continuously.						5	CO5	L2	
	c	Write an 8051 C program to convert packed BCD 0x29 to ASCII and display the bytes on P1 and P2.						5	CO5	L4	
		OR									
-	a	What is the difference between timer and counter? Explain the function of each bit in TMOD Register.						5	CO6	L2	
	b	write an ALP to generate square wave of 3KHZ frequency with 50% duty cycle on Pin P2.1 using timer 1 mode 1 operation, Assume XTAL=12MHZ and show the delay calculation.						5	CO6	L4	
	c	what is the advantage and disadvantages of MODE 2 operation of 8051 when compared to Mode 1 Operation.						5	CO6	L2	
4	a	write the steps required for programming 8051 to transfer and receive data serially.						10	CO7	L2	

	b	write an ALP to transfer letter "Y" serially at 9600 baud rate, continuously	10	CO7	L4
		OR			
-	a	Explain the importance of TI and RI flag.	10	CO8	L2
	b	Define interrupt, and mention the difference between interrupt and polling method and also write the steps in executing interrupt	10	CO8	L2
5	a	Explain DAC interface with diagram and also write a C program to generate staircase waveform.	10	CO9	L4
	b	Show the interfacing circuit and functional pins of LCD	10	CO9	L2
		OR			
	a	Draw the pin diagram of 8255 and briefly explain the signals	10	CO10	L2
	b	Explain about stepper motor interface with diagram, and also write a c program if motor takes 90 steps to complete one revolution and show the calculation (Clockwise Direction)	10	CO10	

2. SEE Important Questions

Course:	8051 MICROCONTROLLER						Month / Year	May /2018	
Crs Code:	15EE52	Sem:	5	Marks:	100	Time:		180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.					-	-	
Module	Qno.	Important Question					**Marks**	**CO**	**Year**
1	1	Compare microprocessor with Microcontroller.					5	CO1	2004
	2	With neat diagram,explain the internal architecture of 8051					7	CO1	2004
	3	Interface 8051 to external 8K RAM and 32K ROM and explain how 8051 access them?					8	CO2	2004
	4	Explain flag register of 8051 Microcontroller					5	CO1	2007

	5	Explain the operation of following code with respect to stack.
		MOV SP, #10h
		PUSH SP
		POP 0E0h
		ADD A,#10h
							3	CO1	2007

2	1	Explain any seven addressing modes of 8051.Give an example for each of them and mention limitations of each.					7	CO2	2005
	2	Differentiate between JUMP and CALL instructions.					4	CO4	2005
	3	Write a program in 8051 to find the sum of 20 data bytes stored in array of external RAM starting with address 2000H. Store the 16 bit sum at the end of array.					5	CO3	2009
	4	Explain the following instructions with their function and bytes used. 1) CJNE dest, source, raddr 2) ACALL target 3) SWAP A 4) RRC A 5) DJNZ Rn, reladdr.					5	CO4	2006
	5	Write a program to toggle all bits of of P1 continuously.					5	CO3	2004
3	1	Give the bit size and data range details for widely used seven C data types of 8051 C.					5	CO5	2006
	2	Write a 8051 C program to toggle all the bits of P0,P1 and P2 continuously with 250ms delay. Use sfr keyword to declare the port addresses.					5	CO5	2006
	3	Explain the difference between counter mode and timer mode of operation. With necessary format, explain the various bits of TMOD –SFR.					5	CO6	2007
	4	Write an 8051 C program to find the checksum byte of data stream 30H,4AH,65H and 10H.Convert the binary value of checksum into decimal and display the value of the BCD digits om ports P0, P1 and P2					5	CO5	2004
	5	Assume that a 1-HZ external clock is being fed into pin T1(P3.5).Write a C					5	CO6	2004

		program for counter 1 in mode 2 to count up and disllay the state of TL1 count on P1.start the count at 00H.			
4	1	List the advantages of serial communication over parallel communication.	4	CO7	2004
	2	Write a program for 8051 to transfer the message "GOOD LUCK" serially at baud rate of 9600, 8bit data with 1 stop bit. Do this continuously	5	CO7	2004
	3	Define interrupt, and mention the difference between interrupt and polling method.	5	C08	2006
	4	Explain IE register formats	5	C08	2004
	5	Write 8051 interupt program to do the following: 1) Recieve data serialy P2 and sent it to P1 continuously. 2) Make timer 0 to generate a square wave of 5KHZ frequency at port Po.1.Assume crystal frequency as 11.0592HZ at baude rate of 9600.	5	C08	2007
5	1	Show the interfacing circuit and functional pins of LCD	6	C09	2009
	2	Draw the block schematic of DAC 0808 interfaced to 8051 at port P1 and write an 8051 program to generate sine wave.	7	C09	2007
	3	Interface stepper motor to 8051 and write a program to rotate it continously.	7	C010	2007
	4	With a block diagram explain the features of 8255 PPI chip and its mode of operation.	7	CO10	2004
	5	Howl to interface the DC motor to 8051 microcontroller using opto isolator ? Write a c Program to move DC motor with 25% duty cycle pulse.	7	CO10	2005

G. Content to Course Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Module-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction Methods for Learning	Assessment Methods to Measure Learning
A	B	C	D	E	F	G	H
1	Understand the features and internal architecture of 8051 using block diagram	4	L4 Analyze	L4 Analyze	- Understand - Explore	Lecture	Slip test
1	Analyze the interfacing of RAM and ROM memories with 8051 using connection diagram	4	L3 Apply	L3 Apply	-Identify -	Explanation	Q & A
2	Understand the syntax, rules of and execution procedure of assembly language.	4	L3 Apply	L3 Apply	-Interpret -	Description	Q & A
2	Understand data transfer, arithmetical , logical, loop, jump and call instructions	4	L4 Analyze	L4 Analyze	- Compare -	Explanation	Q & A
3	Develop programs for time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language	4	L3 Apply	L3 Apply	-Illustrate -	Examine	Focused on analyzing / compare
3	Develop programs for timer/counter -0/1 using assembly and C language	4	L4 Analyze	L4 Analyze	-Examine -	Description	Q & A
4	Develop programs for serial data	4	L4	L4	-Analyze	Explanat	Slip test

	communication of 8051 to RS232 using assembly and C language		Analyze	Analyze	-	ion	
4	Develop program for interrupt handling for timer interrupt, external interrupt and serial communication interrupt using assembly and C language	4	L2 Understand	L2 Understand	-Identify -	Description	Q & A
5	Develop program for LCD, Keyboard, ADC , DAC chip and sensor interface with 8051 using assembly and C language	4	L2 Understand	L2 Understand	-Understand -	Develop	Q & A
5	Develop program for motor and 8255 chip interface with 8051 using assembly and C language	4	L2 Understand	L2 Understand	-Explain -	Description	Q & A

2. Concepts and Outcomes:

Table 2: Concept to Outcome – Example Course

Module-#	Learning or Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome **Student Should be able to …**
A	I	J	K	L	M	N
1	Understand the features and internal architecture of 8051 using block diagram	8051 Hardware Architecture Memory Interfacing	8051 Hardware Architecture Memory Interfacing	Process activities	-Explore -software system, component or process -system models -realistic constraints.	Explore the various types of system
1	Analyze the interfacing of RAM and ROM memories with 8051 using connection diagram	Assembly Programing Basics 8051 Instruction Set	Assembly Programing Basics 8051 Instruction Set	Requirement Analysis	-Identify -requirements for development, -Requirements Engineering Processes.	Identify the development requirements
2	Understand the syntax, rules of and execution procedure of assembly language.	C Programing Basics Timer Programing	C Programing Basics Timer Programing	Development models	-Interpret -Analysis requirements -appropriate design	Interpret the usage of of suitable models
2	Understand data transfer, arithmetical , logical, loop,	Serial Communication Programing	Serial Communication Programing	Design techniques	-Compare - development -Design techniques,	Compare various design techniques for development.

	jump and call instructions	g Interupt Programing g	Interupt Programing			
3	Develop programs for time delay,input/output operations, input/output bit manipulation , logic and arithmetic operations, data conversion and data serialization using C language	I/O Device and Converter Interface Motor and 8255 Interfacing	I/O Device and Converter Interface Motor and 8255 Interfacing	Levels of software testing	-Illustrate - requirements and maintenance practices -Validating	Illustrate the principles for validating the requirements .
3	Develop programs for timer/counter -0/1 using assembly and C language	Storage devices	Storage devices	Evolution process	-Examine - Maintenance -Change requirement	Examine the change requirements for maintenance .
4	Develop programs for serial data communication of 8051 to RS232 using assembly and C language	Arithmetic Operations	Arithmetic Operations	Development panning	-Analyze - project management -quality assurance procedures	Analyze the plans
4	Develop program for interrupt handling for timer interrupt, external interrupt and serial communication interrupt using assembly and C language	Different methodologies	Different methodologies	Quality assurance procedures	-Identify - development process -Quality assurance procedures	Identify the quality assurance procedures
5	Develop program for LCD, Keyboard, ADC , DAC chip and sensor interface with 8051 using	Processing unit	Processing unit	Agile methods for software development	-Understand	Understand the importance of agile project management

	assembly and C language					
5	Develop program for motor and 8255 chip interface with 8051 using assembly and C language	Embedded system and large computer system	Embedded system and large computer system	Agile methods for software development	-Explain, development -methods	Explain the method for Development .