Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title	**: Advanced Microprocessors**	Course Code : **15EC63B**	
Semester	: **6**	Course Group : **Elective**	
Teaching Scheme in Hrs (L:T:P) : **4:0:0**		Credits : **4**	
Type of course	: **Lecture + activity**	Total Contact Hours: **52**	
CIE	: **25 Marks**	SEE : **100 Marks**	

Prerequisites

Students should have knowledge of Microprocessor/Microcontroller Architecture and Programming.

Course Objectives

1. Study of architecture and programming of 8086 microprocessor
2. Study of features of different peripheral devices and standard buses
3. Know the features of advanced microprocessors

Course Outcomes

At the end of the course, the students should be able to

1. Understand the necessity, features and architecture of 8086.
2. Analyse the addressing modes and understand the functions of 8086 instructions.
3. Write simple assembly language programs.
4. Understand the need and handling of interrupts in 8086 and features of peripheral ICs.
5. Explain the architecture of generic advanced microprocessor and features of advanced microprocessors.
6. Understand the need and features of bus standards.

	Course Outcome	CL	Linked PO	Teaching Hrs
CO1	Understand the necessity, features and architecture of 8086.	*R/U/A/AN/E/C*	1, 2,10	**8**
CO2	Analyse addressing modes and instructions of 8086.	*R/U/AN/E/C*	1,2,10	**10**
CO3	Write simple assembly language programs.	*R/U/A*	1,2,3,10	**10**
CO4	Understand the need and handling of interrupts in 8086 and features of peripheral ICs.	*R/U/A/AN*	2,10	**9**
CO5	Explain the architecture of generic advanced microprocessor and features of advanced microprocessors.	*R/U/A*	2,10	**10**
CO6	Understand the need and features of bus standards.	*R/U*	2,10	**5**
			Total Sessions	**52**

Legends: PO-Program Outcome, CO-Course Outcome, CL-Cognitive Level, R-Remember, U-Understand, A-Apply, AN-Analyse, E-evaluate , C-create

Mapping Course Outcomes with Program Outcomes

Course Outcomes	Programme Outcomes									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	*	*	--	--	--	--	--	--	--	*
CO2	*	*	--	--	--	--	--	--	--	*
CO3	*	*	*	--	--	--	--	--	--	*
CO4	--	*	--	--	--	--	--	--	--	*
CO5	--	*	--	--	--	--	--	--	--	*
CO6	--	*	--	--	--	--	--	--	--	*

*Legend: * Linked, -- No link*

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Advanced Microprocessors	3	3	1	--	--	--	--	--	--	3

Legend: Addressing levels: 1-Slight, 2-Moderate, 3-Substantial, -- Not addressed

Quantification Method: *This is to relate the level of PO with the number of hours devoted to the COs which address the given PO. If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3; if 25 to 40% , Level 2; if 5 to 25%, Level 1; and if < 5%, not addressed.*

Course content and pattern of marks for SEE

Unit No	Unit Name	Hrs.	Questions to be set For SEE						Marks Weightage	Weightage (%)
			R	U	A	AN	E	C		
1	Architecture of 8086 microprocessor	8	05	10	05	05	05	--	30	20
2	8086 Instruction set	10	05	10	--	05	05	05	30	21
3	8086 Programming	10	05	10	10	--	--	--	25	18
4	Interrupts and Peripheral ICs	9	05	05	05	05	--	--	20	14
5	Advanced Microprocessors	10	05	10	15	--	--	--	30	21
6	Bus Standards	5	05	05	--	--	--	--	10	06
	Total	52	30	50	35	15	10	5	145	100

Legend: R- Remember, U-Understand A-Application, AN-Analyse, E-evaluate, C-create

Course Content

UNIT-01: Architecture of 8086 microprocessor   Duration -08Hrs.

Introduction to Microprocessors, Features, pin functions and internal architecture of 8086. Flag register, Memory segmentation, Segment Registers, Physical address - calculation with examples, Physical memory organization. Interfacing 8086 with memory and I/O devices under minimum mode (Block-diagram level), Comparison between Minimum mode and Maximum mode configuration

UNIT-02: 8086 Instruction set   Duration -10Hrs.

Addressing modes - with example, Role of index and pointer registers. **8086 instruction set-** Data transfer, arithmetic, logical, shift and rotate, branching, loop control and string instructions, processor control instructions with simple examples.

UNIT-03: 8086 Programming   Duration -10Hrs.

ALP program development cycle, development tools, MASM-Assembler directives, structure of assembly program, sample programs -with relevant comments- such as data transfer, code conversion, largest/smallest, sorting, searching, string palindrome and other simple programs. Comparison of procedure and macro.

UNIT-04: Interrupts and Peripheral ICs   Duration -09Hrs.

Interrupts:-Concept, classification–internal and external, maskable and non-maskable, hardware and software. Interrupt Vector Table, interrupt cycle, interrupt service routine, and interrupt priorities. DOS and BIOS routines as interrupt service routines. **Programmable Peripheral ICs:** Functional block diagram, features, various operating modes of IC 8255. Features of 8253, 8259, 8251, & 8257. Relevance and features of 8087 co-processor.

UNIT-05: Advanced Microprocessors   Duration -10Hrs.

Block diagram of Advanced Microprocessor, Memory Hierarchy, Cache memory, Virtual memory, Paging & segmentation, Pipe lining - Pipe line hazards. Features and comparison of 80286, 80386, 80486, Pentium IV. Concept of core processor. Introduction to Power PC, Features of Power PC601 and AMD Athlon Processor. Features and applications of Super SPARC Processor.

UNIT-06: Bus Standards   Duration -5 Hrs.

Bus standards: Need for Bus standards. Features of RS232, Parallel Centronic Bus, SATA Bus, I^{2}C Bus. USB-Structure, operation and features.

References

A. K.Ray , K M Bhurchandi, "Advanced Microprocessor & Peripherals", Tata McGraw Hill,3nd Edition,2013

1. Douglas V Hall, "Microprocessor & Interfacing: Programming and Hardware", Tata McGraw Hill, 2nd Edition,2006.
2. BARRY B. BREY, " THE INTEL MICROPROCESSORS-Architecture, Programming, and Interfacing", Pearson Education India. Eighth Edition
3. Yn - cheng Liu and Gibson, G.A., "Microcomputer Systems: The 8086 / 8088Family Architecture, Programming and Design", Prentice Hall of India, 2nd Edition, 2006.
4. Badri Ram , ''Advanced Microprocessors and Interfacing''', McGraw Hill, 2014
5. Triebel, walter, Avatar singh," The 8088 and 8086 microprocessors : programming, interfacing, software, hardware, and applications : including the 80286, 80386, 80486, and Pentium processors", Prentice Hall, Fourth edition, 2003.
6. The SPARC Architecture Manual.

7. INTEL manual/data sheet.

Course Delivery

The course will be delivered through lectures, presentations and support of modern tools.

Course Assessment and Evaluation Scheme

Assessment Method	What		To Whom	Assessment mode /Frequency /timing	Max. Marks	Evidence Collected	Course Outcomes
Direct assessment	CIE	IA	Students	Three tests[+]	20	Blue Books	1 to 6
				Activity*	05	Activity Sheets	1 to 6
	SEE	End exam		End of the course	100	Answer Scripts at BTE	1 to 6
				Total	125		
Indirect assessment	Student feedback on course		Students	Middle of the Course	Nil	Feedback Forms	1 to 3 & Delivery of course
	End of course survey			End of the Course	Nil	Question-naires	1 to 6, Effectiveness of delivery instructions & assessment methods

Legends: CIE-Continuous Internal Evaluation, SEE- Semester End-exam Evaluation

[+] Every I.A. test shall be conducted for 20 marks. Average of three tests, by rounding off any fractional part thereof to next higher integer, shall be considered for IA.

*Students should do activity as per the list of suggested activities/ similar activities with prior approval of the teacher. Activity process must be initiated well in advance so that it can be completed well before the end of the term and assessed through appropriate Rubrics.

Questions for CIE and SEE will be designed to evaluate the various CLs as per the Weight age shown in the following table.

Sl. No.	Cognitive Levels (CL)	Weightage (%)
1	Remembering	20
2	Understanding	35
3	Applying	25
4	Analyse	8
5	Evaluate	7
6	create	5
	Total	**100**

Institutional Activities

Sl. No.	Activity
1	Organize Seminar, workshop or Lecture from experts on the modern trends in Processors
Dimension	**Scale** **Marks**

Continuous Internal Evaluation (CIE) pattern

(i) Student Activity (5 marks)

The following student activities or similar activities can be assigned for assessing CIE (IA) marks

Sl. No.	Activity
1	Collect the features of Intel core processors (Dual, quad, i3, i5, i7)
2	Collect the features of core processors used in mobile phones (At least 5 processors)
	Execution Mode 1. Maximum of 4 students in each batch for student activity; every batch is expected perform both activities. 2. Write qualitative report of 4 to 6 pages; one report per batch. 3. Activities can be carried out off-class. 4. Teacher is expected to observe and record the progress of students' activities; Assessment shall be made based on the following rubrics table

(ii) Model of rubrics for assessing student activity

	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	
1. Research and gathering information	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic	3
2. Full-fills team roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles	2
3. Shares work equality	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding	5
4. Listen to other team mates	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but sometimes talk too much,	Listens and talks a little more than needed.	Listens and talks a fare amount	3
					Total marks	ceil(13/4)= 4

(iii) CIE/IA Tests (20 Marks)

Three tests have to be conducted in accordance with the test pattern given below and average marks of them are considered for CIE/IA with specified schedule.

(iv) Format of CIE/IA test question paper

CIE Question Paper						
Institution Name and Code						
Course Co-ordinator/Teacher						
Program Name		*Test No.*		*Units*		
Class/Sem		*Date*		*CL*		
Course Name		*Time*		*COs*		
Course Code		*Max. Marks*		*POs*		
Note to students: Answer all questions						
Question No.	**Question**		**Marks**	**CL**	**CO**	**PO**
1						
2						
3						
4						

Legends: PO-Program Outcome, CO-Course outcome, CL-Cognitive Level, R-Remember, U-Understand, A-Apply
   Note: Internal choice may be given in each CO at the same cognitive level (CL).

(v) Model question paper for CIE

CIE Question Paper						
Institution Name and Code						
Course Co-ordinator/Teacher						
Program Name	Electronics and Communication	*Test No.*	1	*Units*	1 & 2	
Class/Sem	6thSem	*Date*		*CL*	R/U/A/AN/E	
Course Name	Advanced Microprocessors	*Time*		*COs*	1 & 2	
Course Code	15EC63B	*Max. Marks*	20	*POs*	3	

Note to students: Answer all questions

No.	Question	Marks	CL	CO	PO
1	List the features of 8086 **OR** Sketch & Explain how physical address is calculated in 8086	05	R/A	1	1,2,10
2	Explain the PIN functions of 8086 in minimum mode	05	U	1	1,2,10
3	List the classification of instruction set of 8086 with example **OR** Choose CS=3000H, DS=0000H, SS=2000H, BP=0123H, BX=0005H, SI=0500H. Calculate the memory address the following instructions will access. Also explain the addressing modes that are used by each instruction. i. MOV CX, [1234H] ii. MOV DX, [BP] iii. MOV DX, [BX + SI + 200H]	05	R/E	2	1,2,10
4	Explain the role of index and pointer Registers	05	U	2	1,2,10

Semester End-Exam Evaluation (SEE)

(i) End-exam question-paper pattern

Unit No.	Unit Name	Study Duration (Hrs.)	No. Questions for End-exam	
			5 marks Part - a	10 marks Part - b
1	Architecture of 8086 microprocessor	8	2	2
2	8086 Instruction set	10	2	2
3	8086 Programming	10	1	2
4	Interrupts and Peripheral ICs	9	2	1
5	Advanced Microprocessors	10	2	2
6	Bus Standards	5	--	1
	Total	**52**	**09 (45 Marks)**	**10 (100 Marks)**

(ii) Model question paper

Course Title   : **Advanced Microprocessors**
Course Code   : **15EC63B**   Time   : **3 Hrs**
Semester   : **Sixth**   Max. Marks: **100**
Instructions: *1. Answer any SIX question from Part A (5x6=30 Marks)*
                2. Answer any SEVEN full questions from Part B (7x10=70 Marks)

Part A
1. List the features of 8086.
2. Choose CS=1000H, DS=2000H, SS=3000H, ES=4000H, BP=0010H, BX=0020H, SP=0030H, SI=0040H, DI=0050H .find   physical address for the following instructions

   MOV AL,[BP]   MOV CX,[BX]
   MOV AL,[BP+SI]   MOV CS:[BX],AL
3. List various logical instructions of 8086 microprocessor
4. Illustrate segment override pre-fix with an example
5. Define ASSEMBLER, LINKER, LOADER,EDITOR
6. List the features of 8251
7. Write a note on BIOS interrupts
8. List the features of 80286
9. Write a note on USB port

Part B
1. Explain the Internal Architecture of 8086
2. a)Explain the functions of   ALE, BHE/s7, DT/R pins (5)
   b) Predict the value of IP, CS, PSW, ES, and SS registers of 8086 after reset(5)
3. Explain the following instructions with an example
   AAD   ROR   SUB   XLAT   REPNE
4. a) Choose CS=3000H, DS=0000H, SS=2000H, BP=0123H, BX=0005H, DI=0034H, SI=0500H Calculate the memory address the following instructions will access. Also explain the addressing modes that are used by each instruction.   (5)
             a. MOV DX, [BP+DI]
             b. MOV DX, [BP + SI + 200H]
             c. MOV CS:[DI],AL
   b) Write 8086 assembly language instructions which perform following operations(5)
             i)   Copy a word from port 95H to AX
             ii)   Add 1 to contents of BX
             iii)   Convert signed byte in AL to signed word in AX
             iv)   Load the number F3H into AL register.
             v)   Shift word stored in AX right 5 times
5. a) Write a program to convert packed BCD to unpacked BCD(5)
   b) Write a program to find largest number in a given array(5)
6. Explain the following directives:
   MODEL   DB   PUBLIC   PTR   ASSUME
7. a) Explain the sequence of actions performed upon interrupt request(5)

b) Write the contents of IP register in 8086 IVT for the following (5)
    i) Divide-by-zero   ii) Single step iii) NMI   iv) Break point   v) Overflow
8. Sketch and Explain the Block diagram of Advanced Microprocessor
9. a)Explain memory hierarchy in advanced microprocessor (6)
   b) Explain the need of bus standard.(4)
10. Explain the block diagram of PowerPC601

Model Question Bank

Course Title : **Advanced Microprocessors**	Course Code: **15EC63B**

(The following Questions are only indicative, Faculty can frame their own question based on the OBE guidelines)

UNIT-1 Architecture of 8086 microprocessor
05 Marks

Remember
1. List the features of 8086.
2. Define minimum mode. Name all minimum mode pins of 8086 microprocessor
3. Define maximum mode. Name all maximum mode pins of 8086 microprocessor
4. List the internal registers in 8086 microprocessor and their abbreviations and lengths.
5. List the uses of segment registers in 8086.

Understand
1. Explain the pin functions of 8086 in minimum mode.
2. Explain the pin functions of 8086 in maximum mode.
3. Compare minimum mode and Maximum mode of 8086 microprocessor
4. Describe the functions of index registers.
5. Explain the concept of segmented memory. What are its advantages?
6. Explain general purpose registers of 8086 microprocessor
7. Explain segment registers of 8086
8. Explain the need of segmentation
9. Describe the function of status lines S0,S1 and S2 of 8086 microprocessor
10. Explain the functions of   ALE, BHE/s7, DT/R pins
11. Explain control flags of 8086
12. Explain status flags of 8086
13. Explain physical memory organization of 8086 microprocessor
14. Explain how address-data bus is de-multiplexed in 8086?
15. Explain Bus Interface Unit of 8086 microprocessor
16. Explain Execution Unit of 8086 microprocessor

Application
1. Sketch & Explain how physical address is calculated in 8086
2. Write the pin diagram of 8086 microprocessor
3. Write interfacing diagram of 8086 with memory and I/O devices under minimum mode configuration.

4. Sketch the internal diagram 8086.

Analyse

1. Illustrate how 20-bit physical address is generated in 8086 with an example
2. Calculate the physical addresses represented by
   - i. 1234H: 0002H
   - ii. 2670H: 2222H
   - iii. F2F2H: 1234H
3. Calculate the physical address if the contents of
   - i. CS=384AH , IP=4214H
   - ii. DS=1000H, SI=2500H
4. Illustrate how Instruction queue is implemented in 8086

Evaluate

1. Choose
   CS=1000H,DS=2000H,SS=3000H,ES=4000H,BP=0010H,BX=0020H,SP=0030H,SI=0040H,DI=0050H .find physical address for the following instructions

MOV AL,[BP]	MOV CX,[BX]
MOV AL,[BP+SI]	MOV CS:[BX],AL

2. Predict the value of IP, CS, PSW, ES, and SS registers of 8086 after reset.
3. Predict the contents of all status flags after the execution the following instructions
   MOV AX, 65D1H
   MOV DX, 2359H
   ADD AX, BX

<div align="center">

10 Marks

</div>

Understand

1. Explain the Internal Architecture of 8086
2. Explain the FLAG register of 8086
3. a)Explain the functions of QS1 and QS0 pins of 8086
   b) Describe the functions of index and pointer registers.
4. a) Explain with example how 16 bit address is converted into 20 bit address.
   b) Explain the functions of DMA lines.
5. Explain the programming model of 8086.
6. Explain the functions of TEST, BHE, READY, RESET, LOCK pins of 8086.

Application

1. Write the pin diagram of 8086 and explain the pins
2. Interface the I/O devices to 8086 in minimum mode.
3. Write interfacing diagram of 8086 with memory and I/O devices under minimum mode configuration

<div align="center">

UNIT-2: 8086 Instruction set

05 Marks

</div>

Remember

1. Define addressing mode. explain any three Addressing modes
2. List the classification of instruction set of 8086 with example.
3. Differentiate between the jump and loop instructions.
4. List various arithmetic instructions of 8086 microprocessor?
5. List various data transfer instructions of 8086 microprocessor?

6. List various string related instructions of 8086 microprocessor?
7. List various logical instructions of 8086 microprocessor

Understand

1. Explain the following instructions i) IMUL, ii) MUL
2. Explain the programming model of 8086.
3. Explain the following instructions i) AAA, ii) AAD
4. Explain the role of index and pointer Registers.
5. Explain the difference between the respective shifts and rotate instructions.
6. Explain repeat instructions with example
7. Explain CALL and RET instructions
8. Describe the difference between a jump and a call instruction

Analyse

1. Illustrate any 3 addressing modes with an example
2. Identify the addressing mode is used the following instructions
   - i.   MOV AX, BX
   - ii. MOV AX, [DI]
   - iii. IN AX,DX
   - iv. MOV CX, 2342H
   - v.   ADD AX,[BX][BP]
3. Illustrate segment override pre-fix with an example.
4. Differentiate between LOOP and REP instructions.
5. Differentiate between intra-segment and intra-segment jump instruction

Evaluate

1. Choose AL = 99H and BL = 47H after DIV BL what are the values of AL and AH.
2. Choose AX = 200H and CX = 6H after MUL CX what are the values of AX and DX
3. Choose CS=3000H, DS=0000H, SS=2000H, BP=0123H, BX=0005H, SI=0500H. Calculate the memory address the following instructions will access. Also explain the addressing modes that are used by each instruction.
   - a. MOV CX, [1234H]
   - b. MOV DX, [BP]
   - c. MOV DX, [BX + SI + 200H]
6. Choose CS=3000H, DS=0000H, SS=2000H, BP=0123H, BX=0005H, DI=0034H, SI=0500H Calculate the memory address the following instructions will access. Also explain the addressing modes that are used by each instruction.
   - d. MOV DX, [BP+DI]
   - e. MOV DX, [BP + SI + 200H]
   - f. MOV CS:[DI],AL

Create

1. Write 8086 assembly language instructions which perform following operations
   - vi)   Copy a word from port 95H to AX
   - vii) Add 1 to contents of BX
   - viii) Convert signed byte in AL to signed word in AX
   - ix)   Load the number F3H into AL register.
   - x)   Shift word stored in AX right 5 times

2. Write the condition for jump after the execution of the following instructions
   JC   REPNE   JA   JB   LOOPE

10 Marks

Understand

1. Explain the role of IP, BP, SP, SI, DI register.
2. Explain the string instructions with an example
3. a) Explain the functions of machine control instructions.
   b) Differentiate between RET and IRET
4. Explain the following instructions with an example
   AAD   ROR   SUB   XLAT   REPNE
5. Explain the following instructions with an example
   DAS   MOV   SHR   LODSB   XOR
6. Explain with examples the addressing of I/O ports and based indexed addressing mode.
7. Explain the following addressing mode of 8086 with example
   i) Based   ii) implicit   iii) direct   iv) register   v) indirect

UNIT-3 8086 Programming

05 Marks

Remember
1. Define ASSEMBLER, LINKER, LOADER,EDITOR
2. Define PROCEDURE and MACRO.
3. Define assembler directive? Explain any 3 with suitable example.

Understand
1. Differentiate between PROCEDURE and MACRO.
2. Explain the process of assembling.
3. Explain the process of Linking.
4. Explain the structure of assembly program
5. Explain alignment directives
6. Explain value returning attribute directives
7. Explain data control directives
8. Explain the following directives
    i) ORG   ii) TYPE   iii) DW   iv) ENDS   v) ASSUME
9. Explain the following directives
   i) SHORT   ii) OFFSET   iii) ALIGN   iv) ENDM   v) EQU
10. Describe the need of the following program development tools in 8086.
     Assembler   Editor   Linker

Application
1. Write an ALP to add two 16-bit numbers.
2. Write an ALP to multiply 8-bit numbers.
3. Write a program to move a block of data from memory location 0300H to 0400H
4. Write a program to find largest number in a given array.
5. Write a program to search a given number in an array of numbers.
6. Write a program to convert decimal to hexadecimal.

---

7. Write a program to convert packed BCD to unpacked BCD.
8. Write a program to add an array of 16-bit numbers.

10 Marks

Understand

1. Explain the following directives:

   MODEL   DB   PUBLIC   PTR   ASSUME

Application

1. Write an ALP to display String on the console.
2. Write a program to separate out positive and negative numbers from a given series of 16-bit hexadecimal numbers.
3. Write a program to find that given string is palindrome or not.
4. Write a program to sort a given number of bytes in ascending order.

UNIT-04:   Interrupts and Peripheral ICs
05 Marks

Remember

1. Define interrupt, interrupt service routine and vector table.
2. Define interrupt. List various types of interrupts
3. List the modes of operation of 8253 Interval timer.
4. List the features of 8087 numeric co-processor
5. List all interrupt vectors.
6. List the features of 8255.
7. List the features of 8253.
8. List the features of 8259.
9. List the features of 8251.
10. List the features of 8257.
11. List the Differences between DOS & BIOS interrupts.

Understand

1. Explain the sequence of actions performed upon interrupt request.
2. Describe hardware and software interrupts.
3. Explain the operating modes of 8255

Application

1. Sketch IVT and explain
2. Write a note on BIOS interrupts
3. Write a note o n DOS interrupts

Analyse

1. Justify which interrupts are allocated in IVT for the following address of the IP register
   i) 0000H   ii) 0004H   iii) 0008H   iv) 000CH   v) 0010H
2. Write the contents of IP register in 8086 IVT for the following
   i) Divide-by-zero   ii) Single step iii) NMI   iv) Break point   v) Overflow

10 Marks

Application

1. a) Sketch and explain the block diagram of 8255 PPI. (8)
   b) Differentiate between maskable and non- maskable interrupts(2)

UNIT-5 Advanced Microprocessors and Bus Standards
05 Marks
Remember
1. Define pipeline, SFU, virtual memory, superscalar issue of instructions, cache.
2. List the features of 80286
3. List the features of DUAL CORE PROCESSOR.
4. List the features of 80486.
5. List the features of PENTIUM PROCESSOR
6. List the functions of MMU.
7. List the features of 80386 microprocessor
8. List the features of Pentium IV microprocessor?
9. List the features of SATA bus.
10. List the features of USB?
11. List the features of Parallel centronic bus
12. List the features of I^2C bus?
13. List the differences between 80486 and Pentium processor

Understand
1. Compare 80286 with 80386.
2. Explain the need of bus standard.
3. Explain the different types of pipeline hazards.
4. Compare serial and parallel buses.

Application
1. Sketch and Explain the Block Diagram Bus Interface Unit
2. Sketch and Explain the Block Diagram Integer Unit
3. Sketch and Explain the Block Diagram Floating Point Unit
4. Sketch and Explain the Block Diagram Memory Management Unit
5. Write a note on Cache memory
6. How to convert virtual to physical address
7. Write a note on USB port.

10 Marks
Understand
1. a)Explain memory hierarchy in advanced microprocessor (6)
   b) Explain superscalar issue of instructions (4)
   Application
1. Sketch and Explain the Block diagram of Advanced Microprocessor.

UNIT-6 Other Advanced Microprocessors
05 Marks
Remember
1. List the features of PowerPC601.
2. List the features of SuperSPARC Processor.
10 Marks
Understand
1. Explain the block diagram of PowerPC601.

End