

## UNIT I

### Chapter 1 : 80386DX Basic Programming Model

**1-1 to 1-36**

1.1	Introduction.....	1-1
1.1.1	Introduction to 80386DX.....	1-2
1.1.2	80386DX Features.....	1-2
1.2	Memory Organization and Segmentation .....	1-2
1.2.1	The "Flat" Model.....	1-3
1.2.2	The Segmented Model .....	1-4
1.2.3	Architecture of 80386DX .....	1-4
1.2.4	Bus Interface Unit (BIU) .....	1-6
1.2.5	Prefetcher and Prefetched Queue.....	1-6
1.3	Registers.....	1-7
1.3.1	General Purpose Registers .....	1-8
1.3.2	Instruction Pointer .....	1-8
1.3.3	Segment Registers .....	1-8
1.3.4	Systems Flag Register (EFLAGS).....	1-9
1.4	Processing Modes of 80386.....	1-11
1.5	Real and Virtual Mode .....	1-11
1.5.1	Comparison of Real Mode or Virtual Mode of 80386 and Actual 8086 .....	1-12
1.5.2	Addressing in Real Mode.....	1-13
1.6	Protection Mode .....	1-14
1.6.1	Protection Mechanism.....	1-15
1.6.2	Five Mechanisms of Protection Implementation in 80386.....	1-17
1.6.3	Task Management.....	1-18
1.7	Mode Switching.....	1-18
1.7.1	Switching to Protected Mode .....	1-19
1.7.2	Switching Back to Real-Address Mode.....	1-20
1.8	Data Types.....	1-21
1.8.1	Fundamental Data Types .....	1-21
1.8.2	Numeric Data Types .....	1-22
1.8.2(A)	Data Types Unsigned Integer .....	1-22
1.8.2(B)	Signed Integers.....	1-22
1.8.3	Bit Field Data Type .....	1-23
1.8.4	Bit String Data Type.....	1-23
1.8.5	Pointer Data Types.....	1-23
1.8.6	String Data Types.....	1-24
1.8.7	BCD and Packed BCD Integers.....	1-24
1.9	Instruction Format .....	1-24
1.10	Segment Override Prefix .....	1-25
1.11	Operand Selection (Addressing Modes) .....	1-25
1.11.1	Immediate Operands.....	1-25
1.11.2	Register Operands in 80386.....	1-25
1.11.3	Memory Operands.....	1-26
1.11.4	Register Addressing Mode .....	1-28

1.11.5	Immediate Addressing Mode.....	1-29
1.11.6	Memory Addressing Modes .....	1-29
1.11.6(A)	Direct Addressing Mode.....	1-29
1.11.6(B)	Register Indirect Addressing Mode .....	1-30
1.11.6(C)	Based Mode.....	1-30
1.11.6(D)	Index Mode .....	1-30
1.11.6(E)	Scaled Index Mode.....	1-31
1.11.6(F)	Based Indexed Mode .....	1-31
1.11.6(G)	Based Scaled Index Mode.....	1-31
1.11.6(H)	Based Index Mode with Displacement .....	1-31
1.11.6(I)	Based Scaled Index Mode With Displacement.....	1-31
1.11.7	String Addressing Mode .....	1-31
1.11.8	Implied Addressing Mode.....	1-32
1.12	Interrupts and Exceptions.....	1-33
1.13	Exam Pack (Review and University Questions) .....	1-34

### Chapter 2 : Applications Instruction Set **2-1 to 2-69**

2.1	Introduction to Instruction Set of 80386.....	2-1
2.2	Data Movement Instructions.....	2-1
2.2.1	General Purpose Data Transfer Group.....	2-1
2.2.1(A)	MOV .....	2-1
2.2.1(B)	MOV CRn .....	2-3
2.2.1(C)	MOV DRn.....	2-3
2.2.1(D)	MOV TRn .....	2-3
2.2.1(E)	XCHG : Exchange Register / Memory with Register .....	2-3
2.2.2	Stack Manipulation Instructions.....	2-4
2.2.2(A)	PUSH : Push Word onto Stack.....	2-4
2.2.2(B)	PUSHA : Push All General Registers onto Stack... ..	2-4
2.2.2(C)	POP - Pop Word Off Stack.....	2-5
2.2.2(D)	POPA : Pop All General Purpose Registers from Stack.....	2-5
2.2.3	Type Conversion Instructions .....	2-5
2.2.3(A)	CBW - Convert Byte to Word.....	2-6
2.2.3(B)	CWD-Convert Word to Double Word.....	2-6
2.2.3(C)	CWDE - Convert Word to Double Word Extended.....	2-6
2.2.3(D)	CDQ - Convert Double Word to Quad Word .....	2-6
2.2.3(E)	MOVSX : Move with Sign Extend .....	2-7
2.2.3(F)	MOVZX : Move with Zero Extended .....	2-7
2.2.4	Input / Output Instructions .....	2-7
2.2.4(A)	IN Instructions : Copy Data from a Port.....	2-7
2.2.4(B)	OUT Instruction - Output Byte or Word to a Port.....	2-8
2.2.5	Flag Instructions (Flag Transfer) .....	2-8
2.2.5(A)	LAHF - Load AH Register from Flags.....	2-8
2.2.5(B)	SAHF - Store AH register in flags.....	2-8
2.2.5(C)	PUSHF - Push Flags onto Stack.....	2-9



2.2.5(D)	POPF – Pop Flags Off Stack.....	2-9	2.4.5(B)	ROR – Rotate Right Byte or Word.....	2-23
2.3	Binary Arithmetic Instructions.....	2-9	2.4.5(C)	RCL – Rotate through Carry Left Byte or Word ..	2-23
2.3.1	Addition Instructions .....	2-10	2.4.5(D)	RCR – Rotate Through Carry Right Byte or Word .....	2-24
2.3.1(A)	ADD - Add .....	2-10	2.4.6	Byte Set on Condition .....	2-24
2.3.1(B)	ADC - Add with Carry .....	2-10	2.4.6(A)	SETcc (SET Byte on Conditional Code) .....	2-24
2.3.1(C)	INC-Increment.....	2-10	2.4.7	TEST Instruction.....	2-25
2.3.1(D)	AAA – ASCII Adjust After Addition .....	2-10	2.4.7(A)	TEST - Test Byte or Word or Double Word.....	2-25
2.3.1(E)	DAA – Decimal Adjustment for Addition.....	2-11	2.5	Control Transfer Instructions.....	2-25
2.3.2	Subtraction.....	2-11	2.5.1	Unconditional Transfers.....	2-27
2.3.2(A)	SUB – Subtract Instructions .....	2-11	2.5.1(A)	CALL-Call a Procedure C.....	2-27
2.3.2(B)	SBB - Subtract with Borrow .....	2-12	2.5.1(B)	RET – Return from Procedure .....	2-27
2.3.2(C)	DEC-Decrement.....	2-12	2.5.1(C)	JMP – Jump .....	2-28
2.3.2(D)	AAS – ASCII adjust for subtraction .....	2-12	2.5.1(D)	IRET / IRETD - Interrupt Return.....	2-29
2.3.2(E)	DAS – Decimal Adjust for Subtraction .....	2-13	2.5.2	Conditional Transfers.....	2-30
2.3.3	Multiplication Instructions.....	2-13	2.5.3	Iteration Control Instructions.....	2-31
2.3.3(A)	MUL-Multiply byte or word Unsigned .....	2-13	2.5.3(A)	LOOP.....	2-31
2.3.3(B)	IMUL – Multiply Byte or Word Signed .....	2-13	2.5.3(B)	LOOPZ/LOOPE – Loop if Zero / Equal.....	2-31
2.3.3(C)	AAM – Integer multiply byte or word ASCII adjust for multiply.....	2-14	2.5.3(C)	LOOPNZ/LOOPNE – Loop if Not Zero /Not Equal .....	2-32
2.3.4	Division .....	2-14	2.5.4	Interrupts.....	2-32
2.3.4(A)	DIV - Divide Byte or Word or Double Word Unsigned .....	2-14	2.5.4(A)	INT – Interrupt.....	2-32
2.3.4(B)	IDIV - Integer Divide Byte or Word or Double Word .....	2-14	2.5.4(B)	INTO – Interrupt if Overflow.....	2-33
2.3.4(C)	AAD – ASCII adjust for division.....	2-15	2.5.4(C)	BOUND - Check Array Index Against Bounds Against Bound.....	2-33
2.3.4(D)	Difference between DIV and IDIV .....	2-15	2.6	String and Character Transfer Instructions.....	2-33
2.4	Logical Instructions.....	2-15	2.6.1	MOVS.....	2-35
2.4.1	Boolean Operation Instruction.....	2-16	2.6.2	CMPS .....	2-35
2.4.1(A)	NOT – Not byte or word.....	2-16	2.6.3	SCAS.....	2-36
2.4.1(B)	AND – Logical AND.....	2-16	2.6.4	LODS.....	2-36
2.4.1(C)	OR – Inclusive or Byte or Word.....	2-17	2.6.5	STOS.....	2-37
2.4.1(D)	XOR – Exclusive or Byte or Word.....	2-17	2.6.6	REP/REPE/REPNE/REPZ (Prefix) .....	2-37
2.4.2	Bit Test and Modify Instructions .....	2-17	2.7	Instructions for Block Structured Languages.....	2-38
2.4.2(A)	BT (Bit Test) .....	2-17	2.7.1	HLT - Halt Until Interrupt or Reset .....	2-38
2.4.2(B)	BTS (Bit Test and Set) .....	2-17	2.7.2	LOCK - Prefix .....	2-38
2.4.2(C)	BTR (Bit Test and Reset) .....	2-18	2.7.3	ENTER - ENTER a Procedure .....	2-38
2.4.2(D)	BTC (Bit Test and Complement).....	2-18	2.7.4	LEAVE.....	2-39
2.4.3	Bit Scan Instructions.....	2-18	2.8	Flag Control Instructions.....	2-40
2.4.3(A)	BSF (Bit Scan Forward).....	2-18	2.8.1	Carry and Direction Flag Control Instructions.....	2-40
2.4.3(B)	BSR (Bit Scan Reverse).....	2-19	2.8.1(A)	CLC – Clear Carry Flag .....	2-40
2.4.4	Shift Instructions.....	2-19	2.8.1(B)	STC – Set Carry Flag.....	2-40
2.4.4(A)	SHL/SAL – Shift Logical/Arithmetic Left Byte or Word.....	2-20	2.8.1(C)	CMC – Complement Carry Flag.....	2-40
2.4.4(B)	SHR – Shift logical right byte or word.....	2-20	2.8.1(D)	CLD – Clear Direction Flag.....	2-40
2.4.4(C)	SAR – Shift arithmetic right byte or Word.....	2-21	2.8.1(E)	STD – Set Direction Flag .....	2-40
2.4.4(D)	SHLD (Shift Left Double Precision) .....	2-21	2.8.1(F)	CLI – Clear Interrupt Enable Flag.....	2-41
2.4.4(E)	SHRD (Shift Right Double Precision).....	2-22	2.8.1(G)	STI – Set Interrupt Enable Flag .....	2-41
2.4.5	Rotate.....	2-23	2.9	Co-processor Interface Instructions.....	2-41
2.4.5(A)	ROL – Rotate Left Byte or Word .....	2-23			



2.9.1	WAIT – Wait for TEST Pin Active .....	2-41	3.9	Debug Exceptions .....	3-7
2.9.2	ESC – Prefix .....	2-41	3.10	Breakpoint Exception .....	3-7
2.10	Segment Register Instructions .....	2-42	3.11	I/O Addressing.....	3-7
2.10.1	LES - Load pointer using ES .....	2-42	3.11.1	I/O Address Space .....	3-7
2.10.2	LDS : Load pointer with DS .....	2-42	3.11.2	Memory-Mapped I/O .....	3-8
2.10.3	LFS : Load Pointer with FS.....	2-43	3.11.3	Difference between Memory Mapped I/O and I/O Mapped I/O .....	3-8
2.10.4	LGS - Load Pointer using GS.....	2-43	3.12	I/O Instructions .....	3-8
2.11	Miscellaneous Instructions.....	2-43	3.12.1	Register I/O Instructions .....	3-8
2.11.1	LEA : Load Effective Address.....	2-43	3.12.2	Block I/O Instructions .....	3-9
2.11.2	NOP .....	2-44	3.13	Protection and I/O.....	3-9
2.11.3	XLAT : Translate or Replace Byte.....	2-44	3.13.1	I/O Privilege Level.....	3-10
2.12	Assembler Directives .....	2-45	3.13.2	I/O Permission Bit Map .....	3-10
2.13	Introduction to Procedures and Macros.....	2-47	3.14	80386DX Signal Diagram and Description of Signals .....	3-11
2.14	Programs .....	2-48	3.14.1	Memory I/O Interface Signals.....	3-12
2.15	Parameter Passing.....	2-61	3.14.1(A)	Data Bus.....	3-12
2.15.1	Passing Parameters to and from Procedures.....	2-64	3.14.1(B)	Address Bus.....	3-12
2.15.2	Re-entrant and Recursive Procedures.....	2-66	3.14.1(C)	Bus Enable Signals ( BE3 - BE0 ).....	3-12
2.15.2 (A)	Re-entrant Procedure .....	2-66	3.14.1(D)	Bus Status Signals .....	3-12
2.15.2 (B)	Recursive Procedure .....	2-66	3.14.1(E)	Bus Control Signals .....	3-13
2.16	Macros .....	2-66	3.14.2	Interrupt Interface Signals (INTR) .....	3-13
2.16.1	Comparison of Procedure and Macro .....	2-67	3.14.3	DMA Interface Signals.....	3-13
2.17	Exam Pack (Review and University Questions) .....	2-67	3.14.4	Coprocessor Interface Signals .....	3-14
<b>UNIT II</b>			3.15	80386 System Clock .....	3-15
<b>Chapter 3 : Initialization and Bus Cycles 3-1 to 3-29</b>			3.16	Bus Cycle and Bus States .....	3-15
3.1	Processor State After Reset.....	3-1	3.17	80386DX Bus Cycles.....	3-16
3.2	Software Initialization for Real Address Mode ...	3-2	3.18	Pipelined and Non-pipelined Bus Cycles.....	3-18
3.2.1	Stack .....	3-2	3.18.1	Non Pipelined Read Bus Cycle.....	3-18
3.2.2	Interrupt Table.....	3-2	3.18.2	Non Pipelined Write Bus Cycle .....	3-19
3.2.3	First Instructions.....	3-2	3.18.3	Pipelined Read and Write Bus Cycles .....	3-20
3.3	Switching to Protected Mode .....	3-2	3.19	Idle State.....	3-22
3.4	Software Initialization for Protected Mode.....	3-3	3.20	Wait State Cycle .....	3-23
3.4.1	Interrupt Descriptor Table (IDT) .....	3-3	3.21	Interrupt Acknowledge Bus Cycle .....	3-24
3.4.2	Stack .....	3-3	3.22	Halt/Shutdown Cycle .....	3-24
3.4.3	Global Descriptor Table (GDT).....	3-3	3.23	Control Input BS16 and NA .....	3-25
3.4.4	Page Tables .....	3-3	3.24	Aligned and Misaligned Data Transfers.....	3-25
3.4.5	First Task.....	3-3	3.25	Exam Pack (Review and University Questions).....	3-27
3.4.6	Returning Back to Real Mode.....	3-4	<b>Chapter 4 : Systems Architecture 4-1 to 4-13</b>		
3.5	Initialization Example.....	3-4	4.1	Memory Management Registers.....	4-1
3.6	TLB Testing.....	3-5	4.2	Control Registers.....	4-1
3.6.1	Use of TLB Testing.....	3-5	4.3	Debug Registers.....	4-2
3.6.2	TLB Testing.....	3-6	4.4	Test Registers .....	4-3
3.6.3	Demand Paging .....	3-6	4.5	Systems Instructions .....	4-4
3.7	Debugging Features of Architecture.....	3-6			
3.8	Debug and Test Registers.....	3-7			



4.5.1	Verification of Pointer Parameters .....	4-4
4.5.1(A)	ARPL - Adjust RPL Field of Selector.....	4-4
4.5.1(B)	LAR - Load Access Rights .....	4-5
4.5.1(C)	LSL- Load Segment Limit.....	4-6
4.5.1(D)	VERR - Verify for Reading and VERW-Verify for Writing .....	4-7
4.5.2	Addressing Descriptor Tables.....	4-8
4.5.2(A)	LLDT - Load LDT Register.....	4-8
4.5.2(B)	SLDT - Store LDT Register .....	4-8
4.5.2(C)	LGDT-Load GDT Register .....	4-9
4.5.2(D)	SGDT-Store GDT Register.....	4-9
4.5.3	Co-processing and Multiprocessing Instructions...4-10	
4.5.3(A)	CLTS-Clear Task-Switched Flag in CR0 .....	4-10
4.5.3(B)	ESC-Escape instructions .....	4-10
4.5.3(C)	WAIT-Wait until Coprocessor not Busy .....	4-10
4.5.3(D)	LOCK-Assert Bus-Lock Signal.....	4-10
4.5.4	Multitasking Instructions .....	4-10
4.5.4(A)	LTR-Load Task Register.....	4-10
4.5.4(B)	STR-Store Task Register .....	4-11
4.5.5	Input and Output Instructions .....	4-11
4.5.5(A)	IN-Input.....	4-11
4.5.5(B)	OUT-Output.....	4-11
4.5.5(C)	INS - Input String.....	4-11
4.5.5(D)	OUTS - Output String.....	4-11
4.5.6	Interrupt Control Instructions.....	4-11
4.5.6(A)	CLI - Clear Interrupt-Enable Flag .....	4-11
4.5.6(B)	STI - Set Interrupt-Enable Flag.....	4-11
4.5.6(C)	LIDT - Load IDT Register.....	4-11
4.5.6(D)	SIDT-Store IDT Register.....	4-11
4.5.7	Debugging.....	4-11
4.5.7(A)	MOV - Move to and from debug registers .....	4-11
4.5.8	TLB Testing Instructions .....	4-11
4.5.8(A)	MOV-Move to and from Test Registers.....	4-11
4.5.9	System Control Instructions .....	4-12
4.5.9(A)	SMSW - Set MSW .....	4-12
4.5.9(B)	LMSW-Load MSW.....	4-12
4.5.9(C)	HLT - Halt Processor.....	4-12
4.5.9(D)	MOV - Move to and from control registers .....	4-12
4.6	Exam Pack (Review and University Questions).....	4-12
➤	<b>Model Question Paper (In Sem.) .....</b>	<b>Q. 1</b>

**UNIT III****Chapter 5 : Memory Management 5-1 to 5-16**

5.1	Flags Register.....	5-1
5.2	Memory Management in 80386.....	5-2
5.2.1	Segmentation in Protection Mode (Logical to Linear Address Translation).....	5-3

5.2.2	Implementation of Paging in Protected Mode (Linear to Physical Address Translation) .....	5-3
5.2.3	Selector .....	5-5
5.2.4	Program Invisible Registers .....	5-5
5.2.5	Descriptor Register Format.....	5-6
5.3	Accessing Global Memory Location .....	5-7
5.4	Accessing Local Memory Location.....	5-8
5.5	Types of Segment Descriptors.....	5-9
5.6	System Segment Descriptors.....	5-10
5.6.1	LDT Descriptors.....	5-10
5.6.2	Gate Descriptors .....	5-10
5.6.3	TSS Descriptors (S = 0, Type 1, 3, 9 and B) .....	5-11
5.6.4	Descriptor Cache .....	5-12
5.7	Difference between Segmentation and Paging.....	5-13
5.8	Combining Segment and Page Translation.....	5-13
5.8.1	“Flat” Architecture.....	5-14
5.8.2	Segments Spanning Several Pages .....	5-14
5.8.3	Pages Scanning Several Segments .....	5-14
5.8.4	Non-aligned Page and Segment Boundaries .....	5-15
5.8.5	Aligned Page and Segment Boundaries .....	5-15
5.8.6	Page Table Per Segment.....	5-15
5.9	Exam Pack (Review and University Questions).....	5-15

**UNIT IV****Chapter 6 : Protection 6-1 to 6-14**

6.1	Need of Protection.....	6-1
6.2	Overview of 80386 Protection Mechanisms .....	6-1
6.3	Segment-Level Protection .....	6-1
6.3.1	Descriptor Protection Parameters .....	6-2
6.3.2	Type Checking.....	6-2
6.3.3	Limit Checking.....	6-3
6.3.4	Privilege Levels.....	6-4
6.3.4(A)	Privilege Check Access to Data.....	6-6
6.3.4(B)	Privilege Check Access Code Segments.....	6-7
6.3.5	Restricting Control Transfers .....	6-7
6.3.6	Gate Descriptors Guard Procedure Entry Points.....	6-8
6.3.7	Privileged Instructions.....	6-11
6.3.8	I/O Sensitive Instructions.....	6-11
6.3.9	Descriptor Validation.....	6-11
6.3.10	Stack Switching.....	6-11
6.4	Page-Level Protection.....	6-12
6.4.1	Page-Table Entries Hold Protection Parameters .....	6-12
6.4.2	Type Checking .....	6-12



6.4.3	Combining Protection of Both Levels of Page Tables .....	6-13
6.4.4	Overrides to Page Protection .....	6-13
6.5	Exam Pack (Review and University Questions) .....	6-13

### UNIT V

#### Chapter 7 : Multitasking 7-1 to 7-9

7.1	Introduction.....	7-1
7.2	Task State Segment .....	7-1
7.3	TSS Descriptor .....	7-2
7.4	Task Register.....	7-3
7.5	Task Gate Descriptor .....	7-4
7.6	Task Switching.....	7-5
7.7	Task Linking for Nested Task.....	7-6
7.7.1	Busy Bit.....	7-6
7.8	Task Address Space.....	7-6
7.8.1	Task Linear-to-Physical Space Mapping.....	7-7
7.8.2	Task Logical Address Space .....	7-8
7.9	Exam Pack (Review and University Questions).....	7-8

#### Chapter 8 : Virtual 8086 Mode 8-1 to 8-8

8.1	Introduction to Executing 8086 Code.....	8-1
8.1.1	Advantages of VM86 Mode.....	8-1
8.2	Virtual Mode Programmer's Model (Registers Available).....	8-2
8.3	Address Generation in Virtual Mode .....	8-3
8.4	Structure of V86 Task .....	8-3
8.5	Using Paging for V86 Task.....	8-4
8.6	Handling Interrupts and Exceptions in Virtual 86 Mode .....	8-4
8.6.1	8086 ISR .....	8-5
8.6.2	Protected Mode ISR.....	8-5
8.7	Entering Virtual 86 Mode.....	8-6
8.8	Leaving V86 Mode .....	8-6
8.9	Comparison of Real Mode, Virtual Mode and Protected Modes of 80386DX.....	8-7
8.10	Exam Pack (Review and University Questions).....	8-7

### UNIT VI

#### Chapter 9 : Exceptions and Interrupts 9-1 to 9-16

9.1	Identifying Interrupts .....	9-1
9.2	Priority among Simultaneous Interrupts and Exceptions .....	9-2

9.3	Enabling and Disabling Interrupts .....	9-2
9.3.1	Processing an Interrupt.....	9-3
9.3.2	Interrupt Vector Table (IVT) for Real Mode Exception Handling.....	9-3
9.4	Exceptions and Processing.....	9-4
9.4.1	Difference between Interrupt, Fault, Trap and Abort.....	9-5
9.4.2	Exception Priorities .....	9-6
9.5	Handling Interrupts and Exceptions in Protected Mode.....	9-6
9.6	Returning from an Interrupt Procedure .....	9-7
9.7	Interrupt Task and Interrupt Procedure.....	9-7
9.8	Interrupt Descriptor Table (IDT) .....	9-8
9.9	IDT Descriptors.....	9-9
9.9.2	Interrupt Gates.....	9-10
9.9.3	Task Gates .....	9-10
9.9.4	Advantages of Task Gate Over Trap and Interrupt Gates.....	9-11
9.9.5	Disadvantages of using Task Gate .....	9-11
9.9.6	Difference between Interrupt Gate Descriptor and Trap Gate Descriptor.....	9-11
9.10	Difference between Real and Protected Mode Interrupts.....	9-12
9.11	Error Code and Exception Conditions .....	9-12
9.11.1	Details of all the Exception Conditions.....	9-12
9.12	Exam Pack (Review and University Questions).....	9-15

#### Chapter 10 : Introduction to Microcontrollers

**10-1 to 10-4**

10.1	Introduction to Microcontroller .....	10-1
10.1.1	Microprocessor .....	10-1
10.1.2	Microcontroller.....	10-1
10.1.3	Comparison of Microprocessors and Microcontrollers.....	10-1
10.1.4	Advantages of Microcontrollers over Microprocessors.....	10-2
10.2	Features of 8051 Microcontroller.....	10-2
10.2.1	Comparison of MCS48 and MCS51 Microcontroller Family .....	10-3
10.3	Applications of Microcontrollers.....	10-3
10.4	Exam Pack (Review Questions) .....	10-4

➤ **Lab Manual .....** L-1 to L-17

➤ **Model Question Paper (End Sem.) .....** Q. 1 to Q. 2

