School of Technology, Pandit Deendayal Energy University, Gandhinagar

Course File (A to Z Essentials)

Name of the Course:	Microprocessor Programming & Interfacing
Course Code:	20CP202T
Program:	B.Tech./~~M.Tech./Ph.D./Any other~~
Department	Computer Engineering
Semester:	III
Academic Year:	2023-24
Name of Course Coordinator:	Dr. Tanmay Bhowmik
Names of the Other Faculty Members:	Prof. Kiran Parmar

A.	Course Syllabus, Prerequisites for the Course, Teaching Scheme, List of Books and Reference Books, etc.
B.	Lesson Plan (Hour-to-Hour Plan)
C.	Academic Calendar, Course Timetable, Faculty Timetable
D.	Course Outcomes (COs)
E.	Mapping of Course Outcomes with Programme Outcomes (POs)
F.	Evaluation Scheme and Rubrics
G.	Class Notes, Handouts, Course Material, etc.
H.	Course Presentations (PPTs) – If Applicable
I.	Tutorials, Assignments, Case Studies, Quiz, etc.
J.	Course-related ICT: Web links, Software, E-books, Relevant NPTEL and MOOC, Video Lectures, Blogs, Virtual labs, Animation, Simulation, etc.
K.	Laboratory Manuals – If Applicable
L.	List of International / National Journals related to the Course – If Applicable
M.	List of well-known Conferences related to the Course – If Applicable
N.	List of Classic Journal Papers / Articles / Review Papers related to the Course – If Applicable
O.	List of Renowned Industries / Organizations / working in the Course related areas
P.	List of Renowned Scientists / Academicians working in the Course related areas
Q.	Copies of the Mid and End Semester Examination Question Papers and Sample Answer Sheets
R.	Attendance Record
S.	Records of the Continuous Assessment (Assignment, Quiz, Laboratory Work, etc.)
T.	Details of Remedial Classes (with evidences)
U.	Details of Expert Lectures / Industrial Visits/Events (Only related to the Course)
V.	List of Slow and Advanced Learners, activity planned and executed
W.	Direct Assessment (Result of mid, end and internal assessment components)
X.	Indirect Assessment (Exit Survey/Post Test)
Y.	Final Attainment of COs and POs and Interpretation
Z.	Actions to be taken if COs and POs are not achieved

Date:

Signature of Subject Teachers **Signature of Department Coordinator (IQAC)** **Signature of Head of the Department**

20CP202T					Microprocessor Programming & Interfacing					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- To impart the basic concepts of microprocessor
- To be familiar with writing assembly language programs
- To understand and implement concepts about interfacing
- To apply the concepts for interfacing different peripherals like keyboard, display, etc.
- Compare different advanced processors.

UNIT 1 8086 ARCHITECTURE **6 Hrs.**

Block diagram of 8086 Architecture, Pins and Signals, Instruction set.

UNIT 2 ASSEMBLY PROGRAMMING **7 Hrs.**

Programs on subroutines, Memory interfacing and programming peripheral interfacing, I/O interfacing and timer, programmable interrupt controller.

UNIT 3 INTERFACING AND ADVANCED MICROPROCESSORS **7 Hrs.**

DMA, USART, Introduction to Advanced Microprocessors Block diagram of 80286,386,486

UNIT 4 MICROCONTROLLER AND MULTI-CORE PROCESSORS **6 Hrs.**

Introduction to Microcontroller 8051, Introduction to Multi-core processors like NVIDIA.

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1. Describe the various features of microprocessor.
CO2. Explain various elements of 8086 microprocessor architecture.
Co3. Select required instructions by considering the addressing modes.
CO4. Analyse different concepts of programmable interfacing with microprocessor.
CO5. Compare different features of advance microprocessors.
CO6. Use assembly language to program 8086 for Interfacing.

TEXT/REFERENCE BOOKS

1. Ramesh S. Gaonkar Pub: Microprocessor Architecture, Programming, and Applications with the 8085, Penram International.
2. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, Microprocessors and Interfacing, Oxford
3. Daniel Tabak, Advanced Microprocessors, McGrawHill
4. Douglas Hall, Microprocessor & Interfacing, TMH
5. K.R.Venugopal, Microprocessor x86 programming, BPB

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Lesson Plan

Lecture No.	Topic to be covered	Teaching Aid to be used	Remarks (Text book/Unit No etc.)
1	Block diagram of 8086 Architecture	BW + PPT	Unit 1
2	Block diagram of 8086 Architecture	BW + PPT	Unit 1
3	Pins and Signals	BW + PPT	Unit 1
4	Pins and Signals	BW + PPT	Unit 1
5	Instruction set	BW + PPT	Unit 1
6	Instruction set	BW + PPT	Unit 1
7	Addressing Modes	BW + PPT	Unit 1
8	Programs on subroutines	BW + PPT	Unit 2
9	Programs on subroutines	BW + PPT	Unit 2
10	Memory interfacing	BW + PPT	Unit 2
11	Memory interfacing	BW + PPT	Unit 2
12	Programming peripheral interfacing	BW + PPT	Unit 2
13	Programming peripheral interfacing	BW + PPT	Unit 2
14	I/O interfacing and timer	BW + PPT	Unit 2
15	Programmable interrupt controller	BW + PPT	Unit 3
16	Discussion on DMA	BW + PPT	Unit 3
17	USART	BW + PPT	Unit 3
18	Introduction to Advanced Microprocessors	BW + PPT	Unit 3
19	Block diagram of 80286, 386, 486	BW + PPT	Unit 4
20	Case studies on 80286	BW + PPT	Unit 4
21	Case studies on 80386	BW + PPT	Unit 4
22	Case studies on 80486	BW + PPT	Unit 4
23	Introduction to Microcontroller 8051	BW + PPT	Unit 4
24	Introduction to Multi-core processors like NVIDIA	BW + PPT	Unit 4

Class Time-Table

School of Technology
B.Tech - Computer Engineering
Semester : 3 (1)

Autumn Semester 2023 — w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday			G1G2 (20CP202T) F-503, TABH-L	G1G2 (20CP201T) F-503, ADSH-L	G (OE1) E201, NFC1-L		G2 (20CP202P) F-103, TABH-P		G1G2 (23CP201T) F-503, NSC-L	G1G2 (20MA206T) F-503, KSP-L	
							G1 (23CP201T) E215, NSC-P				
Tuesday		G2 (20CP201P) F-103, ADSH-P			G (OE1) E201, NFC1-L			G1G2 (20CP201T) F-503, ADSH-L	G1G2 (20CP202T) F-503, TABH-L	G1G2 (20MA206T) F-504, KSP-L	
		G1 (20CP202P) F-104, TABH-P									
Wednesday	G1G2 (23MSCPM201T) F-503, PUJ-T	G1G2 (23CP201T) F-503, NSC-T	G1G2 (20CP201T) F-503, ADSH-L	G1G2 (20CP203T) F-503, SMP-L	G (OE1) E201, NFC1-L		G2 (23CP201T) E213, NSC-P		G1G2 (23CP201T) F-503, NSC-L	G1G2 (20MA206T) F-503, KSP-L	
							G1 (20CP201P) F-103, ADSH-P				
Thursday	G1G2 (23MSCPM201T) F-503, PUJ-T	G1G2 (20CP203T) F-503, SMP-L	G1G2 (20MA206T) F-503, KSP-L		G (OE1) E201, NFC1-L						
Friday	G1G2 (23MSCPM201T) F-503, PUJ-T	G2 (20CP203P) F-202, ADSH-P		G1G2 (20CP203T) F-503, SMP-L	G (OE1) E201, NFC1-L						
		G1 (20CP203P) F-104, SMP-P									

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (2)

Autumn Semester 2023 — w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G4 (23CP201T) E216, YOKU-P			G (OE1) E201, NFC1-L		G3G4 (20CP201T) F-402, ADSH-L	G3G4 (20MA206T) F-402, KSP-L	G4 (20CP201P) F-103, KPS-P		
		G3 (20CP201P) F-103, ADSH-P							G3 (20CP202P) F-202, TABH-P		
Tuesday		G4 (20CP203P) F-202, KBT-P			G (OE1) E201, NFC1-L						
		G3 (23CP201T) E215, YOKU-P									
Wednesday		G3G4 (20CP203T) F-402, SMP-L	G3G4 (20MA206T) F-402, KSP-L	G3G4 (23CP201T) F-402, YOKU-L	G1G2 (OE1) E201, NFC1-L		G3G4 (20CP202T) F-402, TABH-L	G3G4 (20CP203T) F-402, SMP-L			
Thursday		G3G4 (20MA206T) F-402, KSP-T	G3G4 (20CP203T) F-402, SMP-L	G3G4 (20CP201T) F-402, ADSH-L	G1G2 (OE1) E201, NFC1-L		G4 (20CP202P) F-104, TABH-P		G3G4 (23CP201T) F-503, YOKU-L	G3G4 (20CP202T) F-402, TABH-L	
							G3 (20CP203P) F-202, ADSH-P				
Friday		G3G4 (23CP201T) F-402, YOKU-L	G3G4 (20MA206T) F-402, KSP-L	G3G4 (20CP201T) F-402, ADSH-L	G1G2 (OE1) E201, NFC1-L						

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (3)

Autumn Semester 2023 — w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G5G6 (20CP202T) F-403, KRPR-L	G5G6 (23CP201T) F-403, NSC-L	G5G6 (20CP201T) F-403, KPS-L	G (OE1) E201, NFC1-L		G5G6 (20MA206T) F-403, KSP-L	G5G6 (20CP203T) F-403, VIMI-L			
Tuesday		G5G6 (20MA206T) F-403, KSP-L	G5G6 (23CP201T) F-403, NSC-L	G5G6 (23CP201T) F-403, NSC-L	G (OE1) E201, NFC1-L						
Wednesday		G5G6 (20CP202T) E204, KRPR-L	G5G6 (20CP201T) E204, KPS-L		G (OE1) E201, NFC1-L		G5G6 (20MA206T) F-403, KSP-L	G5G6 (20CP203T) F-403, VIMI-L	G5 (20CP203P) F-203, VIMI-P		
									G6 (20CP202P) E215, TABH-P		
Thursday		G5 (20CP202P) F-104, TABH-P			G (OE1) E201, NFC1-L			G5G6 (20CP203T) F-403, VIMI-L	G6 (20CP203P) E216, VIMI-P		
		G6 (20CP201P) F-103, KPS-P							G5 (23CP201T) E215, NSC-P		
Friday		G6 (23CP201T) E215, NSC-P		G5G6 (20MA206T) F-403, KSP-T	G (OE1) E201, NFC1-L		G5G6 (20CP201T) D008, KPS-L				
		G5 (20CP201P) F-103, KPS-P									

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (4)

Autumn Semester 2023 w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G8 (20CP202P) E213, HITH-P		G7G8 (20CP202T) F-402, KRPR-L	G (OE1) E201, NFC1-L		G7 (23CP201T) F-202, YOKU-P				
		G7 (20CP201P) F-104, KPS-P					G8 (20CP203P) E216, KBT-P				
Tuesday					G (OE1) E201, NFC1-L			G7G8 (23CP201T) F-403, YOKU-L	G7 (20CP203P) E216, KBT-P		
									G8 (23CP201T) F-203, NSC-P		
Wednesday					G (OE1) E201, NFC1-L		G7G8 (20MA206T) F-404, ARA-T	G7G8 (20CP201T) F-404, SHM-L	G7G8 (23CP201T) F-404, YOKU-L	G7G8 (20CP203T) F-404, KBT-L	
Thursday		G7G8 (20CP203T) F-404, KBT-L	G7G8 (20CP201T) F-404, SHM-L	G7G8 (20MA206T) F-404, ARA-L	G (OE1) E201, NFC1-L		G7 (20CP202P) E213, HITH-P		G7G8 (20CP203T) F-403, KBT-L		
							G8 (20CP201P) F-103, SHM-P				
Friday		G7G8 (20CP202T) F-404, KRPR-L	G7G8 (20MA206T) F-404, ARA-L	G7G8 (20CP201T) F-404, SHM-L	G (OE1) E201, NFC1-L		G7G8 (23CP201T) F-404, YOKU-L	G7G8 (20MA206T) F-404, ARA-L			

School of Technology
B.Tech - Computer Engineering
Semester : 3 (5)

Autumn Semester 2023 w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G9 (20CP203P) F-202, RIMO-P			G (OE1) E201, NFC1-L		G9G10 (20MA206T) F-404, SONA-L	G9G10 (20CP203T) F-404, RIMO-L	G9G10 (23CP201T) F-403, DESW-L		
		G10 (23CP201T) E215, DESW-P									
Tuesday		G9G10 (20CP203T) F-503, RIMO-L	G9G10 (20MA206T) F-503, ARA-L		G (OE1) E201, NFC1-L		G10 (20CP203P) E216, HMGA-P		G9G10 (20MA206T) F-404, ARA-L	G9G10 (20CP202T) F-503, TABH-L	
							G9 (20CP202P) F-203, HITH-P				
Wednesday		G9G10 (20CP201T) F-404, SONA-L	G9G10 (20MA206T) F-404, ARA-L		G (OE1) E201, NFC1-L		G9 (20CP201P) F-104, SONA-P		G9G10 (20MA206T) F-403, ARA-T		
							G10 (20CP202P) F-203, HITH-P				
Thursday		G9G10 (20CP203T) F-504, RIMO-L	G9G10 (23CP201T) F-504, DESW-L	G9G10 (20CP201T) D002, SONA-L	G (OE1) E201, NFC1-L						
Friday		G9G10 (23CP201T) F-504, DESW-L	G9G10 (20CP202T) F-504, TABH-L		G (OE1) E201, NFC1-L		G9 (23CP201T) E215, DESW-P				
							G10 (20CP201P) F-104, SONA-P				

Pandit Deendayal Energy University
School of Technology
B.Tech - Computer Engineering
Semester : 3 (6)

Autumn Semester 2023 w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G11G12 (20MA206T) F-402, ARA-L	G11G12 (20MA206T) F-402, ARA-T		G (OE1) E201, NFC1-L		G11G12 (23CP201T) D010, DESW-L	G11G12 (23CP201T) D010, DESW-L	G11G12 (20CP201T) E203, SONA-L		
Tuesday		G12 (23CP201T) E213, DESW-P			G (OE1) E201, NFC1-L			G11G12 (20MA206T) F-402, ARA-L		G11G12 (20CP203T) F-403, HMGA-L	
		G11 (20CP201P) E216, KPS-P									
Wednesday		G11G12 (23CP201T) F-403, DESW-L	G11G12 (20CP202T) F-403, KRPR-L		G (OE1) E201, NFC1-L		G12 (20CP203P) E215, HMGA-P		G11G12 (20CP201T) F-402, SONA-L	G11G12 (20MA206T) F-402, ARA-L	
							G11 (20CP203P) E216, KBT-P				
Thursday		G12 (20CP201P) E216, SONA-P			G (OE1) E201, NFC1-L		G11G12 (20CP203T) F-404, HMGA-L	G11G12 (20CP201T) F-404, SONA-L	G11 (20CP202P) E213, HITH-P		
Friday		G11G12 (20CP203T) F-403, HMGA-L	G11G12 (20CP202T) F-403, KRPR-L		G (OE1) E201, NFC1-L		G11 (23CP201T) E213, NSC-P				
							G12 (20CP202P) E216, HITH-P				

Faculty Time-Table

Dr. Tanmay Bhowmik – Div. 1, 2, 5
Prof. Kiran Parmar – Div 3, 4, 6

Tanmay Bhowmik
Computer Science &Engineering

Autumn Semester 2023 — w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday			G1G2 (20CP202T) F-503, CP(3) - L				G2 (20CP202P) F-103, CP(3) - P		G3 (20CP202P) F-202, CP(3) - P		
Tuesday		G1 (20CP202P) F-104, CP(3) - P							G1G2 (20CP202T) F-503, CP(3) - L	G9G10 (20CP202T) F-503, CP(3) - L	
Wednesday							G3G4 (20CP202T) F-402, CP(3) - L		G6 (20CP202P) E215, CP(3) - P		
Thursday		G5 (20CP202P) F-104, CP(3) - P					G4 (20CP202P) F-104, CP(3) - P			G3G4 (20CP202T) F-402, CP(3) - L	
Friday			G9G10 (20CP202T) F-504, CP(3) - L								

Location Abbr.	Location Name
E215	E, Data Struct. &Algo Lab
F-103	F, HPC LAB
F-104	F, Data Analytics Lab
F-202	F, AI-ML LAB
F-402	F, Lecture Hall
F-503	F, Lecture Hall
F-504	F, Lecture Hall

Subject Abbr.	Subject Name
20CP202P	Microprocessor Programming &Interfacing Lab
20CP202T	Microprocessor Programming &Interfacing

Office Hours (Tanmay Bhowmik): Tuesday (11:00 am – 12:00 pm) [Students are requested to put a prior mail]

Kiran Parmer (VF)
Computer Science &Engineering

Autumn Semester 2023 — w.e.f : 24th July 2023

Day	08:00-09:00	09:00-10:00	10:00-11:00	11:00-12:00	12:00-13:00	13:00-14:00	14:00-15:00	15:00-16:00	16:00-17:00	17:00-18:00	18:00-19:00
Monday		G5G6 (20CP202T) F-403, CP(3) - L		G7G8 (20CP202T) F-402, CP(3) - L							
Tuesday											
Wednesday		G5G6 (20CP202T) E204, CP(3) - L	G11G12 (20CP202T) F-403, CP(3) - L								
Thursday											
Friday		G7G8 (20CP202T) F-404, CP(3) - L	G11G12 (20CP202T) F-403, CP(3) - L								

Location Abbr.	Location Name
E204	E, Lecture Hall
F-402	F, Lecture Hall
F-403	F, Lecture Hall
F-404	F, Lecture Hall

Subject Abbr.	Subject Name
20CP202T	Microprocessor Programming &Interfacing

Microprocessor Programming & Interfacing (20CP202T)

Course Outcomes:

On completion of the course, student will be able to
CO1. Describe the various features of microprocessor.
CO2. Explain various elements of 8086 microprocessor architecture.
CO3. Select required instructions by considering the addressing modes.
CO4. Analyse different concepts of programmable interfacing with microprocessor.
CO5. Compare different features of advance microprocessors.
CO6. Use assembly language to program 8086 for Interfacing.

Course Outcomes vs. PO/PSO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	**3**	2	1	1	-	-	-	1	1	-	-	1	-	-	-
2	3	3	1	1	-	-	-	1	1	-	-	1	-	-	-
3	1	1	**3**	2	-	-	-	1	2	-	-	1	-	-	-
4	1	3	1	2	-	-	-	2	2	-	-	1	-	-	-
5	1	-	**3**	-	-	**3**	-	-	1	-	-	1	-	-	-
6	1	1	3	3	2	-	-	1	1	-	-	1	3	-	-
	1.66	1.66	2	1.5	0.33	0.5	-	1	1.33	-	-	1	0.5	-	-

Evaluation Scheme and Rubrics

Course code: 20CP202T
Course name: Microprocessor Programming and Interface

CO Assessment Tools (Direct Assessment):
Various assessment tools used to evaluate CO's (Rubrics) and the frequency with which the assessment processes are carried out are listed below.

Assessment Method	Assessment Tool	Description	Marks	Mapping with CO	Contribution to CO's
Direct	Mid-sem	MCQ/Analytical/ design based questions on syllabus covered	50	CO1, CO2, CO3, CO4, CO5, CO6	It fractionally contributes to 50% weightage of Direct Assessment to CO attainment. (50/2)
Direct	Internal Assessment	MCQ based questions	25	CO1, CO2, CO3, CO4, CO5, CO6	It contributes to 100% weightage of Direct Assessment to CO attainment.
Direct	End-Sem Examination	**Topics to be covered:** Unit I, II, III, IV	100	CO1, CO2, CO3, CO4, CO5, CO6	It contributes to 50% weightage of Direct Assessment to CO attainment. (100/2)
					Total 100 Marks