



AY: 2024-25

Class:	SE	Semester:	III
Course Code:	CSC304	Course Name:	DIGITAL LOGIC & COMPUTER ARCHITECTURE

Name of Student:	SHRUTI GAUCHANDRA
Roll No. :	15
Assignment No.:	04
Title of Assignment:	Compare Hardwired & Microprogrammed Control Unit
Date of Submission:	
Date of Correction:	

Evaluation

Performance Indicator	Max. Marks	Marks Obtained
Completeness	5	4
Demonstrated Knowledge	3	3
Legibility	2	1
Total	10	8

Performance Indicator	Exceed Expectations (EE)	Meet Expectations (ME)	Below Expectations (BE)
Completeness	5	3-4	1-2
Demonstrated Knowledge	3	2	1
Legibility	2	1	0

Checked by

Name of Faculty : MS. KSHITIJ GHARAT
Signature : *Kshat*
Date : 11/10/24

Q1 Write a microprogram for the instruction
ADD R1, R2

→	T-State	Operation	Microinstructions.
	T1	PC \rightarrow MAR	PCout, MARin, Read, Clear, Set Cin, Add, Zin
	T2	M \rightarrow MBR	Zout, PCin, Wait. for memory fetch cycle
	T3	MBR \rightarrow IR	MBRout, IRin
	T4	R1 \rightarrow x	R1out, Xin, CLRC
	T5	R2 \rightarrow ALU	R2out, ADD, Zin
	T6	Z \rightarrow R1	Zout, R1in
	T7	Check for <u>intr</u>	Assumption enabled into pending CLR X, SET C, SPout, SUB, Zin
	T8	SP \leftarrow SP-1	Zout, SPin, MARin
	T9	PC \rightarrow MDR	PCout, MDRin, WRITE
	T10	MDR \rightarrow [SP]	Wait for memo access

T11	PC \leftarrow 15 Radder	PC _{in} 15 Radder out
-----	---------------------------	--------------------------------

Q2. Compare and contrast Hardwired control unit and microprogrammed control unit.

→ Control unit can be designed using two ways
 1. Hardwired Control Unit
 2. Microprogrammed Control Unit.

Aspect	Hardwired Control Unit	Microprogrammed Control Unit
1. Design	Built using fixed combinational logic circuits.	It uses a microprogram stored in a control memory.
2. Control Signal generation	Directly generated by hardware circuits	Generated by fetching micro-instructions from control memory
3. Speed	Faster, as signals are directly produced by the hardware	Slower, as each instruction involves memory fetch cycles
4. Flexibility	Less flexible: hard to modify or update instruction sets	More flexible: instruction set can be easily modified

Aspect	Hardwired Control Unit	Microprogrammed Control Unit
5. Complexity	Complex design; difficult to implement for large instruction sets.	Simpler design; easier to handle larger instruction sets.
6. Cost	Higher initial design cost due to complex hardware design	Lower initial cost, but requires additional memory
7. Performance	High performance, suitable for systems needing speed.	Moderate performance, better suited for systems needing versatility.
8. Modification	Difficult Requires redesign of hardware circuits.	Easier Changes can be made by updating microinstructions.