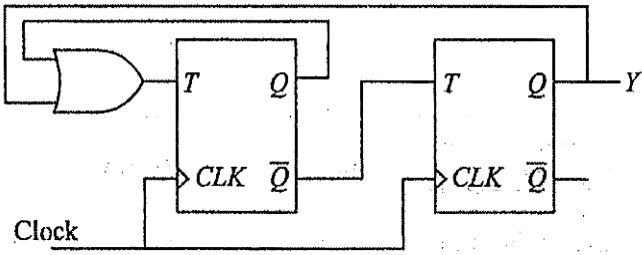


B. ELECTRICAL ENGINEERING 2ND YEAR 2ND SEMESTER EXAMINATION, 2019

Subject: SEQUENTIAL SYSTEMS & MICROPROCESSORS Time: Three Hours Full Marks: 100

Use a separate Answer-script for each PartPart I (50 marks)Question 1 is compulsoryAnswer Any Two questions from the rest (2×20)

Question No.		Marks
Q1	Answer <i>any Two</i> of the following:	
(a)	A $J\bar{K}$ flip-flop is constructed by using an inverter to the 'K' input. If both the inputs of the $J\bar{K}$ flip-flop are tied together to form a single input, it becomes an 'X' flip-flop. What is 'X'? Justify your conclusion.	5
(b)	What is the basic difference between PROM and PAL? Which is called a universal logic solution and why?	5
(c)	Explain using an example the concept of equivalent states in a state diagram.	5
(d)	Derive JK flip-flop from a T flip-flop.	5
Q2	(a) What is triggering of flip-flops? What are the different types of triggering used? Which triggering is the most advantageous and why?	2+2+2
	(b) Explain the operation of a Universal Register using proper diagram.	6
	(c) A 4-bit number 1101 is entered into a Shift-right register realized using D flip-flops in the least significant bit first fashion. Using proper circuit diagram explain the operation of the register. Assume all flip-flops are initially reset.	8
Q3	(a) Find the outputs of each flip-flop for every clock pulse for at least 6 clock pulses. Assume that both the flip-flops are initially reset.	
		8
	(b) Draw an ASM Chart (Moore Model) that operates a Garage Door Opener. When the input (X) is 1, the output (Z) is 1 and the door opens if it was close or remains open if it was open. When the input is 0, the output is 0 and the door closes if it was open or remains closed if it was close.	5

[Turn over

- (c) Design a synchronous counter using T flip-flops that counts from 0 to 7 in binary. 7
- Q4 (a) Differentiate between Sequential logic circuit and Combinational logic circuit. 2
- (b) Derive the characteristic equations for:
- i) S-R flip-flop 6
 - ii) J-K flip-flop.
- (c) A sequential circuit has one input and one output. When the input sequence '110' occurs for the first time the output becomes 1 and remains 1 until the sequence '110' occurs again in which case the output returns to 0. The output remains 0 until '110' occurs for a third time and consequently the output becomes 1 and this operation continues. Assume that Reset is applied to the direct reset inputs on its flip-flops to initialize the state of the circuit to all zeros. Draw the state diagram and the state transition table. Derive the expressions (circuit diagram NOT needed) for the output and flip-flop inputs using only D flip-flops following Mealy Model. 12
- Q5 (a) Draw a simplified diagram of a PROM with the address bits designated as A , B , C such that the following Boolean functions are generated: 8
- $$Y_0=AB, \quad Y_1=B, \quad Y_2=\bar{A}\bar{B}, \quad Y_3=A\bar{C}$$
- (b) Show that a PLA can be used to recognize each of the 10 decimal digits in binary format to drive a 7-segment display. 8
- (c) Using proper diagrams explain SRAM cell and DRAM cell. 4

B.E. ELECTRICAL ENGINEERING SECOND YEAR SECOND SEMESTER - 2019**SEQUENTIAL SYSTEM AND MICROPROCESSORS**

Time: Three hours

(50 marks for each Part)

Full Marks: 100

Use a separate Answer-Script for each Part

PART- II**Group:-A****Answer any four questions:****4X5=20**

- 1) Explain the requirement of a program counter, stack pointer and status flags in the architecture of 8085 microprocessor.
- 2) Draw the timing diagram of opcode fetch, memory read and write cycles.
- 3) Explain the difference in operation of HOLD and HALT states.
- 4) Why unidirectional latch is used when address/data bus signals are multiplexed.
- 5) What is the function of S_0 & S_1 .
- 6) Explain different between JMP and CALL instructions?
- 7) Explain the operation of RIM and SIM instructions.
- 8) State the difference between active vectored interrupts and INTR signals.

Group:-B**Answer any three questions:****3X5=15**

1. Write a programme to generate a square wave via I/O port with address 01H. The square wave can be started and stopped by pressing successively a push button connected to RST 7.5 vector interrupt pin of 8085 CPU.

[Turn over

2. Mention a single instruction of 8085 for each of the following operations:

- i. Set the carry flag
- ii. load the content of HL register pair into the program counter
- iii. compare the content of accumulator with 7AH
- iv. exchange the content of HL registers with the top of the stack
- v. go back to the main program after completing a subroutine

3. Draw diagram for interfacing RAM of size 2K and I/O with 8085 CPU at address 2000H and 4000H for same RAM and 17H and 07H for same I/O. Use partial memory and I/O address decoding method.

4. Explain the operation of RST n instruction for 8085 CPU. Also explain how ISR will be executed, when all vector interrupts RST 5.5, 6.5 and 7.5 requests signal will be applied at a time to respective pin of 8085 CPU.

5. Debug the following 8085 programme and correct it.

```
MVI C, 06H
MVI A, 00H
RPT: INR A
CPI 06H
JNC RPT
```

6. Specify and explain the number of times the following loops are executed.

a) MVI A, 17
Loop1: ORA A
RAL
JNC Loop1

b) LXI B, 1000H
Loop2: DCX B
NOP
JNZ loop2

c) Loop3: MVI D, 05h
NOP
DCR D
JNZ loop3

7. Draw diagram for interfacing 4X4 matrix keyboard with 8255 PPI. Also draw the flow chart detailing algorithm.

Group:-C

Answer any three questions:

3X5=15

1. To write a program to calculate the factorial of a number (between 0 to 8). Use subroutine calling method.
2. To write a program to convert an 8 bit binary data to BCD number.
3. To write a program to sort given 10 numbers in descending order. Also find count for repeated number in the unsorted list.
4. Write a program to perform multiplication of two 8 bit numbers using bit rotation method.
5. Write a program to find smallest number from an array of 16 elements the array is stored in memory from 2000H onwards. Store the result at memory location 2001H.