



UTM
UNIVERSITI
TEKNOLOGI MALAYSIA

Sekolah Pendidikan
Profesional dan
Pendidikan Berterusan
(SPACE)

**JABATAN KEJURUTERAAN ELEKTRIK
PUSAT PENGAJIAN DIPLOMA (PPD), SPACE
UNIVERSITI TEKNOLOGI MALAYSIA
KUALA LUMPUR**

DIGITAL ELECTRONICS LABORATORY

REPORT SHEET EXPERIMENT 3

| | |
|----------------------|----|
| Group members | 1. |
| | 2. |
| | 3. |
| | 4. |
| | 5. |
| Lecturer | : |
| Date | : |

| No. | PO | CO | Student Marks | Marks |
|--------------------|------|------|---------------|---------------|
| 1 | PLO1 | CLO3 | | 50% |
| 2 | PLO2 | CLO3 | | 30% |
| 3 | PLO4 | CLO3 | | 10% |
| 4 | PLO8 | CLO5 | | 10% |
| Total Marks | | | | / 100% |

EXPERIMENT 1 : EDGE TRIGGERED J-K FLIP-FLOP (IC 7476)

RESULT

Part A : Edge-triggered J-K flip flops (IC 7476)

Step 2(ii)

| | CP (Pulse Switch A or B) | J | K | Q | Q' | Operations |
|--------------------------|--------------------------|----------|----------|---|----|------------|
| CLR = 0 , PRE = 1 | | | | | | |
| 0 | x | x | x | | | |
| CLR = 1 , PRE = 1 | | | | | | |
| 1 | Press switch ↑ | 0 | 0 | | | |
| 2 | Hold | 0 | 0 | | | |
| 3 | Release switch ↓ | 0 | 0 | | | |
| CLR = 1 , PRE = 1 | | | | | | |
| 4 | Press switch ↑ | 0 | 1 | | | |
| 5 | Hold | 0 | 1 | | | |
| 6 | Release switch ↓ | 0 | 1 | | | |
| CLR = 1 , PRE = 1 | | | | | | |
| 9 | Press switch ↑ | 1 | 0 | | | |
| 10 | Hold | 1 | 0 | | | |
| 11 | Release switch ↓ | 1 | 0 | | | |

Table 5(a)

| | | | |
|--------------|-------------|-------|------------|
| PLO 1 | CLO3 | | /8m |
|--------------|-------------|-------|------------|

Step 3


















| CP  | J | K | Q | Q' | Operations |
|--|---|---|---|----|------------|
| PRE = 1 , CLR = 1 | | | | | |
|  | 0 | 0 | | | |
|  | 0 | 1 | | | |
|  | 1 | 0 | | | |
|  | 1 | 1 | | | |
| PRE = 0 , CLR = 1 | | | | | |
|  | 0 | 0 | | | |
|  | 0 | 1 | | | |
|  | 1 | 0 | | | |
|  | 1 | 1 | | | |
| PRE = 1 , CLR = 0 | | | | | |
|  | 0 | 0 | | | |
|  | 0 | 1 | | | |
|  | 1 | 0 | | | |
|  | 1 | 1 | | | |
| PRE = 0 , CLR = 0 | | | | | |
|  | 0 | 0 | | | |
|  | 0 | 1 | | | |
|  | 1 | 0 | | | |
|  | 1 | 1 | | | |

Table 5(b)

| | | | |
|------|------|-------|-----|
| PLO1 | CLO3 | | /8m |
|------|------|-------|-----|

Observation

Q1. From the observation made on Table 5(a), when can the data at input J and K be used to change the output state of the flip-flop?

.....

.....

.....

.....

.....

| | | | |
|------|------|-------|-----|
| PLO1 | CLO3 | | /5m |
|------|------|-------|-----|

Q2. Give a brief discussion on the observation made from the Table 5(b) of the edge triggered J-K flip-flop.

.....
.....
.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /5m |
|-------------|-------------|-------|------------|

Q3. What are the functions of PRE and CLR direct inputs in J-K flip-flop?

.....
.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /5m |
|-------------|-------------|-------|------------|

Q4. S'-R' flip-flop (in Part A) and J-K flip-flop (in Part E) are both 2-data input flip-flops. state 3 differences in operations between them?

.....
.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /3m |
|-------------|-------------|-------|------------|

EXPERIMENT 2 : ASYNCHRONOUS BINARY UP COUNTER AND 7493 BINARY COUNTER

RESULT

Part A : Asynchronous Binary Up Counter

Step 3: Observe the flip-flop outputs when the logic pulse button is pressed for the first time.

Q_D=..... Q_C=..... Q_B=....., Q_A=.....,

| | | | |
|-------------|-------------|-------|-----|
| PLO1 | CLO3 | | /2m |
|-------------|-------------|-------|-----|

Step 4: Observe the flip-flop output when the logic pulse button is pressed for the second time.

Q_D=..... Q_C=..... Q_B=....., Q_A=.....,

| | | | |
|-------------|-------------|-------|-----|
| PLO1 | CLO3 | | /2m |
|-------------|-------------|-------|-----|

Step 5: Using a wire/jumper connected to Ground (0V), touch the CLR pins for each flip-flop. What happens to:

Q_D=..... Q_C=..... Q_B=....., Q_A=.....,

| | | | |
|-------------|-------------|-------|-----|
| PLO1 | CLO3 | | /2m |
|-------------|-------------|-------|-----|

Step 6

| CP | Q _D | Q _C | Q _B | Q _A |
|----|----------------|----------------|----------------|----------------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |

Table 1

| | | | |
|-------------|-------------|-------|------|
| PLO1 | CLO3 | | /10m |
|-------------|-------------|-------|------|

Part B : 7493 Binary Counter.

Step 2: Press the pulse switch to the first flip-flop, State the observation.

$Q_D = \dots\dots\dots$ $Q_C = \dots\dots\dots$ $Q_B = \dots\dots\dots$, $Q_A = \dots\dots\dots$,

| | | | |
|-------------|-------------|-------|-----|
| PLO1 | CLO3 | | /2m |
|-------------|-------------|-------|-----|

Step 3: Connect R_{O1} and R_{O2} to Ground. State your observation.

$Q_D = \dots\dots\dots$ $Q_C = \dots\dots\dots$ $Q_B = \dots\dots\dots$, $Q_A = \dots\dots\dots$,

| | | | |
|-------------|-------------|-------|-----|
| PLO1 | CLO3 | | /2m |
|-------------|-------------|-------|-----|

Step 5

| CP | Q _D | Q _C | Q _B | Q _A |
|----|----------------|----------------|----------------|----------------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |

Table 2

| | | | |
|-------------|-------------|-------|------|
| PLO1 | CLO3 | | /10m |
|-------------|-------------|-------|------|

EXPERIMENT 3 : SERIAL LOAD REGISTER

RESULT

Part A : Serial Load Register

Step 7:

| Input | | | | Outputs | | | |
|-------|-------|-----------------|------------------|----------------|----------------|----------------|----------------|
| Line | Clear | Data Input Line | Clock Pulse (CP) | LED Indicators | | | |
| | | | | Q _A | Q _B | Q _C | Q _D |
| A | 0 | X | | | | | |
| B | 1 | 0 | | | | | |
| C | 1 | 1 | CP | | | | |
| D | 1 | 0 | CP | | | | |
| E | 1 | 1 | CP | | | | |
| F | 1 | 1 | CP | | | | |
| G | 0 | 1 | | | | | |
| H | 1 | 1 | CP | | | | |
| I | 1 | 1 | CP | | | | |
| J | 1 | 0 | CP | | | | |
| K | 1 | 0 | CP | | | | |
| L | 1 | 0 | CP | | | | |
| M | 1 | 1 | CP | | | | |
| N | 1 | 0 | CP | | | | |
| O | 0 | 0 | | | | | |
| P | 1 | 1 | CP | | | | |
| Q | 1 | 0 | CP | | | | |
| R | 0 | 1 | CP | | | | |

Table 3.1

| | | | |
|------|------|-------|------|
| PLO1 | CLO3 | | /20m |
|------|------|-------|------|

Experiment Questions

Q1. A register that stores 6 bits has how many flip-flops?

.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /4m |
|-------------|-------------|-------|------------|

Q2. How many clock pulses are required to transfer 1101 into a 4-bit 8180 shift register?

.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /4m |
|-------------|-------------|-------|------------|

Q3. Why is the IC 74194 is called a universal register?

.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /4m |
|-------------|-------------|-------|------------|

Q4. What requirements need to be met when serial loading data into an IC 74194 in a right to left direction?

.....
.....
.....
.....

| | | | |
|-------------|-------------|-------|------------|
| PLO1 | CLO3 | | /4m |
|-------------|-------------|-------|------------|