



**COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY**

**SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**FINAL EXAMINATION PAPER-PENSTER 4 - 2014**

**CERTIFICATE IV IN ELECTRONICS ENGINEERING**

**EEE417: DIGITAL ELECTRONICS 1B**

**DAY:      DATE:      TIME:      VENUE: \_\_\_\_\_**

# SOLUTION

**SECTION-A****MULTIPLE CHOICE****[20 Marks]**

<b>Question</b>	<b>Solution</b>	<b>Marks</b>
1.	<b>D</b>	<b>1</b>
2.	<b>C</b>	<b>1</b>
3.	<b>B</b>	<b>1</b>
4.	<b>A</b>	<b>1</b>
5.	<b>C</b>	<b>1</b>
6.	<b>A</b>	<b>1</b>
7.	<b>D</b>	<b>1</b>
8.	<b>C</b>	<b>1</b>
9.	<b>D</b>	<b>1</b>
10.	<b>B</b>	<b>1</b>
11.	<b>A</b>	<b>1</b>
12.	<b>D</b>	<b>1</b>
13.	<b>B</b>	<b>1</b>
14.	<b>C</b>	<b>1</b>
15.	<b>A</b>	<b>1</b>
16.	<b>C</b>	<b>1</b>
17.	<b>D</b>	<b>1</b>
18.	<b>B</b>	<b>1</b>
19.	<b>C</b>	<b>1</b>
20.	<b>A</b>	<b>1</b>

**SECTION-B****SHORT ANSWER QUESTIONS****[20Marks]**

1.	TTL IC-BJT or Bipolar Junction Transistor CMOS- MOSFET	<b>1</b> <b>1</b>
2.	Propagation delay time Fan-out power dissipation	<b>1</b> <b>1</b> <b>1</b>
3.	ECL is the fastest as it has the least propagation delay time	<b>1</b>
	CMOS and ECL has more fan-out capability compared to TTL	<b>1</b>
	CMOS has the least power consumption while compared to ECL and TTL	<b>1</b>
	CMOS can withstand more noise than ECL and TTL	<b>1</b>
	CMOS is best to use as it has more advantages	<b>1</b>
4.	a) DM- manufacturer's code 74- TTL series LS- low power schottky type 02- Quad 2 input NOR gate	<b>0.5</b> <b>0.5</b> <b>0.5</b> <b>0.5</b>
	b) Nominal $V_{CC} = 5V$	<b>1</b>
	c) $P_D = V_{CC} \times I_{CC}$ , where $I_{CC} (avg) = I_{CCH} + I_{CCL}/2$ $I_{CC}(avg) = (1.6mA + 2.8mA)/2$ $= 2.2mA$ $P_D = 5 \times 4mA$ $= 11mW$	<b>1</b> <b>0.5</b> <b>0.5</b> <b>0.5</b> <b>0.5</b>
	d) $V_{NH} = V_{OH(min)} - V_{IH(min)}$ $= 2.7 - 2$ $= 0.7V$	<b>1</b> <b>0.5</b> <b>0.5</b>
	e) $V_{NL} = V_{IL(max)} - V_{OL(max)}$ $= 0.8 - 0.5$ $= 0.3V$	<b>1</b> <b>0.5</b> <b>0.5</b>

**SECTION-C****TRUE OR FALSE****[14 Marks]**

1.	T		8.	F
2.	T		9.	T
3.	F		10.	T
4.	T		11.	F
5.	T		12.	T
6.	T		13.	T
7.	F		14.	T

**Question 1:**

- a) Lower number of Fan-Out
- b) Dissipates more Power
- c) Has greater propagation Delay (3Marks)

**Question 2:**

Unipolar MOSFET transistors (1 Mark)

**Question 3:**

CMOS IC is best to use for the following reasons:-

- a) Greater number of Fan-Outs
- b) Dissipates less Power, therefore more efficient,
- c) Has lesser propagation Delay (2 Marks)

**Question 4: Analysis and Calculations**

Using the attached datasheet, determine:

- a) DM → Manufacturer's code  
74 → 7400 TTL series  
LS → Low Power Schottky TTL Logic  
00 → Quad 2-input Nand Gate (4 marks)

- b) Nominal  $V_{CC} = 5V$  (1 mark)

- c) Power dissipation,  $P_D(\text{avg}) = V_{CC} \times I_{CC}(\text{avg}) = V_{CC} \times (I_{CCH} + I_{CCL})/2$   
 $= 5V \times (1.6mA + 4.4mA)/2$   
 $= 5V \times 3mA = 15 \text{ mW}$  (4 marks)

- d) High-level noise margin,  $V_{NH} = V_{OH}(\text{min}) - V_{IH}(\text{min}) = 2.7V - 2.0V = 0.7V$  (2.5 marks)

- e) Low-level noise margin,  $V_{NL} = V_{IL}(\text{max}) - V_{OL}(\text{max}) = 0.8V - 0.5V = 0.3V$  (2.5 marks)

**SECTION-E****SHORT ANSWER QUESTIONS****[20 Marks]**

1.	i)	Liquid crystal Display	<b>1</b>
	a)	Polarizer	<b>1</b>
	b)	Conductive pattern on glass	<b>1</b>
	c)	Liquid crystal	<b>1</b>
	d)	Metalized layer	<b>1</b>
	e)	Glass back plane	<b>1</b>
	f)	Metalized segments	<b>1</b>
	ii)	Vacuum Fluorescent Display	<b>1</b>
	a)	Cathodes (heaters)	<b>1</b>
	b)	Grid	<b>1</b>
	c)	Plates	<b>1</b>
	d)	Glass back	<b>1</b>
2.		5	<b>2</b>
3.		CRT, Nixie tube display, Incandescent filament display, plasma display or gas discharge, Electroluminescent display, Alphanumeric display <b>Any 3 is correct</b>	<b>3</b>
4.		$R_S = \frac{V_S - V_F}{I_F}$ $= \frac{5 - 1.7}{25\text{mA}}$ $= 132\Omega$	<b>1</b> <b>1</b> <b>1</b>

1.	RAM	Random Access Memory
2.	DRAM	Dynamic Random Access Memory
3.	FPMDRAM	Fast Page Mode Dynamic Random Access Memory
4.	EDORAM	Extended Data Output Random Access Memory
5.	BEDORAM	Burst Extended Data Output Random Access Memory
6.	SRAM	Static Random Access Memory
7.	VRAM	Volatile Random Access Memory
8.	SIMM	Single In-line Memory Module
9.	DIMM	Dual In-line Memory Module
10.	ROM	Read Only Memory
11.	ROMBIOS	Read Only Memory Basic Input Output System
12.	PROM	Programmable Read Only Memory
13.	EPROM	Erasable Programmable Read Only Memory
14.	EEPROM	Electrically Erasable Programmable Read Only Memory
15.	FDD	Floppy Disk Drive
16.	HDD	Hard Disk Drive