

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

(a) \overline{A} ✓

$\overline{B.C}$ ✓✓

3

(b) $\overline{D+E}$ ✓✓

2

(c)

A	B	C	D	E	Q
0	0	0	1	1	0
0	0	1	1	1	0
0	1	0	1	1	0
0	1	1	1	0	0
1	0	0	0	1	0
1	0	1	0	1	0
1	1	0	0	1	0
1	1	1	0	0	1

✓ ✓ ✓ ✓

4

(d) (3-input) AND gate ✓

1

[10]

Q2.

(a) (i) Top: non-inverting input ✓
Bottom: inverting input ✓

2

(ii) when $V_+ > V_-$, output goes high ✓

when $V_+ < V_-$, output goes low ✓

2

(b) (i) 5V across $30k + 10k + 10k = 50k$ (or similar calc) ✓
70k needed ✓

2

(ii) calc leading to ✓ $\geq 9V$ ✓

2

(c) V_{-sat} output from op-amp is higher ✓ than V_f for red LEDs ✓
 V_f for blue LEDs higher ✓ (Max 2)

2

[10]