

Name of the Student: \_\_\_\_\_

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

**Q1.**

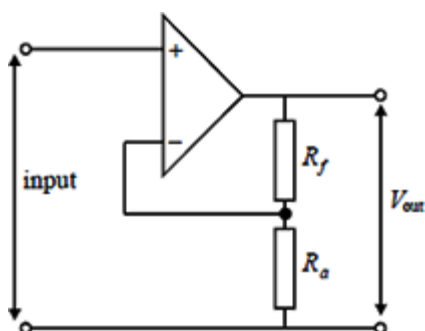
- (a) (i) *positive feedback:*  
part [or all] of output fed back in phase with input **(1)**

*negative feedback:*  
part [or all] of output fed back 180° out of phase with input **(1)**  
positive feedback – gain increased\*  
negative feedback – gain decreased\*  
\* **(1)**

- (ii) voltage gain more predictable [or constant]\*  
distortion or noise reduced\*  
bandwidth increased\*  
\* any two **(1) (1)**

(5)

- (b) (i)



potential divider between outputs **(1)**  
correct inputs **(1)**

- (ii)  $R_a \geq 1 \text{ k}\Omega$  **(1)**

using gain =  $1 + \frac{R_f}{R_a}$  gives  $R_f = 11 \text{ k}\Omega$  **(1)**

[or value consistent with  $R_a$ ]

(4)

**[9]**

**Q2.**

- (a) output of op-amp A is +12 V and output of op-amp B is 0 V **(1)**

(1)

(b)  $V_x = 12 \times \frac{12}{24} = 6$  (1)

$$V_y = 12 \times \frac{8}{24} = 4 \text{ V (1)}$$

(2)

(c) P is < 6 V when  $R_{ldr} < 2 \text{ k}\Omega$  (1)

i.e. illumination > 50 lux (1)

P is < 4 V when  $R_{ldr} < 1 \text{ k}\Omega$  (1)

i.e. illumination > 100 lux (1)

(4)

(d) when  $P < 6 \text{ V}$ ,  $V_- < V_+$  for A (1)

output + (1)

for op amp B,  $V_- > V_+$ , output –, i.e. current (1)

when P becomes < 4 V, output of A is + (1)

i.e. current stops (1)

(max 4)

[11]