

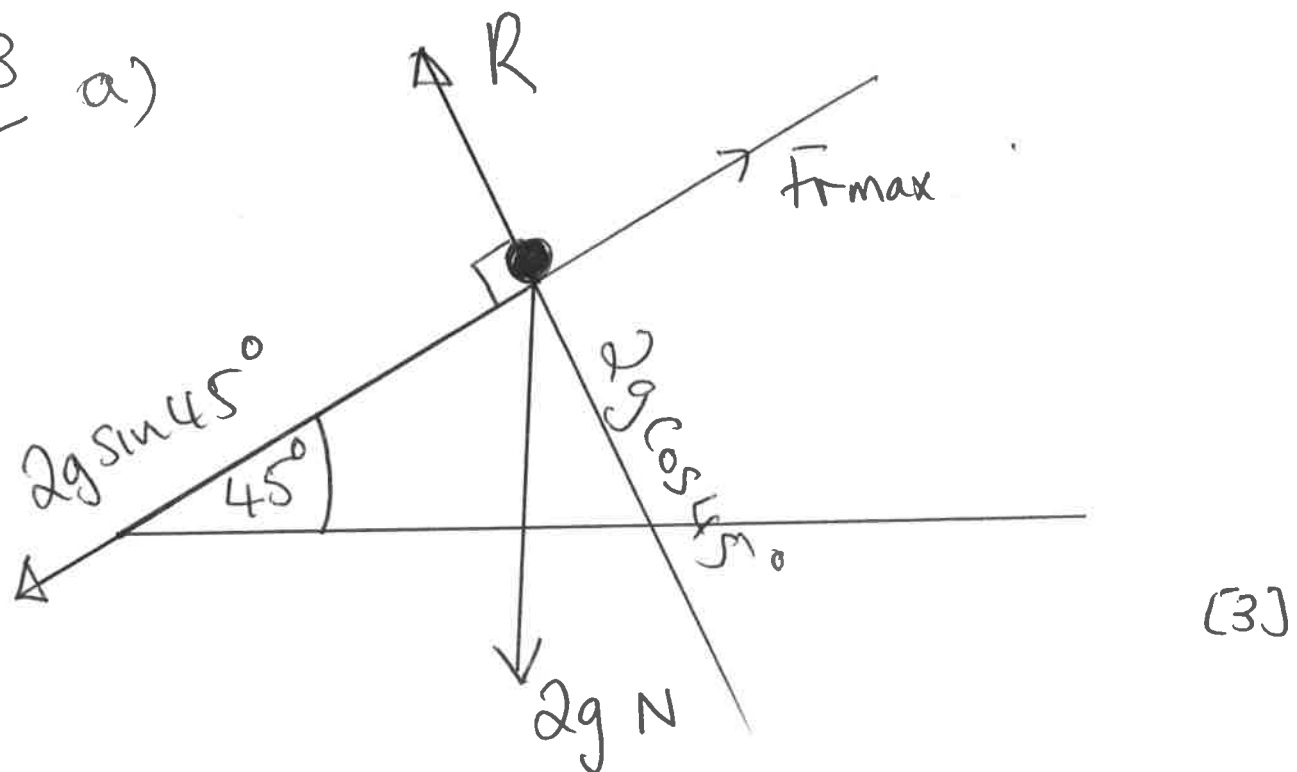
Cert HE : APPLIED ANALYTICS

CLASS TEST (2025)

- 1) a) Temperature has base units of $-K$
b) Luminous Intensity Cd
c) Volume m^3
d) Displacement m
e) Time s [5]

2) Pressure = $\frac{\text{Force}}{\text{Area}}$
 $= \frac{\text{mass} \times \text{acc}^n}{\text{Area}}$
 $= \frac{kg \, ms^{-2}}{m^2}$
 $= \underline{kg \, m^{-1} s^{-2}}$ [5]

3 a)



b) Resolving along the plane: $\nearrow$ +ve

$$\begin{aligned} F_{\text{max}} &= 2g \sin 45^\circ \\ &= 13.86 \text{ N} \quad (2 \text{dp's}) \quad [4] \end{aligned}$$

(c) $R = 2g \cos 45^\circ$ as in equilibrium
forces balance. $[2]$

(d) $R = 2g \cos 45^\circ$
 $= 13.86 \text{ N} \quad (2 \text{dp}). \quad [2]$

4 i) $x^2 - 5x + 6 = 0$

$$(x - 2)(x - 3) = 0$$

either

$$x - 2 = 0$$

$$\underline{x = 2}$$

OR

$$x - 3 = 0$$

$$\underline{x = 3}$$

[3]

(ii) $x^2 + 7x + 6 = 0$

$$(x + 1)(x + 6) = 0$$

either

$$x + 1 = 0$$

$$\underline{x = -1}$$

OR

$$x + 6 = 0$$

$$\underline{x = -6}$$

[3]

(iii) $x^2 + 10x = -25$

$$x^2 + 10x + 25 = 0$$

$$(x + 5)(x + 5) = 0$$

either

$$x = -5$$

OR

$$x = -5$$

$$x = -5 \text{ (twice),}$$

[3]

$$(iv) \quad x^2 - 2x - 15 = 0$$

$$(x + 3)(x - 5) = 0$$

either

$$x + 3 = 0$$

$$x = -3$$

OR

$$x - 5 = 0$$

$$x = 5$$

[3]

$$(v) \quad 2x^2 + 5x + 2 = 0$$

$$(2x + 1)(x + 2) = 0$$

either

$$2x + 1 = 0$$

$$2x = -1$$

$$x = -1/2$$

OR

$$x + 2 = 0$$

$$x = -2$$

[3]

$$5 \quad \text{ii) } x^2 - 4x - 1 = 0$$

$$a = 1, b = -4, c = -1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-1)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 + 4}}{2}$$

$$x = \frac{4 \pm \sqrt{20}}{2}$$

$$x = \frac{4 \pm \sqrt{4 \times 5}}{2}$$

$$x = \frac{4 \pm 2\sqrt{5}}{2}$$

$$x = 2 \pm \sqrt{5}$$

either

$$x = 2 - \sqrt{5}$$

$$\underline{x = -0.24}$$

OR

$$x = 2 + \sqrt{5}$$

$$\underline{x = 4.24}$$

(5)

(2dp's)

$$(ii) \quad 2x^2 + 5x - 3 = 0$$

$$a = 2, b = 5, c = -3 \text{ in formula}$$

$$\Rightarrow x = \frac{-5 \pm \sqrt{(5)^2 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{-5 \pm \sqrt{25 + 24}}{4}$$

$$x = \frac{-5 \pm \sqrt{49}}{4}$$

$$x = \frac{-5 \pm 7}{4}$$

either

OR

$$x = \frac{-5 - 7}{4}$$

$$x = \frac{-5 + 7}{4}$$

$$x = \frac{-12}{4}$$

$$x = \frac{2}{4}$$

$$\underline{x = -3}$$

$$\underline{x = \frac{1}{2}}$$

[5]

$$6) i) \frac{3(x-1)}{2} = \frac{(x+2)}{4}$$

$$\Rightarrow 3 \times 4 \times (x-1) = 2(x+2)$$

$$12(x-1) = 2x+4$$

$$12x-12 = 2x+4$$

$$12x-2x = 12+4$$

$$10x = 16$$

$$x = \frac{16}{10}$$

$$\underline{x = 1.6}$$

[5]

$$(ii) \quad \begin{array}{rcl} 2x + 5y = 7 & \text{---} & \textcircled{A} \times 3 \\ 3x + 2y = 5 & \text{---} & \textcircled{B} \times 2 \end{array}$$

$$\Rightarrow 6x + 15y = 21 \text{ --- } \textcircled{C}$$

$$6x + 4y = 10 \text{ --- } \textcircled{D}$$

Subtract:

$$11y = 11$$

$$\Rightarrow y = \frac{11}{11}$$

$$\underline{y = 1}$$

Sub. $y=1$ back into (A) $\Rightarrow$

$$2x + 5(1) = 7$$

$$2x + 5 = 7$$

$$2x = 7 - 5$$

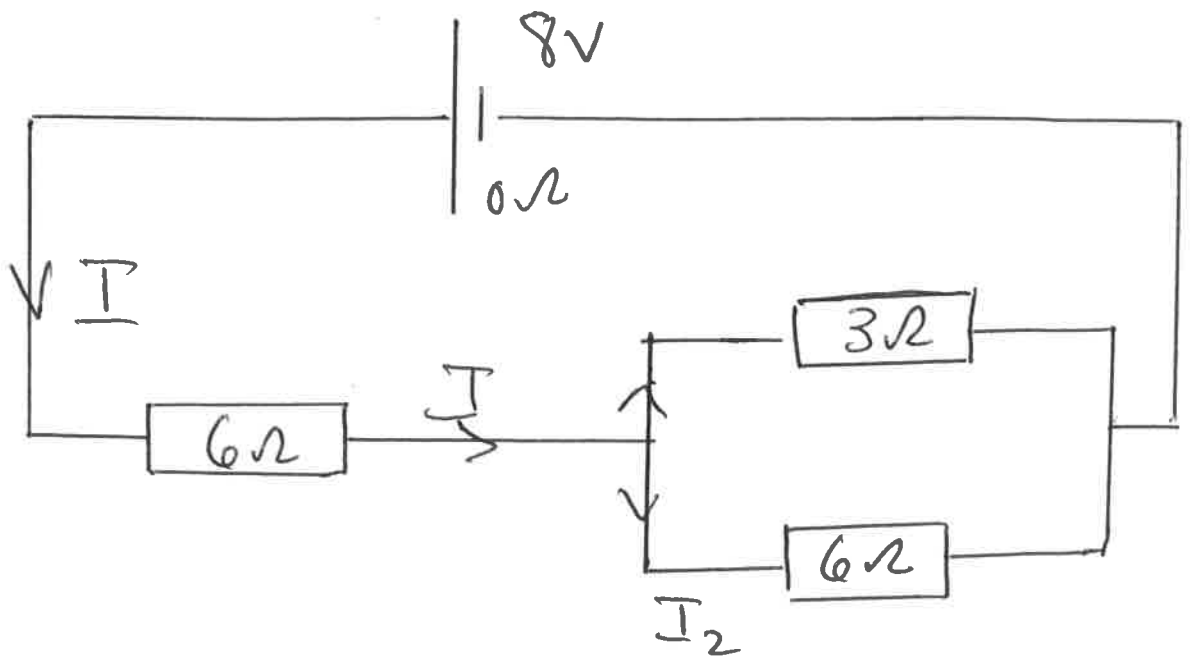
$$2x = 2$$

$$x = \frac{2}{2}$$

$$\underline{x = 1}$$

$$\underline{\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}}$$

[5]



for Resistors in parallel

$$\frac{1}{R} = \frac{1}{3} + \frac{1}{6}$$

$$\frac{1}{R} = \frac{2}{6} + \frac{1}{6}$$

$$\frac{1}{R} = \frac{3}{6} = \frac{1}{2}$$

$$\Rightarrow R = 2\Omega$$

$$I = \frac{V}{R}$$

$$I = \frac{8}{8} = 1A$$

Total Resistance

$$R_{total} = 6\Omega + 2\Omega$$

$$a) \quad = 8\Omega$$

P.d. across Resistors in

$$\text{Parallel} = IR$$

$$= 1 \times 2$$

$$= 2 \text{ volts.}$$

$$(b) \quad I_2 = \frac{2}{6} = \frac{1}{3} A$$

$$(c) \quad \text{Power} = E \times I \\ = 8 \times 1 \\ = \underline{8 \text{ watts.}}$$

[9]