

Question 1

1.1

1.1.1

$$a = -3 \text{ m/s}^2$$

1.1.2

$$s = 137,5 \text{ m}$$

1.1.3

$$\text{Momentum} = 70\,000 \text{ kg}\cdot\text{m/s}$$

1.1.4

$$\text{Change in KE} = 825 \text{ kJ}$$

1.1.5

$$\text{Braking Force} = 6000 \text{ N.}$$

1.2

1.2.1

$$\text{Torque} = 300 \text{ Nm}$$

1.2.2

$$\text{Power} = 1,8 \text{ kW}$$

Question 2

2.1 Theory

2.2

2.2.1

$$\begin{aligned} \text{Reaction C} &= 63,75 \text{ kN} \\ \text{Reaction B} &= 16,25 \text{ kN} \end{aligned}$$

2.2.2

Shear Force Diagram

Question 3

3.1 $\Sigma VC = 41,152 \text{ kN}$; $\Sigma HC = 62,64 \text{ kN}$

Resultant = $74,948 \text{ kN}$; $33,303^\circ \text{ N of E}$

Equilibrant = $74,948 \text{ kN}$; $33,303^\circ \text{ S of W}$

3.2 $CA = 25,456 \text{ kN}$; STRUT
 $AB = 18 \text{ kN}$; TIE

Question 4

4.1 Theory

4.2

4.2.1 Sketch

4.2.2 $F_{up} = 1039,725 \text{ N}$.

Question 5

5.1

5.1.1 Heat released by steel = $1177,6 \text{ kJ}$

5.1.2 Volume of oil = $17,796 \text{ litres}$

5.2 A_{final} of Aluminium plate = 20023 mm^2

5.3

5.3.1 $h_f = 962 \text{ kJ}$

5.3.2 $h_g = 2801 \text{ kJ}$

5.3.3 $h_{fg} = 1839 \text{ kJ}$

Question 5

5.3

5.3.4 $h_{ws} = 2690,66 \text{ kJ}$

5.3.5 $h_{1-x} = 110,34 \text{ kJ}$

Question 6

6.1

6.1.1 Work done by pump = 6927,212 kJ

6.1.2 Power required = 192,423 W

6.2

6.2.1 Force exerted by ram, $W = 3826,531 \text{ kN}$

6.2.2 Distance moved by ram, $H = 0,063 \text{ m}$

6.2.3 Number of pumping strokes = 734

6.2.4 Volume of liquid received = 2258,02 litres

Question 7

7.1

7.1.1 Total Resistance = 6,463 Ω

7.1.2 Total Current Flow = 2,872 A

7.2

7.2.1 Current through lamp : $I_{\text{lamp}} = 0,625 \text{ A}$

Question 7

7.2

7.2.2 Resistance of lamp: $R_{\text{lamp}} = 384 \Omega$

7.2.3 Costs @ 6c/unit = 2,7c

Question 8

8.1 Theory

8.2 Theory

8.3 Theory

Answers to calculations with compliments from:

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