

JAWABAN Seleksi TOFI 2000

1.

$$S_1 = \frac{1}{2}at^2 \quad \dots\dots(1)$$

$$S_2 = Vt_2 + \frac{1}{2}at_2^2 \quad \dots\dots(2)$$

$$S_3 = V_0t_3 + \frac{1}{2}at_3^2 = \frac{1}{2}at_3^2 + \frac{1}{2}at_3^2 = \frac{1}{2}at_3^2 + \frac{1}{2}at_3^2 = at_3^2 = \frac{1}{2}at^2 + \frac{1}{2}at^2 \quad \dots\dots(3)$$

$$V = \frac{S}{t_{tot}} = \frac{S_1 + S_2 + S_3}{t + t_2 + t_3} = \frac{\frac{1}{2}at^2 + Vt_2 + \frac{1}{2}at^2}{\frac{3}{2}t + t_2} \quad \dots\dots(4)$$

$$\frac{3}{2}tV = Vt_2 + \frac{1}{2}at^2 + \frac{1}{2}at^2$$

$$t_2 = \frac{t^2 + \frac{1}{8}at^2}{\frac{3}{2}V}$$

$$t_2 = \frac{t^2 + \frac{1}{8}at^2}{\frac{3}{2}V} \quad \dots\dots(5)$$

Penilaian: (Maks : 10)

Tulis jawaban : 1 point

Rumus $V = \frac{S_1 + S_2 + S_3}{t_1 + t_2 + t_3}$ 1 point

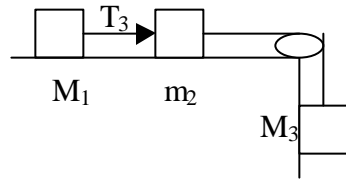
S_1 : 1 point

S_2 : 1 point

S_3 : 1 point

Partial Max : 5

2. Gesekan diabaikan (anggap m_3 jatuh ke bawah)



$$? \ m_1 a_0 \ ? \ m_2 a_0 \ ? \ m_3 g \ ? \ m_1 \ ? \ m_2 \ ? \ m_3 \ ? \ a$$

$$a \ ? \ \frac{m_3 g \ ? \ m_1 \ ? \ m_2 \ ? a_0}{m_1 \ ? \ m_2 \ ? \ m_3} \ \dots\dots(1)$$

$$T \ ? \ m_1 a_0 \ ? \ m_1 a \ \dots\dots(2)$$

$$T \ ? \ m_1 a_0 \ ? \ \frac{m_1 \ ? m_3 g \ ? \ m_1 \ ? m_2 \ ? a_0}{m_1 \ ? \ m_2 \ ? \ m_3}$$

$$T \ ? \ \frac{m_1 \ ? m_3 \ ? a_0 \ ? \ m_1 m_3 g}{m_1 \ ? \ m_2 \ ? \ m_3}$$

$$T \ ? \ \frac{m_1 m_3 \ ? a_0 \ ? \ g}{m_1 \ ? \ m_2 \ ? \ m_3} \ \dots\dots(3)$$

Penilaian : (Maks : 10)

Tulis jawaban : 1 point

Gaya fiktif ma_0 : 1 point

Rumus T : 1 point

Dapat a_{benar} : 2 point

Dapat a_{system} : 2 point

Partial Max : 5

3.

panjang tali : L

$$mg - L - x = \frac{1}{2} kx^2 \dots (1)$$

$$x^2 = \frac{2mg}{k} - L - x$$

$$x^2 = \frac{2mg}{k} - x - \frac{2mgL}{k} = 0 \dots (2a)$$

$$x = \frac{\frac{2mg}{k} \pm \sqrt{\left(\frac{2mg}{k}\right)^2 - 4 \cdot \frac{2mgL}{k}}}{2}$$

$$= \frac{mg}{k} \pm \sqrt{\left(\frac{mg}{k}\right)^2 - \frac{2mgL}{k}}$$

$$= \frac{mg}{k} \pm \sqrt{1 - \frac{2kL}{mg}} \dots (2b)$$

Letak titik adalah:

$$L' = L + \frac{mg}{k} \pm \sqrt{1 - \frac{2kL}{mg}} \dots (3)$$

Penilaian (Maks : 15)

Tulis jawaban : 1 -2 point

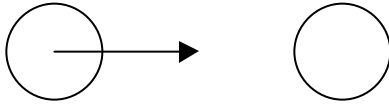
Rumus $mgh = \frac{1}{2} kx^2$:2 point

Dapat persamaan x : 5 point

Solusi : 2 point

$L' = L + x$: 5 point

4.



Kasus yang mungkin

a) $v_0 < R \omega_0$ (ω_0 searah jarum jam)

$$v = v_0 + \omega_0 R \quad \omega = \omega_0 + \frac{f}{m} t \quad \omega = \frac{fR}{I} t$$

$v = R \omega$ (tidak slip)

$$t = \frac{2v_0 - R\omega_0}{7g} \dots (1)$$

b) $v_0 > R \omega_0$

$$t = \frac{2v_0 - R\omega_0}{7g} \dots (2)$$

c) v_0 berlawanan arah jarum jam ($v_0 < R \omega_0$) harus!

$$t = \frac{2v_0 + R\omega_0}{7g} \dots (3)$$

Penilaian (Maks 20)

Tulis jawab : 1-2 point

Kasus a) 7 point

b).... 6 point

c).... 6 point

$v = v_0 + \omega R$: 1 point

Ada persamaan $v = R \omega$: 1 point

$v = R \omega$: 1 point

5.

Setelah tumbukan A diam B bergerak dengan V_0

$$v_0 = \sqrt{\frac{k}{m}} \cdot \frac{2T}{T} \dots\dots(1)$$

Mereka bertumbukan lagi

$$t = \frac{1}{2}T + \frac{1}{2}T \cdot \sqrt{\frac{m}{k}} \dots\dots(2a)$$

$$t = \sqrt{\frac{m}{k}} \dots\dots(2b)$$

Ketiga kali tidak mungkin(3)

Penilaian (Maks 15)

Tulis jawaban : 1-2 point

Dapat rumus : 3 point

$T = 1/2T$: 5 point

Solusi.....: 2 point

Tumbukan ketiga tidak mungkin: 2 point

Alasan : 2 point?

6.

$$m a_0 \sin \theta = m g \cos \theta - N = \frac{m V_A^2}{R - r} \dots (1)$$

$$a_0 \sin \theta = g \cos \theta - \frac{V_A^2}{R - r}$$

$$m g (R - r) \cos \theta = \frac{1}{2} m V_A^2 + \frac{1}{2} I \omega^2 \dots (2)$$

$$= \frac{1}{2} m V_A^2 + \frac{1}{2} \frac{1}{2} m r^2 \omega^2$$

$$= \frac{3}{4} m V_A^2$$

Pengaruh percepatan : menghambat gerakan

$$v_2 = v_1$$

$$V_A^2 = \frac{4}{3} g (R - r) \cos \theta$$

$$\dots a_0 \sin \theta = g \cos \theta - \frac{4}{3} g (R - r) \cos \theta$$

$$\frac{7}{3} g \cos \theta = a_0 \sin \theta + \frac{4}{3} g$$

$$\frac{7}{3} g \cos \theta = a_0 \sqrt{1 - \cos^2 \theta} + \frac{4}{3} g + \frac{7}{3} g \cos \theta$$

$$9 a_0^2 = 9 a_0^2 \cos^2 \theta + g^2 (16 - 56 \cos \theta + 49 \cos^2 \theta)$$

$$\cos^2 \theta (49 g^2 - 9 a_0^2) = 16 g^2 - 9 a_0^2 = 0$$

$$\cos \theta = \frac{56 g^2 - \sqrt{(56 g^2)^2 - 4 (49 g^2 - 9 a_0^2) (16 g^2 - 9 a_0^2)}}{2 (49 g^2 - 9 a_0^2)}$$

$$= \frac{28 g^2 - \sqrt{(28 g^2)^2 - (49 g^2 - 9 a_0^2) (16 g^2 - 9 a_0^2)}}{49 g^2 - 9 a_0^2}$$

Penilaian : (Maks 20)

Tulis jawab.....1-2 point

Persamaan gaya..... 5 point

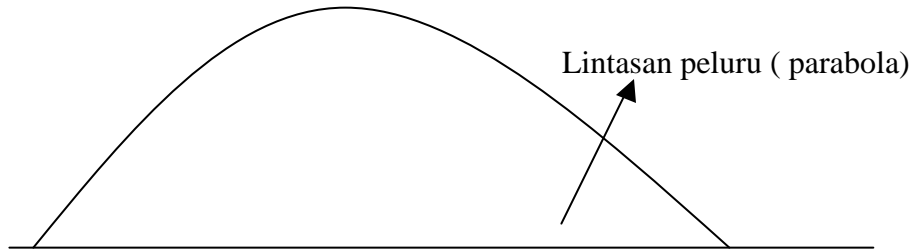
Persamaan energi..... 5 point

Persamaan cos θ + sin θ3 point

Pengaruh percepatan..... 2 point

Solusi.....4 point

7.



$$t ? \frac{V_0 \sin ?}{g} \dots\dots\dots(2)$$

$$h ? \frac{1}{2} g \frac{V_y^2}{g^2} ? \frac{V_0^2 \sin^2 ?}{2g} \dots\dots\dots(3)$$

Ia harus tahu bahwa lintasannya adalah lintasan pusat massa(4)

Penilaian : Maks 10

Tulis jawaban : 1 point

Lintasan : 4 point (ada kata pusat massa)

Rumus gerak peluru : 2 point

$$h ? \frac{V_0^2 \sin^2 ?}{2g} \dots\dots\dots: 3 \text{ point}$$