PHYS 1010 6.0: CLASS TEST 2

Time: 50 minutes; Calculators & formulae provided at the end = only aid; Total = 20 points.

Emphasis is on problem solving out of chapters 4,5, and concepts from 6.1

FORMULA SHEET

$v(t_\mathrm{f}) = v(t_\mathrm{i}) + \int_{t_\mathrm{i}}^{t_\mathrm{f}} a(t)\ dt \quad s(t_\mathrm{f}) = s(t_\mathrm{i}) + \int_{t_\mathrm{i}}^{t_\mathrm{f}} v(t)\ dt$

$v_\mathrm{f} = v_\mathrm{i} + a\Delta t \quad s_\mathrm{f} = s_\mathrm{i} + v_\mathrm{i}\Delta t + \frac{1}{2}a\Delta t^2 \quad v_\mathrm{f}^2 = v_\mathrm{i}^2 + 2a\Delta s \qquad g = 9.8\ \mathrm{m/s^2}$

$f(t) = t \quad \frac{df}{dt} = 1 \quad F(t) = \int f(t)\ dt = \frac{t^2}{2} + C$

$f(t) = a \quad \frac{df}{dt} = 0 \quad F(t) = \int f(t)\ dt = at + C \quad F(t) = \text{anti-derivative} = \text{indefinite integral}$

area under the curve $f(t)$ between limits t_1 and t_2: $F(t_2) - F(t_1)$

$x^2 + px + q = 0$ factored by: $x_{1,2} = -\frac{p}{2} \pm \sqrt{\frac{p^2}{4} - q}$

uniform circular m. $\vec{r}(t) = R(\cos\omega t\ \hat{\mathbf{i}} + \sin\omega t\ \hat{\mathbf{j}}); \quad \vec{v}(t) = \frac{d\vec{r}}{dt} = ...; \quad \vec{a}(t) = \frac{d\vec{v}}{dt} = ...$

$\exp' = \exp; \quad \sin' = \cos; \quad \cos' = -\sin. \quad \frac{d}{dx}[f(g(x))] = \frac{df}{dg}\frac{dg}{dx}; \quad (fg)' = f'g + fg'$

$m\vec{a} = \vec{F}_\mathrm{net}; \quad F_G = \frac{Gm_1 m_2}{r^2}; \ g = \frac{GM_E}{R_E^2}; \ R_E = 6370\ \mathrm{km}; \ G = 6.67 \times 10^{-11}\,\frac{\mathrm{Nm^2}}{\mathrm{kg^2}}; \ M_E = 6.0 \times 10^{24}\mathrm{kg}$

$f_\mathrm{s} \le \mu_\mathrm{s} n; \quad f_\mathrm{k} = \mu_\mathrm{k} n; \quad f_\mathrm{r} = \mu_\mathrm{r} n; \quad \mu_\mathrm{r} << \mu_\mathrm{k} < \mu_\mathrm{s}. \qquad F_H = -k\Delta x = -k(x - x_0).$

$\vec{F}_\mathrm{d} \sim -\vec{v}$; linear: $F_\mathrm{d} = dv$; quadratic: $F_\mathrm{d} = 0.5\rho Av^2; \quad A = \text{cross sectional area}$

$W = F\Delta x = F(\Delta r)\cos\theta \quad$ For $F(x)$ the work is given as area under the F_x vs x curve.