Sample Exam III

Problems MC

1- C 2- a 3- C 4- C

Problems

We will use $PV = nRT$ $V = \frac{nRT}{P}$

$n = \frac{.532\ kg}{32\ kg} = .016$, $R = 8.3\ \frac{J/^\circ K}{mol}$ $T = 273^\circ K$

$P = 1 \times 10^5\ N/m$

$V = \frac{(.016)(8.3)(273)}{10^5} = 36 \times 10^{-5}\ m^3$ $= 3.6 \times 10^{-4}\ m^3$

2) Rate of Rate of heat Flow $P = \frac{\Delta T}{R}$

$\frac{P_{glass\ (g)}}{P_{glass + Foam\ g+F}} = \frac{\frac{\Delta T}{R_g}}{\frac{\Delta T}{R_{Frg}}} = \frac{R_{Frg}}{R_g}$

$R_g = \frac{d}{A}\left(\frac{1}{\chi_g}\right)$ $R_{Frg} = \frac{d}{A}\left(\frac{1}{\chi_g} + \frac{1}{\chi_F}\right)$

Since Foam has same d as glass + same A

$P_g / P_{g+f} = \frac{\frac{1}{\chi_g} + \frac{1}{\chi_F}}{\frac{1}{\chi_g}} = \frac{1 + \frac{1}{.025}}{1}$

$= \frac{1+40}{1} = 41$

$P_{g+F} = \frac{P_g}{41}$

the heat Flow through Foam + glass is $\frac{1}{41}$ heat Flow through glass

Sample Final

MC 1-b 2-C 3-C 4-b

Problems

For circlar motion $F = ma = \frac{mv^2}{r}$

IF the motion is caused by gravity $F = \frac{GMm}{r^2}$

so $\frac{mv^2}{r} = \frac{GMm}{r^2}$ $v^2 = \frac{GM}{r}$

but by geometry $v = \frac{2\pi r}{T}$ so $\left(\frac{2\pi r}{T}\right)^2 = \frac{GM}{r}$

or $T^2 = \frac{4\pi^2 r^3}{GM}$. For our problem M is mass of Jupiter

$T_{Io} = 1.77\,d = 1.77\,d\left(\frac{24\,h}{d}\,\frac{60\,m}{h}\cdot\frac{60\,s}{m}\right) = 1.5\times10^5\,s$, $M = 1.9\times10^{27}\,kg$

$G = 6.7\times10^{-11}\,\frac{m^3}{kg\cdot s^2}$

$r = \left(\frac{GMT^2}{4\pi^2}\right)^{1/3} = (.72\times10^{26})^{1/3} = (72\times10^{24})^{1/3}$

$= 4.2\times10^8\,m$

Problem First calculate a

$v_i = 0$ $v_f = 3.3$ $t = 2s$ $a = \frac{\Delta v}{\Delta t} = \frac{-3.3}{2} = -1.65\,m/s^2$

$d = \frac{1}{2}at^2 = -.83(4)^2 =$ 13.3 m down