EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE - 2004/2005 (March/April 2006)

REPEAT

PH 306 ENVIRONMENTAL PHYSICS

Answer ALL questions.

Time: 1 hour

01. (a) List the four principal layers of the atmosphere in order from the Earth's surface upwards. Within each of these layers, state how the temperature varies with height.

(b) Explain why air pressure is greatest at the Earth's surface and always decreases with altitude.

(i) The density of air is $1.2\,kgm^{-3}$ at the Earth's surface. Calculate the height of the column of air required to exert a pressure of 1 atmosphere $(1\times10^{5}\,Pa)$ at its base.

(ii) At constant temperature the pressure of the atmosphere decreases exponentially with height according to the equation $p = p_0 \exp(-kh)$ where p_0 is the pressure at the Earth's surface. Given that p at a height of $5\,km$ is approximately $0.5p_0$ estimate the height at which p will have fallen to $\left(\frac{1}{8}\right)p_0$.

02. (a) Briefly discuss on tidal power and geothermal power generation. Investigate what contribution could be made by renewable energy sources to our country's energy requirements.

(b) Define the terms "thermal conductivity (k)" and "thermal transmittance (U)".

A cavity wall consists of brick $10\,cm$ thick, an $5\,cm$ air cavity spacing, $10\,cm$ of concrete and $2\,cm$ of plaster as shown in the figure. Given that the thermal conductivity of brick is 0.8, concrete 0.2 and plaster $0.1\,Wm^{-1}K^{-1}$ respectively and the thermal resistance of the internal surface is 0.12, external surface 0.06 and the cavity $0.19\,m^2KW^{-1}$ respectively, determine the U-value for the cavity wall.