



EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE – 2012/2013

SECOND SEMESTER (SEPTEMBER/OCTOBER 2015)

PH 306 ENVIRONMENTAL PHYSICS

Time: 01 hour

Answer ALL Questions

Q1.

- (a) List the four principle layers of the atmosphere in order from the Earth's surface upwards. Within each of these layers, state how the temperature varies with altitude.
- (b) Define and briefly comment on the following terms
- i. Solar constant
  - ii. Planetary albedo
  - iii. Earth's energy balance
  - iv. Green house effect
- (c) Explain briefly how the ozone layer prevents the harmful ultraviolet (UV) radiation reaching the Earth's surface. State at least three man-made chemicals that contribute mostly to the destruction of ozone in the atmosphere and explain the mechanism of destruction.

Q2.

- (a) Discuss the importance of renewable energy, and name minimum four renewable energy sources that are suitable to fulfill the energy demand of Sri Lanka. Choose one of the named energy sources and explain the physical principles involved in generating power from it.

(b) Describe the mode of action of a flat-plate solar collector.

A flat-plate solar collector of area  $A$  is incident by solar radiation (with solar irradiance  $G$ ) perpendicular to the collector of which a fraction  $t$  is transmitted and a fraction  $a$  is absorbed. If the energy losses through convection, radiation, and conduction are negligible, show that the capture efficiency of the collector is given by

$$n = ta - \frac{(T_p - T_a)}{RAG}$$

where  $T_a$  is the temperature of the working fluid entering,  $T_p$  is the emergent temperature, and  $R$  is the thermal resistance for energy loss from the collector.