

# 1998 Paper 4 Question 10

## Computer Graphics and Image Processing

In ray tracing, *ambient*, *diffuse* and *Phong's specular* shading can be used to define the colour at a point on a surface. Explain what each of the three terms refers to, and what real effect each is trying to model. [3 marks each]

The diagram below represents a scene being ray traced. The circles may be taken to represent the cross-sections of spheres.

In answering the remaining parts of this question you may use the single sheet supplied with the examination paper. Ensure that you attach it to the rest of your answer.

A particular ray from the eyepoint  $O$  has been found to have its closest intersection with an object at point  $P$ . Show, on a diagram, all subsequent rays and vectors which must be found in order to calculate the shading at point  $P$ . Explain the purpose of each one.

Assume that:

- each object has ambient, diffuse and specular reflections, but is *not* a perfect reflector
- each object is opaque
- all rays and vectors lie in the plane of the paper
- we are *not* using distributed ray tracing

[8 marks]

Assume now that all of the objects are perfect reflectors (in addition to having ambient, diffuse and specular reflection). Show, on a separate diagram, the extra rays which need to be calculated and explain the purpose of each one. [3 marks]

