UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For the following qualifications :-

Coll Dip

Astronomy DP11: Foundations of Astronomy and the Solar System

COURSE CODE	:	**ASTRDP11**
UNIT VALUE	:	**0.50**
DATE	:	**14-MAY-02**
TIME	:	**18.30**
TIME ALLOWED	:	**2 hours**

02-C0092-3-50

TURN OVER

Answer THREE questions from Section A and THREE questions from Section B.

You are advised to spend no more than 10 minutes on each Section A answer, and about 30 minutes on each Section B answer.

The numbers in square brackets indicate the provisional allocation of maximum marks for sub-sections of the question.

SECTION A

1. What is the Apparent Visual Magnitude of a star? [4]

   How was the magnitude scale originally set up? [3]

2. What is the definition of a Black Body? [2]

   State some of the main properties of Black Body Radiation. [5]

3. Give the names of the different regions of the electromagnetic spectrum, as a function of the wavelength. [4]

   Which regions of the spectrum can be observed in ground-based astronomy? [3]

4. Describe the currently accepted theory of the origin of Earth's Moon. [4]

   Include a description of the evidence that favours this theory above others. [3]

5. Write brief notes on any TWO (and only two) of the following three topics:

   (a) Trojan asteroids [3½]

   (b) Apollo asteroids [3½]

   (c) The Kuiper Belt [3½]

6. Write brief notes on the atmosphere of Venus. [4]

Why is it so different today from Earth's atmosphere, even though the two planets are of similar size and density? [3]

SECTION B.

7. Explain what is meant by the Parallax of a star, and define the parsec. [4]

For each of these situations, discuss one principal method used to determine distances:

(a) within the Solar System [2]

(b) for nearby stars [3]

(c) for stars of known spectral and luminosity class [4]

Explain what is meant by the Radial Velocity and the Proper Motion of a star, and how they can be combined. Outline how each of them can be measured. [7]

8. How can hot regions of the interstellar medium be observed? [4]

Discuss the various types of bright nebula, their appearance and how they originate. [10]

How can cold regions of the interstellar medium be observed? [6]

9. Binary stars can be observed in the three ways listed below. Explain the circumstances in which each can occur and the nature of the observations.

(a) visual binaries; [6]

(b) spectroscopic binaries; [7]

(c) eclipsing variables. [7]

10. Describe briefly the main types of terrain and features seen on the Moon's surface, and state which features are probably oldest and which are youngest. [6]

What is the most likely explanation for maria being seen only on the side of the Moon facing the Earth? [5]

Describe the current evidence for the presence of ice deposits on the Moon. Where are the deposits, and how were they detected? [5]

What kind of rock is an impact breccia, and why is it rare on the surface of the Earth but common on the Moon? [4]

11. State Kepler's three laws of planetary motion. [9]

Draw a sketch of a cometary or planetary orbit and label the various parts (e.g., Sun, perihelion, etc.) [3]

The mass of the imaginary distant giant planet Persephone was poorly known until a faint satellite, Madonna, was discovered. The satellite is much smaller that the planet, and has a period of 14.2 days in a circular orbit of radius 1,500,000 km. What is the mass of Persephone in units of solar masses? If Jupiter's mass = 0.955×10^{-3} M_{sun}, how many Jupiter masses does Persephone have? [8]

[You may assume that 1 AU = 149,600,000 km]

12. Write short essays (including diagrams if appropriate) on any TWO (and only two) of the following three topics:

Comets, addressing both their physical and orbital characteristics. [10]

The internal structure of the giant planets Jupiter and Saturn. [10]

The Galilean satellites of Jupiter. [10]