

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualification:–

Coll Dip

Astronomy DP12: The Sun, the Stars and the Search for Life

COURSE CODE : **ASTRDP12**

UNIT VALUE : **0.50**

DATE : **17-MAY-05**

TIME : **18.30**

TIME ALLOWED : **2 Hours**

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. How does the temperature of the Sun vary as you travel outwards from the core to the Corona? You may illustrate your answer with a diagram or graph. [7]

2. In stellar evolution what is the final endpoint of a (i) a solar mass and (ii) a $50 M_{\odot}$ star? [4]

What types of pressure support (i) white dwarfs and (ii) neutron stars? [3]

3. What is the mass luminosity relationship for stars? [3]

Why does this imply that the more luminous a star is, the shorter its lifetime? [4]

4. Write down the Drake Equation [2]

Briefly state what each factor indicates. [5]

5. What are the Habitable Zone and the Continuous Habitable Zone? [3]

How can one determine the size of the Habitable Zone of a stellar system? [4]

6. What is the Water Hole? [5]

List the three key compounds that we would expect to find on inhabited planets. [2]

SECTION B

7. Given an account of the PP-chain nuclear fusion reactions for hydrogen burning that provide the main energy source for the Sun. [10]

What are the basic properties of sunspots? [5]

Sunspots are manifestations of the magnetic field of the Sun. What other properties of the Sun are associated with the magnetic field? [5]

8. Briefly discuss the spectral classification sequence for stars, indicating how individual spectral types are assigned from studies of their optical spectra [7]

Define what is meant by a Hertsprung-Russell (H-R)Diagram. [3]

With the aid of a labelled H-R diagram, indicate the positions of the following stars: Main Sequence, Red Giants, Supergiants, White Dwarfs. [7]

Briefly describe how the age of a star cluster can be determined from the cluster's H-R diagram. [3]

9. Describe the internal structure of the Sun and how energy is transported from the core to the surface. [8]

Describe how the internal structure of the Sun will change as it evolves from the Main Sequence to become a White Dwarf. [12]

10. List five different methods that can be used to search for extra-solar planets. [5]
For each method, which parameters of extra-solar planets can one determine? Explain how. [12]
Briefly state the differences between a) a very low mass star b) a brown dwarf c) a planet. [3]
11. Excluding Earth, which planets and satellites in our Solar System may contain (or may have contained) life? [2]
What is ALH84001 and why is it important? [6]
What is the Miller-Urey experiment? [3]
Briefly describe how it works and underline what it demonstrates and what it does not demonstrate. [9]
12. The most accepted theory for the formation of our Solar System is the Nebular Hypothesis (known also as the Condensation Model). Describe the main features of this model, including the formation of the Sun, the planets and other Solar System bodies. [20]