



**DEPARTMENT OF PHYSICS & ASTRONOMY**

**Autumn Semester 2006-2007**

**THE HISTORY OF ASTRONOMY**

**2 Hours**

*Answer FOUR questions.*

*All questions are marked out of ten. The breakdown on the right-hand side of the paper is meant as a guide to the marks that can be obtained from each part.*

- 1** Explain in detail how  
(a) the radius of the Earth, and  
(b) the Earth-Moon distance  
were first measured. [2.5]
- When was it realised, and by what means, that the polar and equatorial radii of the Earth were different, and that the Earth-Moon distance was changing as a function of time? [2.5]
- How has the astronomical unit been measured in the past and how has the accuracy of the results changed with time? [5]
- 2** How did astronomers estimate the age of the Earth, the Sun, and the universe in the past?  
What was the relationship between these quantities in the early 1930s? [10]
- 3** Compare and contrast the contributions to the advancement of astronomy made by Tycho Brahe (1546 – 1601) and Johannes Kepler (1571 – 1630). [6]
- What was the relationship between the lives and work of these two astronomers? [4]
- 4** Write a brief history of the *reflecting* telescope from 1660 to 1940 stressing the key stages in its development and the key discoveries made by the instrument. [10]

- 5 (a) Describe how and when Cepheids were first used to estimate astronomical distances. What role did they play in establishing the size of our Galaxy and the distance between our Galaxy and its near neighbours? [6]
- (b) Historically explain how, and when, the galactic and extragalactic distance scales were affected by the discovery of both intergalactic absorption and the difference between Population I and Population II stars. [4]
- 6 (a) Describe how our understanding of the elemental composition of the universe was established. [5]
- (b) The relative abundance of the elements is now explained using both the Big Bang and stellar nucleosynthesis. Discuss how this explanation has been developed in the course of the 20<sup>th</sup> century. [5]
- 7 (a) How did radio astronomical measurements of 21 cm radiation, and the counting of galactic radio sources as a function of brightness, influence the study of our Galaxy and cosmology? [5]
- (b) Describe from an historical standpoint the development of the realisation that the majority of the mass in our universe is 'dark'. [5]
- 8 Compare and contrast the work of Edwin Powell Hubble (1889 – 1953) and Sir Arthur Stanley Eddington (1882 – 1944) in the advancement of 20<sup>th</sup> century astronomy. [10]

**END OF EXAMINATION PAPER**