UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualifications:-

B.A. *B.Sc.* *B.Sc.(Econ)*

Astronomy 1B91: The Evolving Universe – An Overview

COURSE CODE : **ASTR1B91**

UNIT VALUE : **0.50**

DATE : **06-MAY-04**

TIME : **10.00**

TIME ALLOWED : **2 Hours 30 Minutes**

TURN OVER

Answer FOUR questions.

The numbers in square brackets in the right-hand margin indicate the provisional allocation of maximum marks per sub-section of a question.

Velocity of light, c,	=	3×10^8 m s^{-1}
Constant in Wien's Law	=	2.9×10^{-3} m K
Hubble's constant, H_0,	=	70 km s^{-1} Mpc^{-1}

1. Define the light gathering power, resolving power and magnification of a telescope. [5]

   Outline three advantages and three disadvantages of placing an observatory on the Moon. [7]

   State two basic characteristics of blackbody radiation which are important for astrophysical studies. [4]

   Using Wien's law, determine the most appropriate observational wave-bands for the study of stars with surface temperatures of 3000 K and 22000 K? [4]

2. Describe the spectral classification scheme for stars in terms of temperature and luminosity. What is the spectral type of the Sun? [9]

   The two stars HD 149757 and HD 209100 have surface temperatures of 32000 K and 4400 K, respectively. If the stars have the same radii, determine the ratio of their luminosities. [3]

   Describe the key evolutionary stages, after formation, of a star that has a neutron star as an end-state. [8]

3. Describe in some detail the nuclear reactions that comprise the principal energy source in the core of the Sun. [10]

Determine the fraction of energy emitted per unit area by a sunspot of temperature 4500 K compared to the surrounding photosphere of temperature 5800 K. [3]

Outline the main phenomena observed in the Sun during its most active phases. [7]

4. Explain what is meant by a 'standard candle' for distance determination. List 3 objects that may be used as standard candles. [6]

For the Milky Way Galaxy, outline the characteristics and content of its disk, bulge, nucleus and halo. [10]

The H_α emission line of a nearby galaxy is shifted from its laboratory wavelength of 656.3 nm to 662.0 nm. Calculate the distance to the galaxy. [4]

5. By considering the location of the Earth, contrast the Geocentric model with our modern cosmological perspective of structure in the Universe. [12]

Explain how observations of the redshift of galaxies and measurements of deuterium support the Big Bang model. [4]

What is meant by the critical density of the Universe? [4]

6. Outline the four basic processes which are dominant in shaping the surface features of terrestrial planets. [10]

Discuss the evidence for a sub-surface ocean of liquid water in Europa [7]

Jupiter has a very strong magnetic field. Briefly explain whether this is expected based on our understanding of the planet's internal structure. [3]

END OF PAPER