Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

(a) Explain what is meant by *light year* and *parsec.*

(i) light year

_____

_____

(ii) parsec

_____

_____

(2)

(b) 95 Herculis is approximately 450 light years from the Earth. It is a binary system consisting of two stars each of apparent magnitude 5.1. One star belongs to spectral class A and the other to spectral class G.

(i) Calculate the absolute magnitude of either of the stars of 95 Herculis.

_____

_____

_____

_____

(ii) To which spectral class does the hotter star belong? Justify your answer.

_____

_____

_____

(iii) To which spectral class does the smaller star belong? Justify your answer.

(5)

(c) The two stars of 95 Herculis are separated by an angle of 1.8×10^{-3} degrees. Calculate the minimum diameter of an aperture which would just allow these stars to be resolved wavelength of the light = 5.0×10^{-7} m

_____

_____

_____

(2)

(Total 9 marks)

Q2.

The Earth's atmosphere absorbs electromagnetic radiation of certain wavelengths. Detectors on the surface of the Earth are largely restricted to the visible and radio regions.

(a) (i) On the axes below, draw the black body radiation curve for the Sun.

(ii) Mark on the wavelength axis the region affected by the atmosphere's absorption of ultra violet radiation.

(iii) What is responsible for this absorption?

_____

(iv) What effect can this absorption have on the measured temperature of a star? Explain your answer.

_____

_____

_____

_____

_____

(4)

(b) The atmosphere has little effect on radio waves between 30 MHz and 300 GHz. This radio window was first exploited in 1946 when a short pulse of radio waves of wavelength 2.7 m was transmitted from the Earth and reflected back by the Moon.

(i) Show that the frequency of the transmitted waves falls within the radio window.

_____

_____

(ii) The experimenters had to take into account the relative movement of the Earth and Moon when tuning the receiver. The maximum difference between the frequency of the detected and transmitted waves was 300 Hz.

What is the name of this effect?

_____

(iii) Calculate the relative velocity of the Earth and Moon when the frequency of the received signal was 300 Hz greater than the transmitted frequency.

_____

_____

_____

(5)

(Total 9 marks)