

# Computer Marked Assignment

Covering: **Block 1**

Make sure you know how to use the CMA form: detailed instructions are given in your student handbook (or supplement).

You are strongly advised to attempt every question in this assignment.

If you do not wish to answer a question, pencil across the 'don't know' cell ('?').

If you think that a question is unsound in any way, pencil across the 'unsound' cell ('U') in addition to pencilling across either an answer cell or the 'don't know' cell.

*Note* For each question, you **must** pencil across **either** the required number of answer cells **or** the 'don't know' cell.

Cut-off date:

**Friday 25 April 1997**

## PART A

*This part relates to Block 1, mainly Chapters 1-3, and carries 50% of the marks for this assignment.*

**Q1** Images of the solar corona are readily obtained at a wavelength of 530.3 nm, a spectral line emitted by  $\text{Fe}^{13+}$ . Why is this coronal emission line so prominent? Select *one* reason from the key.

KEY for Q1

- A The corona has a particularly high abundance of iron.
- B The photons from this line are concentrated towards the Earth by the solar wind.
- ☒ C The corona has a very high temperature.
- ☒ D ~~The photosphere does not emit radiation in this wavelength region.~~
- E The chromosphere strongly absorbs this wavelength.
- F The corona has a very low density.

Pencil across *one* cell in row 1.

**Q2** Which *one*, if any, of the following phenomena is *not* correlated with the solar activity cycle?

KEY for Q2

- A The frequency of solar flares. ☒
- B The frequency of solar prominences. ☒
- C The fraction of the photosphere covered by sunspots. ☒
- D The fraction of the photosphere covered by plages. ☒
- E The geometrical form of the corona. ☒
- F The frequency of auroral displays. ☒
- ☒ G All of A-F are correlated with solar activity.

Pencil across *one* cell in row 2.

**Q3** What is the most likely photospheric temperature of a star in which the absorption lines of ionized calcium are near their maximum strength and the ionized iron lines are much less than their maximum strength? Select from the key the answer closest to yours.

KEY for Q3

- A 3 000 K
- ☒ B 4 000 K
- C 5 000 K
- D 6 000 K
- E 7 000 K
- F 8 000 K

Pencil across *one* cell in row 3.

*more lumi, narrower lines*  
**Q4** Two stars have approximately the same photospheric temperature, but the spectral absorption lines of star P are very much broader than those of star Q. Which *two* of the following statements are *false*?

KEY for Q4

- A Star Q is considerably more luminous than star P. ☒
- B Star Q has a greater radius than star P. ☒
- C If star P is a main sequence star then star Q is not a main sequence star. ☒
- ☒ D If star Q is a main sequence star then star P is a supergiant.
- E If the flux density received from star P is the same as that from star Q then, if interstellar absorption is negligible in both cases, star Q is farther away than star P. ☒
- ☒ F If the stars are at the same distance, and if interstellar absorption is negligible in both cases, then the flux density received from star Q will be the same as that received from star P.

Pencil across *two* cells in row 4.

$$L_Q > L_P$$

$$L_Q > L_P$$

$$R_Q^2 > R_P^2$$