PART IV

Attempt **TWO** *questions in this Part, which carries 24% of the marks for the examination. All of these questions carry equal marks. You are advised to spend about* **40 minutes** *on this Part. Write your answers to this Part in the* ***SEPARATE ANSWER BOOK*** *provided.*

Remember to write your name, personal identifier and examination number on your answer book.

Question 7
part a, 5%
part b, 7%

Many astronomical distances are determined using standard candles.

(*a*) Outline how observations of a standard candle are used to determine distances.

(*b*) For each of the following objects, describe the observable properties that enable them to be identified as the listed type:
(i) Type Ia supernovae
(ii) Cepheid variable stars.

Describe how you would use each object to determine distances.

Question 8
part a, 7%
part b, 5%

(*a*) (i) Outline the main similarities and differences between a Seyfert galaxy and a starburst galaxy.

(ii) Why is it believed that a Seyfert galaxy contains an active galactic nucleus (AGN), but a starburst galaxy does not?

(*b*) Sketch the standard model of an AGN, indicating the engine and the regions responsible for emitting (i) the broad spectral lines, (ii) the forbidden spectral lines.

Question 9
part a, 5%
part b, 7%

(*a*) List the *three* cosmological problems that are addressed by the theory of inflation, and state why each *is* a problem.

(*b*) Describe what is meant by inflation, explaining its possible role in the early development of the Universe and how it can resolve the three problems in part *a*.

[END OF QUESTION PAPER]