The Open University

Science Supplementary Material
S281   Astronomy and Planetary Science   JUL 1996

S281 CMAs 43, 44
TMA 04

Course and assignment number:

Computer Marked Assignment

S281 43

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.*

Covering: **Block 3**

Cut-off date:
Friday 30 August 1996

PART A

This part relates mainly to Book 3, Chapters 1 and 2, and carries 50% of the marks for this assignment.

Q1 and **Q2**   These questions concern the rotation of the material in a galaxy.

KEY for Q1 and Q2

A   The orbital period of the circulating material changes with distance from the centre of the galaxy.

B   The speed of the circulating material changes with distance from the centre of the galaxy.

C   The angular speed of the circulating material changes with distance from the centre of the galaxy.

D   None of A–C.

Q1   Select the *one* item from the key that is *always true* when speaking of material that is *not* undergoing differential rotation.

B

Pencil across *one* cell in row 1.

Q2   Select the *one* item from the key that is *sometimes* true and sometimes false when describing the motion of material that *is* undergoing differential rotation.

Pencil across *one* cell in row 2.

Q3   A galaxy with a roughly spherically symmetric mass distribution has a rotation curve as shown in Figure 1. Which *one* of the graphs in the key for Q3 (*overleaf*) correctly represents the included mass $M(r)$ as a function of radius r from the centre of the galaxy? The included mass is given by $M(r) = rv^2/G$.
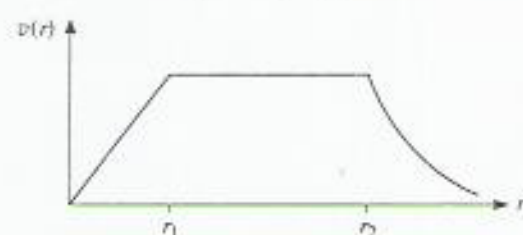

Figure 1   The rotation curve for the galaxy in Q3.

$$V = \sqrt{\frac{GM(r)}{r}}$$

$$\propto \sqrt{\frac{M(r)}{r}}$$