

Name of the Student: _____

Max. Marks : 13 Marks

Time : 13 Minutes

Mark Schemes

Q1.(a) use of $z = v/c$

to give $v = zc = 0.057 \times 3 \times 10^8 \checkmark$

$$= 1.71 \times 10^7 \text{ms}^{-1} = 1.71 \times 10^4 \text{kms}^{-1}$$

use of $v = Hd$

to give $d = v/H = 1.71 \times 10^4 / 65 \checkmark$

$$= 263 \checkmark \text{ Mpc} \checkmark$$

4

(b) (Strong) radio sources $\checkmark$

1

[5]**Q2.**(a) (i) increase in wavelength (of em radiation) due to relative recessive velocity between observer and source $\checkmark$

1

(ii) use of $v = Hd$

to give $v = 65 \times 25 \checkmark$

$$= 1.6 \times 10^3 (\text{km s}^{-1}) \checkmark$$

2

(b) (i) all type 1a supernovae have same **peak** absolute magnitude $\checkmark$ apparent magnitude can be measured $\checkmark$ ref to m-M log (d/10) or inverse square law $\checkmark$

max 2

(ii) use of $m-M = 5 \log (d/10)$

gives $12.9 - (-19.3) = 5 \log (d/10) \checkmark$

$$\log (d/10) = 6.44$$

$$d = 27.5 (\text{Mpc}) \checkmark$$

(c) to make the accepted value for the distance more reliable ✓✓