[This question paper contains 3 printed pages.]

Your Roll No. .....

UNIVERSITY OF DELHI

Department of Physics & Astrophysics

M. Sc. (Physics), III Semester, November - December, 2012

PHYS-555 (Astronomy & Astrophysics-I)

Maximum Marks: 70 **Time: 3 hrs.**

(Write your Roll No. on the top immediately on receipt of this question paper)

(Attempt any *four* questions. All symbols have their usual meanings)

Some useful constants:

1 *AU*= $1.496 \times 10^{13} cm$

1 *light year* = $9.463 \times 10^{17} cm$

1 Parsec= 3.26 light yrs

$G = 6.67 \times 10^{-6} cm^3 g^{-1} sec^{-2}$

$M_\odot = 2 \times 10^{33}$ *gm*

$L_\odot = 3.9 \times 10^{33}$ *ergs* sec^{-1}

$R_\odot = 6.96 \times 10^{10} cm$

1. (a) Describe the Horizontal Coordinate system. What are the advantages and disadvantages of this coordinate system? 7

(b) Describe Universal Equatorial coordinate system. How it is superior than other coordinate systems? 7

(c) In Delhi at LST=20hrs, the altitude and azimuth of Moon are given as 31.5^0 and 62^0 respectively. Find its Right ascension and Declination. The latitude of Delhi is 28^0.

7+7+3 ½

2. (a) What is spectroscopic parallax? Where it is used? 4

(b) Find the expression for "Distance Modulus". $m - M = 5 \log d/10$ 4

(c) The total magnitude of a triple star is 0.0. Two of its components have magnitudes 1.0 and 2.0. What is the magnitude of the third star? 5

(d) The Sun has an apparent magnitude of (-26.81) Find its absolute magnitude. 4.5

4+4+5+4 ½

3. (a) What is the difference between a Type-I and a Type-II supernova?

(b) Describe how a $10M_\odot$ protostar evolves with time.

(c) Use HR diagram to describe the evolution of a $1M_\odot$ star.

(d) How are the stars classified in-terms of their temperature and color?

4+6+4+3 ½

4. (a) What is "Optical thickness"? How it is related to the magnitude of a star?

(b) What is "Extinction coefficient"? How one can find the extinction coefficient of a site?

(c) If the Sun seen through a fog, appears as bright as the full Moon in a cloudless sky, find the optical thickness of the fog. (Apparent magnitude of Sun and Full moon are -26.81 and -12.5 respectively)

(d) What are Sunspots? How is their formation explained by Bob Cock's model?

5+4+5+3 ½

5. (a) Describe the working of a CCD.

(b) Show that the error in the signal received from a star is same as the error in the magnitude of the star.

(c) Describe how one can improve the signal to noise ratio during observation of Astronomical objects.

(d) What is the pulsation mechanism of Pulsating Variables? What is the difference between pulsating variables and cataclysmic variables? 4½5

4+4+5+4 ½