REV-01
MSP/37/42

2023/06

SET A

M.Sc. PHYSICS
SECOND SEMESTER
ASTROPHYSICS & COSMOLOGY
MSP – 204
[USE OMR FOR OBJECTIVE PART]

Duration: 1:30 hrs. **Full Marks: 35**

Objective

Time: 15 mins. **Marks: 10**

Choose the correct answer from the following: ***1×10=10***

1. The earth is at the shortest distance from the sun (perihelion) in _____.
   a. June b. July
   c. January d. September
2. Which of the following objects seems to stay fixed in the sky all the time?
   a. Vega b. The Sun
   c. Moon d. Polaris
3. 1 sidereal day is equivalent to _____ solar day(s).
   a. 1 b. 0.997
   c. 0.456 d. 0.258
4. The mass of the Sun is
   a. $1.52 \times 10^{10} kg$ b. $3.53 \times 10^{15} kg$
   c. $1.99 \times 10^{30} kg$ d. $1.55 \times 10^{42} kg$
5. The core temperature of the sun is of the order of
   a. $10^{6} K$ b. $10^{7} K$
   c. $10^{8} K$ d. $10^{9} K$
6. Which of these is not typically found on the H-R Diagram?
   a. white dwarfs b. black holes
   c. red giants d. super red giants
7. The mass defect when 4 H converts to He is counted to be
   a. 0.0286 amu b. 1.0078 amu
   c. 4.0028 amu d. 931.5 amu
8. The Grand Unified Theory Era after the Big Bang is from _____ seconds
   a. 10^{-40} to 10^{-30} b. 10^{-58} to 10^{-5}
   c. 0 to 10 d. 10^{-43} to 10^{-38}
9. What can be calculated by taking the inverse of the Hubble constant?
   a. The age of the solar system b. The recession velocity of the Universe
   c. The age of the Universe d. The Doppler Shift

10. Our knowledge of Physics breaks down when we get very close to the time of the Big Bang. How close?

a. To within the era of recombination

b. To within the Planck time

c. To within the time when gravity decoupled from the unified force

d. To within the time of nucleosynthesis.

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Descriptive

Time : 1 hr. 15 mins. Marks:25

[Answer question no.1 & any two (2) from the rest]

1. a. Define the Coordinated Universal Time (UTC) and Indian Standard Time (IST). 2+3=5

   b. If a cricket match starts at 06:40 am UTC, at what time it would be telecasted LIVE in India?

2. a. Define Apparent (m) and Absolute Magnitude (M) scales. Write the relationship equation between them. 3+4+3 =10

   b. The star Rigel is 276 light years away from us, if its apparent magnitude is 0.14, what is its absolute magnitude?

   c. The Right Ascension of the star Sirius is α=18h 36m 56s. How far is the star from vernal equinox by angle?

3. a. State the principle of trigonometric parallax method. 5+5=10

   b. The moon is observed from points A and B on the earth, A and B are diametrically opposite to each other. The angle subtended at the moon by the two directions of observation is 1°54'. Given the diameter of the earth to be about 1.28×10^7 m, compute the distance of the moon from the earth.

4. Discuss the steps involve in P-P chain reaction and in CNO cycle 5+5=10

5. a. Explain briefly how the white dwarfs are formed? 5+5=10

   b. If a star with mass $1M_\odot$ and radius $0.01R_\odot$ converts to a white dwarf, calculate the density it will possess.

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