2024/06

SET A

M.Sc. PHYSICS
SECOND SEMESTER
ASTROPHYSICS & COSMOLOGY
MSP – 204 [REPEAT]

[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. Betelgeuse is a _____ star?
   a. Main Sequence
   b. Red Giant
   c. Red Supergiant
   d. White Dwarf

2. The absolute magnitude of a celestial object is determined by placing it at how many distances from the Earth?
   a. 3.26 pc
   b. 10Mpc
   c. 1 pc
   d. 32.6 light years

3. Bellatrix is a star that lies in which constellation?
   a. Sagittarius
   b. Orion
   c. Virgo
   d. Ursa Minor

4. What is the main physical mechanism driving the variability of Cepheid variable stars?
   a. Stellar eclipses
   b. Nuclear fusion reaction
   c. Stellar winds
   d. Radial pulsations in the star's outer layers

5. What are the units of Hubble's constant?
   a. Km/s/Mpc
   b. Mpc/km/s
   c. Km/s
   d. 1/Mpc

6. What is the name of the latest solar mission launched by NASA?
   a. Parker Solar Probe
   b. Aditya L1
   c. Ulysses
   d. Solar Orbiter

7. Which part of the electromagnetic spectrum does the James Webb Space Telescope primarily focus on?
   a. Visible light
   b. X-rays
   c. Infrared light
   d. Ultraviolet light

8. At $10^{-6}s$, the temperature of the universe was how much?
   a. $10^{19}GeV$
   b. $10^{15}GeV$
   c. $1GeV$
   d. None of the above

9. How much percentage of the universe does dark matter constitute?
   a. 5%
   b. 27%
   c. 68%
   d. 100%

10. How many in-situ payloads are there in ADITYA L1?
   a. 4
   b. 3
   c. 8
   d. 5

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Descriptive

Time : 1 hr. 15 mins. **Marks : 25**

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

1. Explain the process of stellar evolution with proper diagram. 5

2. Elaborately describe the Big Bang theory of the universe with proper diagram. 8+2=10

3. **a.** Describe the ADITYA L1 mission elaborately. 5+5=10

   b. Illustrate and explain the layers of the Sun with its solar activities.

4. **a.** Using Stefan- Boltzmann law, find out the temperature of the Sun. 3+3+4 =10

   b. A pressure of 10^3 Pa prevails in the solar atmosphere. What should be the strength of the magnetic field required to balance such a pressure?

   c. The temperature inside a sunspot is 4000 K and that of its surface is 6000 K. Calculate the strength of the magnetic field inside the sunspot, which, will balance the pressure inside and outside.

5. What do you mean by "Dark Universe"? Explain how Hubble's law and Hubble's constant contribute into the cosmology. Explain cosmic microwave background radiation and what information do you infer from it? Mention at least two of the CMBR missions names. 3+5+2 =10

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