

Universe


 SET Self Evaluation Test - 31

1. "The universe is expanding" means
 - (a) Size of the hole in Ozon layer is increasing
 - (b) Universe is expanding into something
 - (c) Infinite universe is becoming more infinite
 - (d) None of these
2. The galaxy in which we live is
 - (a) Spiral galaxy
 - (b) Radio galaxy
 - (c) Irregular galaxy
 - (d) None of these
3. The distance of Venus from the sun is 0.72 AU. the orbital period of the Venus is
 - (a) 200 days
 - (b) 320 days
 - (c) 225 days
 - (d) 325 days
4. Suppose the sun was located at the position occupied by the nearest star, say, alphacenturi 4 light years away. By what factor the solar radiation received per sec per unit area decrease
 - (a) 1.5×10^{-6}
 - (b) 1.5×10^{-8}
 - (c) 1.5×10^{-9}
 - (d) 1.5×10^{-11}
5. If a galaxy is at a distance 430 million light years from us, determine Hubble's constant. Its speed being $6.48 \times 10^6 \text{ ms}^{-1}$
 - (a) 16 kms^{-1} per million light year
 - (b) 15 kms^{-1} per million light year
 - (c) 14 kms^{-1} per million light year
 - (d) None of these
6. The magnitude of two stars A and B are 2.5 and -5 respectively. The brightness ratio of $\frac{B}{A}$ is
 - (a) 7.5
 - (b) 10^2
 - (c) 10^3
 - (d) $10^{7.5}$
7. A body at 1500 K emits maximum energy at a wavelength 20,000 Å. If the Sun emits maximum energy at wavelength 5500 Å, then the temperature of Sun is
 - (a) 5454
 - (b) 4454
 - (c) 4550
 - (d) 5400
8. The hottest type of stars are called
 - (a) A type
 - (b) B type
 - (c) O type
 - (d) M type
9. Venus appears brighter than other stars because
 - (a) It is heavier than other planets
 - (b) Its density is more than other planets
 - (c) It is nearer to earth in comparison to other planets
 - (d) Nuclear fusion takes place at its surface
10. The death of a star results is in a neutron star if the original mass of star in terms of mass of Sun (M) is
 - (a) Less than $2M$
 - (b) Between $2M$ and $4M$
 - (c) Greater than $5M$
 - (d) Exactly equal to M
11. The tail of a comet points
 - (a) Towards the Sun
 - (b) Away from the Sun
 - (c) In arbitrary
 - (d) Away from the earth
12. The angle of maximum elongation for Venus is 47° . The distance of Venus from earth in A.U. is
 - (a) 0.68 A.U.
 - (b) 0.86 A.U.
 - (c) 1 A.U.
 - (d) 0.73 A.U.
13. The number of stars in our solar system is
 - (a) 9
 - (b) 5
 - (c) 1
 - (d) More than 9
14. If angular diameter of Sun is about 30' and it's distance from earth is $1.5 \times 10^{11} \text{ m}$, then solar diameter is
 - (a) $1.1 \times 10^7 \text{ m}$
 - (b) $1.5 \times 10^8 \text{ m}$
 - (c) $1.4 \times 10^9 \text{ m}$
 - (d) $1.9 \times 10^{11} \text{ m}$

AS Answers and Solutions

(SET -31)

1. (c)
 2. (a) The galaxy in which we live is spiral galaxy. Our galaxy Milky way is a spiral galaxy.

3. (c) $\frac{T_2^2}{T_1^2} = \left(\frac{r_2}{r_1}\right)^3$ or $T_2 = T_1 \left(\frac{r_2}{r_1}\right)^{3/2} = 1 \left(\frac{0.72}{1}\right)^{3/2}$
 = 0.62 year or 225 days.

4. (d) $\frac{E_1}{E_2} = \frac{r_2^2}{r_1^2}$ or $\frac{E_2}{E_1} = \frac{r_1^2}{r_2^2} \Rightarrow \frac{(1.5 \times 10^{11})^2}{(4 \times 9.46 \times 10^{15})^2} = 1.5 \times 10^{-11}$
 where $r_1 =$ Distance of Sun from earth $= 1.5 \times 10^{11} m = 1 AU$, $r_2 = 4 ly = 4 \times 9.46 \times 10^{15} m$

5. (b) $H = \frac{v}{r} = \frac{6.48 \times 10^6}{430} = 15.07 \text{ kms}^{-1}$ per million light year

6. (c) $m_B - m_A = -2.5 \log_{10} \left(\frac{I_B}{I_A}\right)$
 $\Rightarrow -5 - (2.5) = -2.5 \log_{10} \frac{I_B}{I_A} \Rightarrow \log_{10} \frac{I_B}{I_A} = 3$
 $\Rightarrow \frac{I_B}{I_A} = 10^3$.

7. (a) According to Wien's displacement law $\lambda_m T = \text{constant}$

$$\text{or } \lambda_m T = \lambda_m' T'$$

$$\text{or } T' = \frac{\lambda_m}{\lambda_m'} \times T = \frac{20,000 \text{ \AA} \times 1500 \text{ K}}{5500 \text{ \AA}} = 5454 \text{ K}.$$

8. (c) O type stars are hottest.

9. (c) Venus appears brighter than other stars because it is nearest to earth than other stars.

10. (b)

11. (b) Tail of comet points away from the sun.

12. (a) The angle formed at earth between earth planet and earth sun direction is called planet's elongation represented by ϵ , when planet appears farthest from the Sun, the angle subtended by the Sun and earth at the planet is 90° .

From the geometry of figure

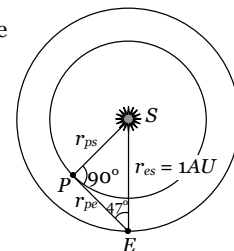
$$\frac{r_{PE}}{r_{SE}} = \cos \epsilon = \cos 47^\circ$$

$$r_P = r_{SE} \cos 47^\circ$$

$$= (\cos 47^\circ) \times 1 AU = 0.68 AU$$

Choice (a) is correct

$[\cos 45^\circ = \frac{1}{\sqrt{2}} = 0.707$. As angle increases its cosine decreases $\cos 47^\circ$ can not be 0.86, 0.73 or 1]



13. (c) The number of stars in our solar system in one (our Sun).

14. (c) We know that

$$D = r\theta = 1.5 \times 10^{11} \times \frac{1}{2} \times \frac{\pi}{180^\circ} = 1.4 \times 10^9 m$$
