19. Life Cycle of Stars

Practice Questions

Q 1) Write notes on.

1. Evolution of stars.

Ans: The change in the properties of stars with time resulting in its passing through different stages is called as evolution of a star. Stars evolve very slowly for most of their lifetime. As stars are continuously emitting energy, their energy is constantly decreasing. For their stability to remain intact i.e. for maintaining a balance between the gas pressure and the gravitational force, it is necessary that the temperature remains constant. The reason for the evolution of stars is the burning of and therefore, the decrease in the amount of fuel in their centre. When the fuel in the centre finishes, the energy generation stops. As a result, the temperature of the star starts decreasing. Due to the decrease in temperature, the gas pressure decreases and the balance between gas pressure and gravitational force cannot be maintained. As the gravitational force is now higher than the gas pressure, the star starts contracting. For this the fuels in the centre are used. How many fuels will be used depends on the mass of the star.

2. Stability of stars.

Ans: For the stability of star to remain intact i.e. for maintaining a balance between the gas pressure and the gravitational force, it is necessary that the temperature remains constant. For the temperature to remain constant, energy must be generated inside the star. This generation of energy occurs because of burning of fuel at the centre of the star. The reason for the evolution of stars is the burning of and therefore, the decrease in the amount of fuel in their centre. When the fuel in their centre finishes, the energy generation stops. As a result, the temperature of the star starts decreasing. Due to the decrease in temperature, the gas pressure decrease and the balance between gas pressure and gravitational force cannot be maintained. As the gravitational force is now higher than the gas pressure, the star starts contracting. This causes another fuel to start burning. When all fuels are exhausted, the energy generation finally stops. The evolution ends and the end stages of stars comes. Pressure remains constant even after temperature decreases. Therefore, the stability of the star can be maintained.

3. Galaxy.

Ans: Galaxy has about 10^{11} stars. Some stars are larger than the sun and have their own solar system. There are different types of stars in the galaxy they show diversity in colour, brightness. Its shape is like a disc with a bulge in the centre and its diameter is about 10^{18} km. The solar system is situated at a distance of 2×10^{17}km from its centre. The galaxy is rotating around an axis passing

through its centre and perpendicular to the disc. Its period of rotation is about 2×10^8 yrs.

4. Sun.

Ans: The Sun appears to be larger than all other stars in the sky because of its being nearest to us. There are billions of star which have higher or lower mass, size and temperature than those of the Sun. Hydrogen makes up for 72% of the mass of the Sun while helium is 26%. The rest 2% is made up of elements heavier than helium. The total mass of the Sun is 2×10^{30} kg. The radius of the Sun is 695700 km. The surface temperature of the Sun is 5800K and the temperature at the centre is 1.5×10^7K. The age of the Sun is 4.5 billion yrs. The masses of other stars are measured with respect to the mass of the Sun. This means that the mass of the Sun is used as the unit of mass. The scientist have concluded that the properties of the Sun have remained unchanged over its lifetime i.e. the past 4.5 billion years.

5. Galaxy.

Ans: The collection of billions of stars and their planetary systems is called as galaxy. Our solar system is also a galaxy. There are stars, planets, star cluster, nebula, Gas cloud, Dust cloud, dead stars etc. in a galaxy.

Q 2) Write reasons.

1. The star having initial mass less than 8 time the mass of the Sun ($M_{star} < 8M_{sun}$) is called as red giant star.

Ans: Stars undergo huge expansion and their radius increases by a factor of 100 to 200. It appears reddish due to their lower temperature. $M_{star} < 8M_{sun}$Star is called as red giant star due to their large size, lower temperature and reddish colour.

2. The other components can be seen by telescope, other than planets and stars.

Ans: Several telescopes are placed on the surface of the earth, while some others are kept aboard manmade satellites. As these telescopes are situated above the earth's atmosphere they can observe astronomical objects more effectively. Hence the other components can be seen by telescope, other than planets and stars.

3. Sun is an ordinary star.

Ans: Even though Sun appears to be larger than all other stars in the sky because of it being nearest to us, there are billions of star which have higher or lower mass size and temperature than those of the Sun. Therefore, Sun is an ordinary star.

Q 3) Write the answers of the following question.

1. State the properties of stars.

Ans: 1. At night, we can see about 4000 stars with our naked eyes. 2. Stars are dense sphere of hot gases. 3. Sun is an ordinary star. 4. There are billions of stars which have higher or lower mass size and temperature than those of the Sun.

2. How is the dense sphere of hot gas formed?

Ans: Due to some disturbance, clouds start contracting. Because of the contraction, their density starts increasing and their temperature also starts to increases and a dense sphere of hot gas is formed from the cloud.

3. Describe the end stage of the stars.

Ans: Due to the imbalance between gravitational force and hot gases pressure of stars they start contracting and the density of star increases. When the density becomes very high, some new types of pressures are generated which do not depend on the temperature of the gas. In such case, the gas pressure remains constant even after the energy generation stops completely and the temperature of the gas goes on decreasing. The stability of the star can remain intact forever and this can be considered as the end stage of a star. The visual appearance of this final stage of the stars is related to main mass of the star.

i. End stages of stars having initial mass less than 8 time the mass of the Sun ($M_{star} < 8M_{sun}$)
ii. End stages of stars having mass between 8 and 25 time the mass of the Sun ($8M_{sun} < M_{star} < 25M_{sun}$)
iii. End stages of stars having mass larger than 25 times the mass of the Sun ($M_{star} > 25M_{sun}$)

Q 4) Identify the correlation.

1. _____: 3.3 lakh times of the earth.: : Radius of the earth: 100 times that of the earth

Ans: The mass of the Sun

2. The light to reach on the earth from the Sun: _____: : The light to reach from the star alpha Centauri : 4.2 years

Ans:; 8 minutes

Q 5) Identify different terms.

1. Elliptical, Irregular, Rectangular, Spiral

Ans: Rectangular (other are the shapes of galaxies)

2. White dwarf, Neutron star, Red giant, Black hole

Ans: Red giant (other are the end stages of stars)

3. Explain the difference-

Gravitational force of the star	Air pressure of the star
The gravitational force is acting inwards, towards the centre of the star.	The gas pressure is acting outwards, i.e. away from the centre of the star.

Q 6) Write whether the following statements are true or false.

1. Due to some disturbances, these clouds start expanding.

Ans: False (Due to some disturbances, these clouds start contracting)

2. Hydrogen at the centre of the Sun works as a fuel.

Ans: True

Q 7) Write a definition.

1. Light year

Ans: The distance travelled by light in one year is called a light year.

2. Red giant stars

Ans: Stars undergo huge expansion and their radius increases by a factor of 100 to 200. This stage is called as red giant stars.

3. Milky Way

Ans: The galaxy in which our solar system is situated is called as Milky Way.

4. Satellite

Ans: The other planets/ object that moves around planet are called as satellites.

Q 8) Write the answers in one sentence.

1. What is the name of our galaxy?

Ans: The name of our galaxy is Mandakini.

2. What are the shapes of the galaxy?

Ans: Spiral, elliptical and irregular are the shapes of the galaxies.

3. Which nucleus is formed in the Sun?

Ans: The helium nucleus is formed in the Sun.

4. Which unit is used for measuring large distances?

Ans: The unit of light year is used for measuring large distances.

5. Which force keeps the star stable?

Ans: The gravitational force keeps the star stable.

6. We cannot see the star but can see a minute black hole at its place. What is it called as?

Ans: We cannot see the star but can see a minute black hole at its place and it is called a black hole.

7. How does the star become due to the energy generation?

Ans: The star become self-illuminated due to the energy generation.

8. The gas pressure depends on what?

Ans: The gas pressure depends on the density and temperature of the gas.

9. How much time does light take to reach us from the moon?

Ans: The light takes about 1second to reach us from the moon.

10. How many years does the galaxy take for one rotation?

Ans: The galaxy take 2×10^8years for one rotation.

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