SHIKSHA CLASSES

Sub. : Science **Answer Paper** **Marks : 20**

Std. : VIIIth - S.B. **19. Life Cycle of Stars**

Q.1(A) : Choose the correct alternative **2**

1) The speed of light is ……. km/s.

Ans : a) 300000

2) The end stage of the Sun will be ……. .

Ans : b) White dwarf

Q.1(B) : Solve any one of the following question 1

1) Write true or false?

a) Light year is used to measure time.

Ans : False. (Light year is used to measure distance.)

b) End stage of a star depends on its initial mass.

Ans : True.

2) What is a black hole?

Ans : A black hole is the end stage of a quite big star where due to the extremely high gravitational force nothing not even light comes out.

3) Match the following.

Ans :

Column 'A'	Answer
1. Gravitational force	d. towards the centre of a star or a planet
2. The star nearest to us other than the Sun	a. Alpha Centauri

Q.2(A) : Give reason (Any One) 2

1) The Sun is called as an ordinary star.

Ans : The star nearest to the earth is the Sun. Hence, it appears quite big and bright. There are billions of stars in our galaxy called the Milky Way and Mandakini which are greater or lower in mass, size and temperature than the Sun. Hence, the Sun is called an ordinary star.

2) Evolution of the star take place

Ans : Star loses its energy constantly due to continuous emission of light and energy. This means that the temperature of a star decreases continuously and hence its gas pressure which thereby decreases its stability. But we know a star is very stable. So, to maintain the stability of a star, its temperature is maintained constant with the help of energy released by the burning of fuel at its centre. This burning and therefore the decrease in the amount of fuel is the reason for the evolution in the stars.

Q.2(B): Solve any two of the following question. 4

1) How do stars form?

Ans : There are huge clouds of gas and dust in the empty spaces between the stars in a galaxy. These clouds are called interstellar clouds. The size of an interstellar cloud is about a few light years. When an interstellar cloud starts contracting due to some disturbance, its density and temperature increase. This results in formation of a dense sphere of hot gas and nuclear energy generation starts at the centre of the star. Therefore, the gas sphere becomes self-luminous. Thus a star is formed, i.e., a star is born.

2) Why was the name black hole given?

Ans : When a star having initial mass larger than 25 times the mass of the Sun reaches its end stage, its gravitational force and density increase exponentially. All nearby objects get attracted towards the star and nothing can come out of it, not even light. All incident light is absorbed by the star. We can probably see a very minute black hole at its place. Hence, the name is given as black hole.

3) What are the different constituents of our solar system?

Ans : The different constituents of our solar system are as follows :

1) Sun as a star.
2) Eight planets, namely, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune; of which Mercury, Venus, Earth and Mars are made up of rocks and minerals, while Jupiter, Saturn, Uranus and Neptune are made up of gases.
3) Natural satellites of some planets revolving around the respective planets.
4) Asteroids located between Mars and Jupiter.
5) Comets made up of ice, dust and gases.
6) Meteors and meteoroid

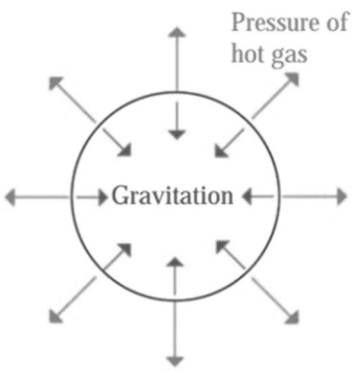
4) What is a galaxy?

Ans : A system of billions of stars, their planetary systems and interstellar clouds of gas and dust held together by gravitational attraction is called a galaxy.

Q.3 : Solve any two of the following question. 6

1) How is stability of stars maintained?

Ans : Properties of a star remain unchanged for quite a long time. The gravitational force and the force due to the pressure of the hot gas act together on a star. The gravitational force acts towards the centre of the star and tries to bring the gas particles close together. Hot gas shows the tendency to spread and its force acts away from the centre of the star. This force tries to disperse the gas particles. A balance between the gravitational force and the force due to the hot gas keeps the star stable.



However, if the magnitude of any one force is more than that of the other force, the star either contracts or expands depending upon which force dominates.

2) What are the major differences between a star and a planet?

Ans : 1) Nuclear/atomic explosions regularly take place at the centre of stars. This causes the discharge of heat and light. Hence, stars shine. Planets do not discharge any light. They are visible due to the light reflected by them.

2) Stars are very big in size and massive relative to planets.

3) Stars twinkle, planets do not.

4) Stars are made up of hydrogen, helium and other light elements.

5) Planets are made up of solid, liquid or gaseous substances or a combination thereof.

3) Which types of stars end their life as a neutron star?

Ans : Stars having initial mass between 8 and 25 times the mass of the Sun end up as neutron stars. When these stars pass through the supergiant stage, their size increases to 1000 times. Huge explosion that occurs in the last stage of these stars is very powerful and very high energy is given off. After the huge explosion, called the supernova explosion, their central portion contracts in size to about 10 km. In this stage, such stars are completely made up of neutrons and hence are called neutron stars.

4) What are the three end stages of stars?

Ans : 1) Stars having initial mass less than 8 times the mass of the Sun ultimately become white dwarfs.

2) Stars having initial mass between i 8 and 25 times the mass of the Sun ultimately become neutron stars.

3) Stars having initial mass larger than 25 times the mass of the Sun ultimately turn into black holes.

Q.4 : Solve any One of the following question. 5

1) Describe various stages of evolution of star.

Ans : Though the properties of a star remain unchanged for quite a long time, this situation is never static. A star passes through different stages. This process is called the evolution of a star.

Important stages of the evolution of a star are as follows:

1) **Initial stage of stability:** The gravitational force and the force due to the pressure of the hot gas act together on a star. The gravitational force acts towards the centre of the star and tries to bring the gas particles close together. Hot gas shows the tendency to spread and its force acts away from the centre of the star.This force tries to disperse the gas particles. A balance between the gravitational force and the force due to the hot gases keeps the star stable, as long as the energy generation continues at the centre of the star.

2) **Burning of the fuel:** As a star continuously emits energy, its energy constantly decreases. When the fuel at the centre of the star is exhausted, the energy generation stops and the temperature of the star starts decreasing. Decreasing temperature causes the gas pressure to decrease and the balance between the gravitational force and the force due to the gas pressure is no more maintained.

As the magnitude of the gravitational force is now more than that of the force due to the gas pressure, the star starts contracting. This causes another fuel to start burning, e.g. on exhausting

hydrogen, helium starts undergoing fusion. Availability of multiple fuels depends on the mass of the star.

The higher the mass of the star, the more is the number of fuels used. The star either contracts or expands during the course of using these fuels. This may cause the imbalance between the gravitational force and the force due to the hot gas.

3) **Total exhaustion of the fuel:** When all fuels are exhausted, the energy generation in the star finally stops completely and the temperature of the star starts decreasing. The balance between the gravitational force and the force due to the gas pressure can no more be maintained. The evolution of the star ends and the star proceeds to its end stage.

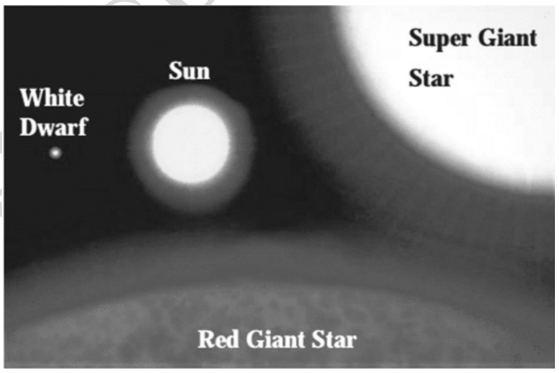
4) **End stage of a star:** Once the fuel in the star is totally exhausted, the energy generation in the star stops and subsequently the gas pressure decreases, the star starts contracting and its density starts increasing. When the density becomes very high, some new types of pressures are generated which are independent of the temperature of the gas.In such a case, the pressure remains stable despite low temperature and absence of any energy generation and thus the star remains stable for ever. This stage is the end stage of the star. Depending on the initial mass, stars can reach one of the three end stages.

- Stars having initial mass less than 8 times the mass of the Sun ultimately become white dwarfs.
- Stars having initial mass between 8 and 25 times the mass of the Sun ultimately become neutron stars.
- Stars having initial mass larger than 25 times the mass of the Sun ultimately turn into black holes.

2) Write short notes on the following:

End stages of stars having initial mass less than 8 times the mass of the Sun.

Ans : These stars undergo huge expansion and their radius increases by a factor of 100 to 200 during their various stages of evolution. These stars appear reddish due to their lower temperature. Hence, they are called red giant stars.At the end of evolution, these stars explode, their outer gas envelope is thrown out and the inner part contracts roughly to the size of the earth. Hence, the density of the star becomes very high. In this stage, the pressure due to electrons becomes independent of temperature and sufficient to balance the gravitational force for ever. Such stars look white and due to their small size they are called white dwarfs.



A comparison of sizes of different stars

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