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Subject : General Science and Ability.

⇒ Q.1 (a): Differentiate between a star and a planet. What is the magnitude of a star and how the color of stars is correlated with their temperature?

Star

1. Definition:- A star is a celestial body that possesses light and reflects it on its own.

2. Numbers:- They are Billions and millions number of stars present in the universe.

3. Size and Temperature:- Stars are huge in size and high temperature.

Planet

1. Definition:- A planet is a celestial body that does not have internal source of energy. They receive light from external source like sun.

2. Numbers:- In our solar system that part of the known universe has only 8 planets.

3. Size and Temperature:- Planets are relatively small in size and low temperature.

Star

4. Lifecycle:- Stars undergo a lifecycle.

5. Movement:- Every star in the universe move freely with a twinkling effect. They do not revolve without any other star or planet.

6. Example:- Sun, Red dwarf, Sirius star

Planet

4. Lifecycle:- planet do not have lifecycle.

5. Movement:- Every star like Sun, has planets revolving around it in orbits.

6. Example:- Earth, Mercury.

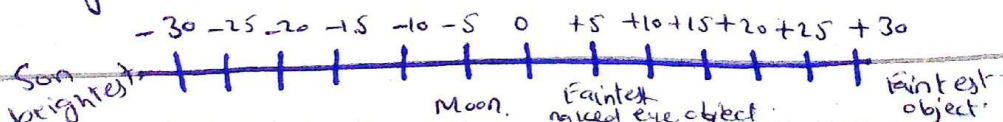
⇒ Magnitude of a Star:-

The measure of the brightness of a star is called magnitude of a star. It is measured with a stellar magnitude scale that ranges from +30 to -30.

On this scale, the brightest object has the smallest number, and the faintest object has the largest number. For example the magnitude of -10 is brightest as compared to +10. magnitude.

⇒ Example:-

Sirius is the brightest star with a magnitude of -1.46.



⇒ Relation Between the color and temperature

of a star: The surface temperature of a star determines the color it emits. The color, in turn, depends on wavelength and wavelength depends on a given magnitude. Thus According to plank's Equation:

$$E \propto \frac{1}{\lambda}$$

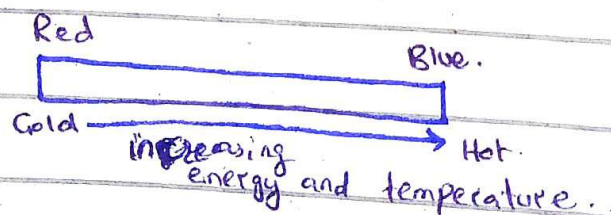
E = Energy

λ = Wavelength.

The blue stars with a low wavelength have high energy as well as high temperature and are hot. Whereas the red stars with wavelength high contain low energy and low temperature, thus are cold.

⇒ Example:-

Sirius is a hot star emitting blue light, and Betelgeuse is a cold star that emits red light.



Q No.1:(b): "Semiconductors are the Brains of modern Electronics." Explain in detail what this quotation means.

→

1. Semiconductors:- Semiconductors are the type of material that has electrical resistance of metals and the resistance of insulators. It is sometimes referred to as an integrated circuit or microchip made from pure elements like silicon and germanium.

2. → Semi-conductors in modern electronics:-
It is a matter of fact that semiconductors are critical components of millions of electronic devices used in computing, telecommunication, household appliances, banking, security, healthcare, transportation, and manufacturing etc.

3. → Computing:-

Microchips, as used in computers, became the first modern means of computation. Depending on the type of chip, a semiconductor uses binary codes to launch a program or download and save a document.

4

→ Telecommunication:-

The principle of Semiconductors for telecommunication is the same as in computing. A smartphone's semiconductor chips affect its display, navigation, battery use, 4G reception, and a lot more features. Not just mobile phones, all modern means of communication use Semiconductors to function.

5

→ Household appliances:-

Refrigerators, microwave ovens, washing machines, air conditioners, and other machines around homes and offices operate properly. Different chips in Semiconductor control temperature, timers, and other automated features.

6

→ Banking:-

Considering the banking sector, banks are the major investors in microchips as banks deal with digital accounting, cloud platforms, security cameras.

7

→ Healthcare:-

Medical Professionals, nowadays, make use of advanced technology while carrying out complex surgical procedures.

like heart Surgeries or organ transplants for accuracy, Precision and Safety

→ Q.No.1(c): Briefly describe the most popular and accepted theory about the origin of the universe.

1. Introduction:-

There are a number of theories and hypotheses that tried to explain the origin of the universe. However the most accepted among all is "The expanding Universe Theory", (Big Bang Theory) formulated by Georges Lemaitre. He was a well known mathematician and astronomer.

2. Big Bang Theory:-

Most astronomers believe the universe began in a Big Bang about 13.7 billion years ago. According to this theory, the universe is a result of an expansion and is continually expanding.

1. Singularity:-

Before the creation of everything, there was present a singularity.

Singularity means that our universe

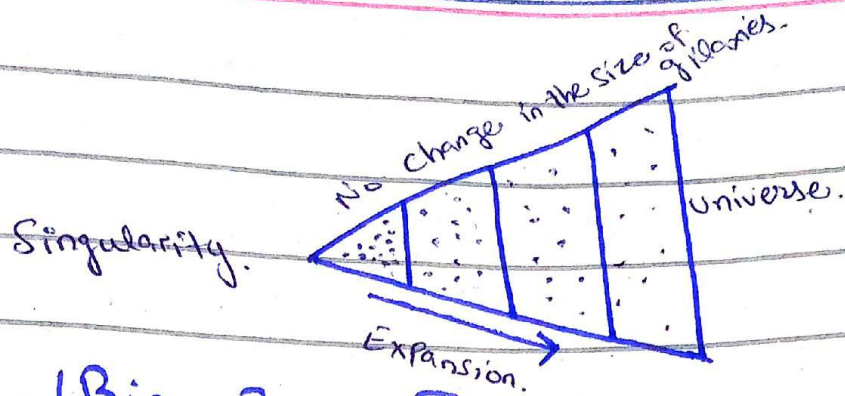
was a very dense and hot single point and time and space were zero. Similarly, the matter and energy had same state and temperature was 10^{30} .

2⇒ Expansion:-

About 13.5 billion years ago, some force suddenly expanded the singularity, resulting in the evolution of time and space. As the space started to expand, the temperature started to cool down gradually as a result of which the energy was converted into the quarks, the first particle of matter to be formed.

3⇒ Formation:-

Eventually, the quarks started making groups and created different sub-atomic particles, which then formed atoms, elements, and molecules in the form of large chunks. As gravity was present, it converted these irregular chunks into round and elliptical shaped galactic content that, ultimately, lead to the creation of the galaxies, solar systems, planets etc. This is the universe we see today.



(Big Bang Theory)

→ Evidence for the Big Bang:-

By analysing the spectrum of light from from a star or galaxy, astronomers can tell how fast it is moving and whether it is moving towards Earth or away from Earth.

If an object moving away from Earth, its light shifts to longer, redder wavelengths, an effect known as red shift. If an object moving towards earth, its light shifts to shorter, blue wavelengths, an effect known as blue shift. Red Shift supports the big bang theory.

Hubble's Law provides scientific reasoning to the Big Bang Theory and provides the basis for its authenticity.

The law explains that the galaxies are continuously expanding without affecting the size of galaxies.

Q. No. (H). - What are the advantages and limitations of renewable energy resources? Briefly explain the prospects of non-conventional energy resources in Pakistan.

⇒
(1) Renewable Energy Resources:-

Renewable energy resources are the sources that are continuously replenished.

These sources of energy include solar energy, wind energy, geothermal energy, and hydroelectric power.

(2) Advantages of Renewable Sources of energy:-

1. These sources are naturally occurring therefore, they replenish naturally.
2. They are clean to use as they do not emit carbon and greenhouse gases. Consequently, they minimize global warming and protect our environment.

The installation of renewable energy

3. plants creates lot of employment opportunities.

(3) ⇒ Limitations of Renewable Sources of energy.

1. The installation of renewable energy plants is expensive and acquires a lot of resources.
2. The power generation from these sources depends greatly on geographical locations and weather conditions.
3. The storage cost of these energy sources is very high.

(4) ⇒ Prospects of non-conventional sources in Pakistan:-

Pakistan is a country rich in alternative sources of energy and has great potential of non-conventional energy sources. Some of the prospects of non-conventional energy sources are discussed below.

1. Wind Energy:-

Wind is an abundant resource in Pakistan. Since the country has several well-known wind corridors and an average wind speed of 7.87 m/s in 10 percent of its windiest areas the country still has a potential installable capacity of around 346,000 MW.

2. Solar energy:-

Pakistan has tremendous potential to generate solar energy. According to the World Bank, the country can fulfill its current electricity demand by utilizing just 0.071 percent of the country's area for solar voltaic power generation. Moreover, it can generate more than 2,900 gigawatts of solar power capacity.

3. Biomass:-

A large amount of solid waste is wasted every year due to improper solid ~~waste~~ waste management. However, if Pakistan properly manages its solid waste and animal dump, a large amount of biomass can be produced. According to estimation, the potential of biomass energy in Pakistan is 50,000 GWh per year.