Studybeesofficial

Where Minds Pollinate

Class 12
Physics

Chapter 23

Handwritten Notes

Follow Our Socials

studybeesofficial

studybeesofficialpak

studybeesofficialpak

DATE

Chapter no 23:

Cosmology :)

Radiations From hot body : (Imp)

it is a nature of object that it absorbs radiations of particular frequencies and it can emit radiations on heating. The nature of radiations depends upon temperature. At high temperature, the emitted radiations are of shorter wavelength and at low temperature, the emitted radiations are of longer wavelength.

Black body :

It is an ideal body which has ability to absorb all the types of radiations incident upon it. It is an ideal absorber having absorption power "1". It is also an ideal radiation which emits radiations on heating.

Prince

	a	b	c
a			
b	x	x	x
c			

(Students)

100 DATE

Intensity distribution diagram and Wien's displacement law:

- When black body is heated, radiations are emitted.
- We can observe curve lines b/w temperature and intensity, which shows that intensity is non-uniformly distributed.
- A particular wavelength (λ) has maximum intensity in the curve called λmax.

Wien's Displacement law:

According to this law, in black body :-

$$\lambda max \propto \frac{1}{T}$$

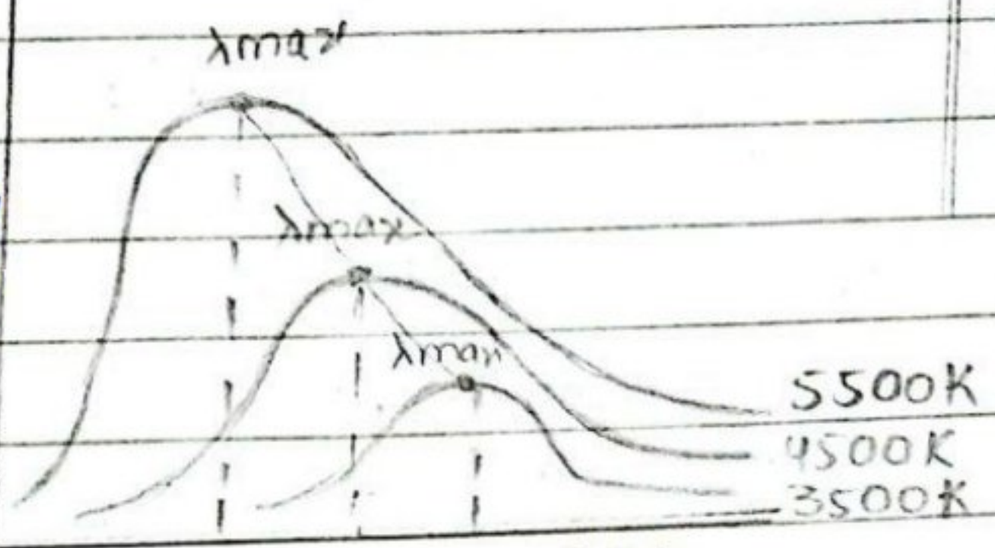
$$\lambda max\ T = constant$$

$$\lambda max\ T = 2.9 \times 10^{-3}\ mK$$

Prince

DATE

This technique is used to find temp of diff obj's.



- The higher, the temperature, the greater is the intensity of radiation.

Luminosity and Radiant flux intensity

Luminosity:

Luminosity is measure of total power output of radiation emitted by star.

- **Unit:** Watt or Js^{-1}.
- **Dependence:** Temperature of star
  Surface area of star

Stephen – Boltzman Law:

According to this law, the total energy emitted by black bole per second per unit area is directly proportional to 4th power of temperature.

(intensity) $E \propto T^4$

$$\boxed{L = A\sigma T^4}$$

A = Surface area
L = Luminosity
L/A = intensity (E)
σ = Stephen – Boltzman constant
$\sigma = 5.67 \times 10^{-8}\ Wm^{-2}K^{-4}$

$E = \frac{J}{sm^2}$

$E = \frac{L}{A}$ $\therefore Js^{-1} = L$ $A = m^2$

$L = EA$

luminosity.

- In Punjab book:-

$E = \sigma T^4$

$\frac{L}{A} = \sigma T^4$

$$\boxed{L = A\sigma T^4}$$

9

Radiant Flux Intensity:

It is the luminosity per unit area measured on the surface of Earth.

- it is represented by F.
- The relation b/w radiant flux intensity "F" and luminosity "L".

$$F = \frac{L}{A}$$

$$F = \frac{L}{4\pi d^2} \quad \because A = 4\pi d^2$$

d = distance b/w Earth and star

- A greater radiant flux intensity (F) shows that star is closer to Earth.

Q: What is standard candles? How these are used to indicate distance / as distance indicator?

Ans: **Standard Candles:**

An astronomical object (star) which has known luminosity due to (Prince)

DATE

characteristics quality possessed by that class of object.

According to the relation;

$$F = \frac{L}{4\pi d^2}$$

if we know radiant flux intesisity (F) and luminosity (L) of standard candle, then we can find out "d", which is the distance b/w star and Earth.

: How we can estimate the radius of star?

=

- Step-1: first we find the surface temperature by using Wien's Displacement law.

Step-1: $\lambda_{max} T = 2.9 \times 10^{-3}\ mK$

Step-2: we find out luminosity by using inverse square law

$$F = \frac{L}{4\pi d^2}$$

Step-3: Using Boltzman law to find out radius of star "r".

$$L = 4\pi r^2 \sigma T^4$$

Prince

DATE

Spectra of light:

Spectral Signature:

Every element has the ability to absorb or emit particular wavelength and have unique set of absorption and emission lines. The pattern of lines is called spectral signature. This technique is used by scientist to figure out what the object or material is made of.

Types of Spectra:

1. Absorption Spectra
2. Emission Spectra

1 Absorption Spectra:

When light passes through a gas, atoms and molecules in gas absorb certain colours/wavelengths of that light. This result is called absorption spectra. (a rainbow with dark absorption lines

DATE

Emission Spectra:

When same gas : ram glow giving a very specific colours to form emission spectra with bright lines known as emission lines.

Q: = What is red shift? How Doopler effect is used in this phenomena?

Ans: When lines in the emission and absorption spectra from distinct objects show an increase in wavelength from their known values. These lines appear to be shifted towards red end of spectra but lines have same pattern. This shows that the element is same but having red shift.

→ According to Doopler effect, the apparent change in wavelength or frequency of radiation due to relative motion of source and observer.

- Red Shift; if the object is moving away from Earth.
- Blue Shift; if the object is moving toward Earth.

Red Shift can be calculated by;

$$\frac{\Delta\lambda}{\lambda} = \frac{\Delta f}{f} = \frac{v}{c}$$

Prince

DATE

where $\Delta\lambda$ is the shift in wavelenght and λ is the wavelength emitted by (from) source.
And Δf is shift in frequency and f is frequency emitted from source.
And v is speed of star or galaxy and c is speed of light.

Expansion of Earth:

(-from Book).