Applied Ergonomics
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Lecture – 22

So, welcome to the second lecture of our first topic that is physical work environment and in series with that in the previous lecture we covered about the physics of the light.

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So, today we will discuss about, since this has been covered in the previous lecture and today we will cover this visibility and lighting system possible.

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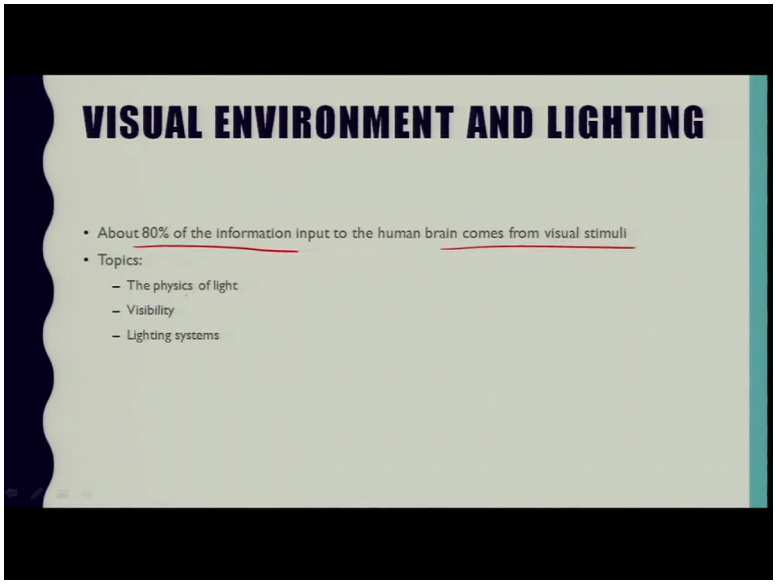

So, the visual environment as this is a very clear sentence or information that about 80 percent of the information input to the human brain comes from the visual stimuli.

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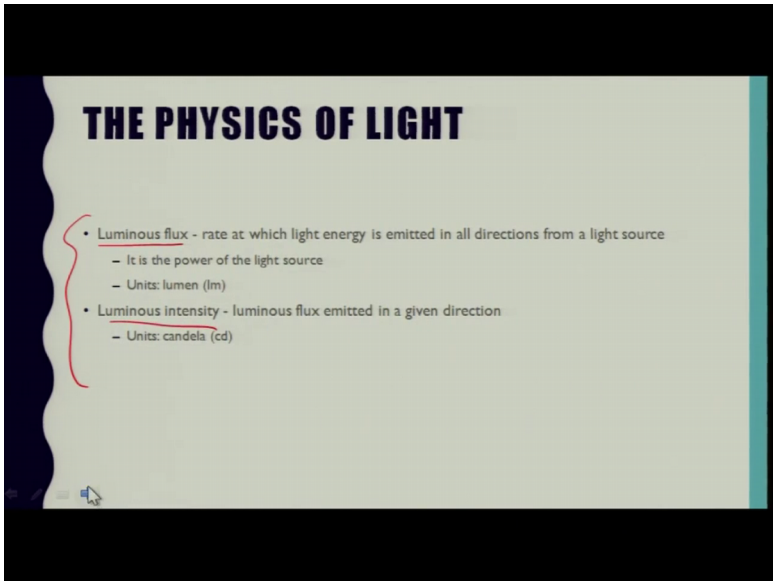

So, in that context we have discussed about the physics of the light and we just as a summary and of the past information that we gathered in the previous lecture.

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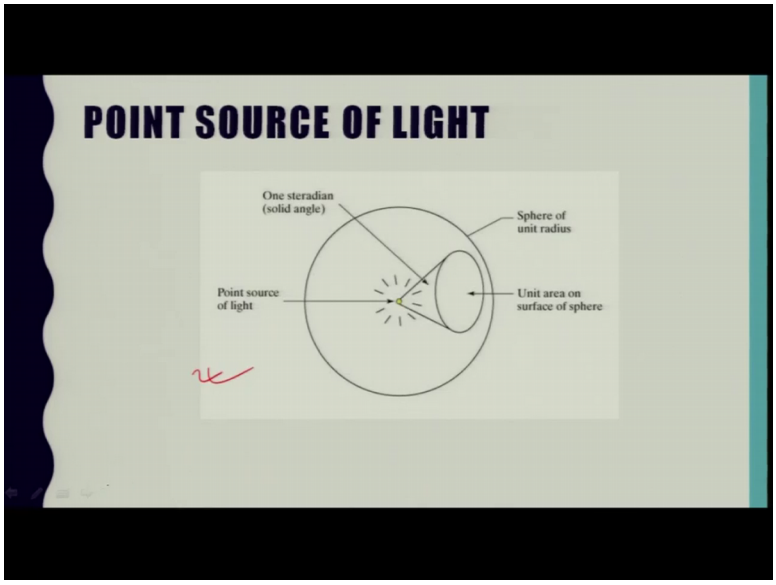

So, this luminous flux we understood about the luminous intensity and how this point source applied helps in making some of the calculations of illuminance and luminance and this formula is very much important in order to calculate the illuminance and luminance of a particular source.

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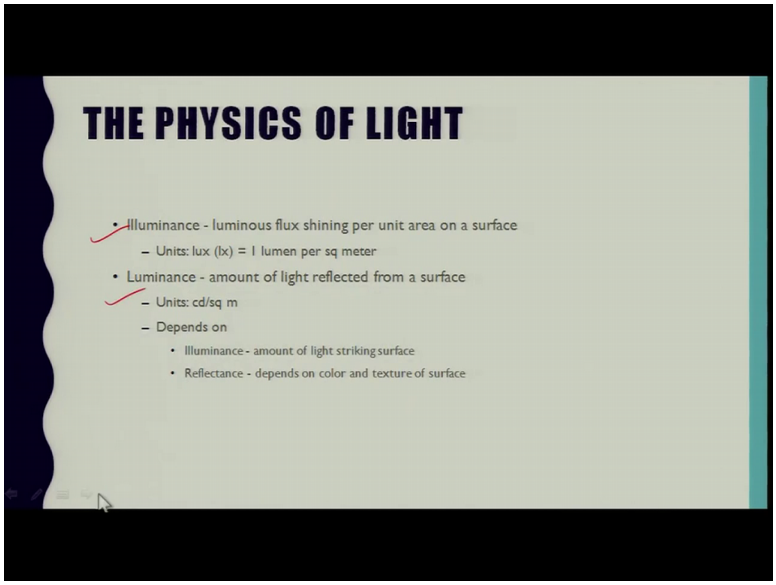

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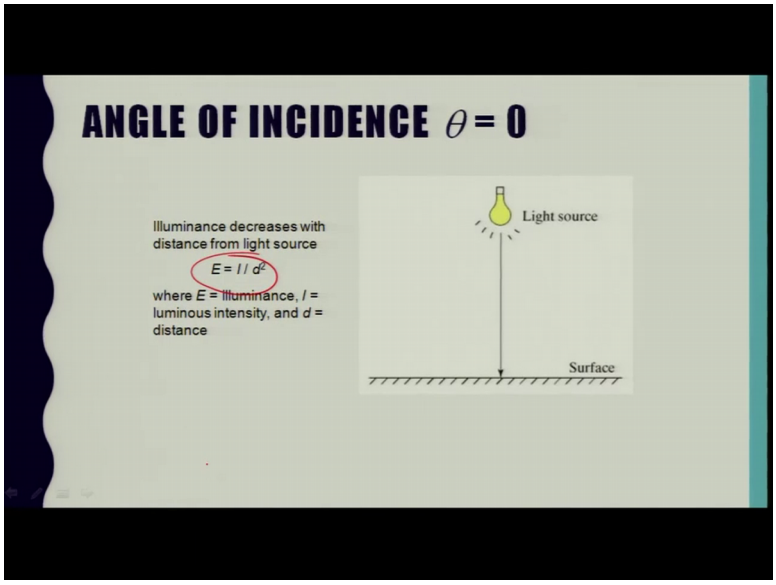

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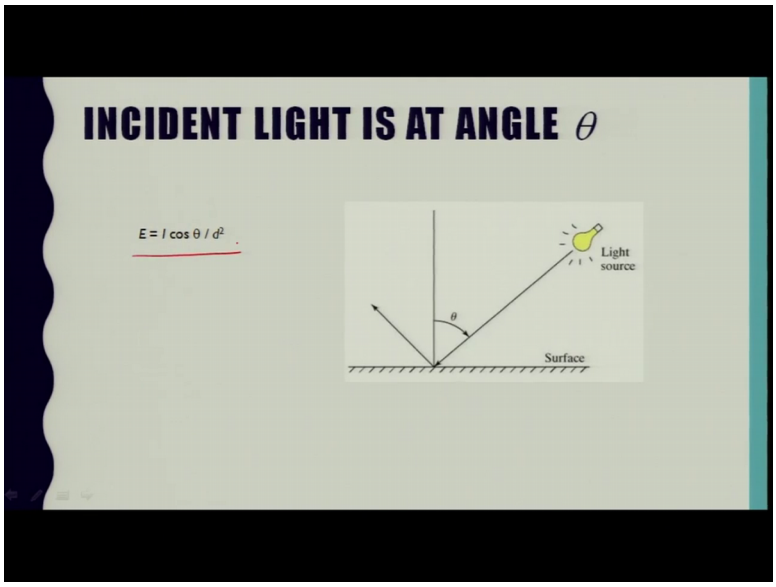

So, the if a particular light is incident at some angle so this cos theta component included in the equation and in this way.

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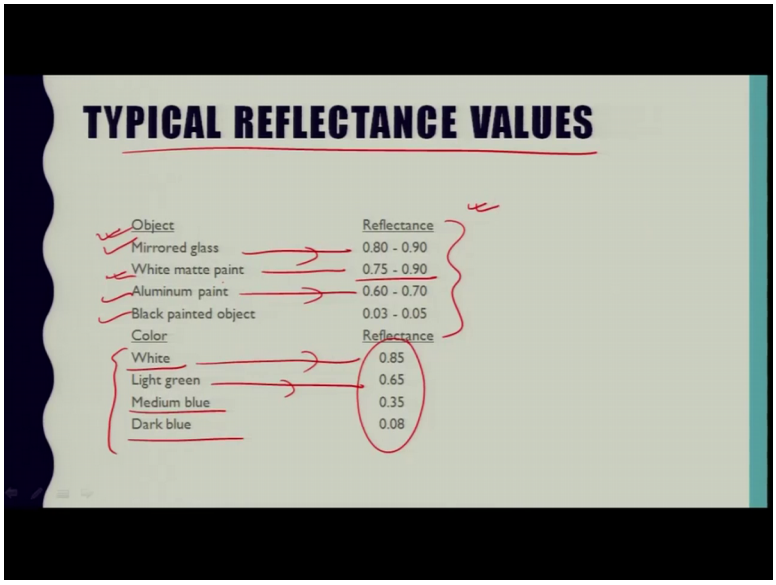

So, the luminous intensity is has been figured out with the help of the formula given in the previous slide. So, there are various typical reflected values, reflectance values that has been measured with the several objects. So, some of the objects that are very important in as for as optical study is concerned so the mirrored glass reflectance is 0.80 to 0.90, white matte paint it is having this 0.75 to 0.90, aluminum paint is having 0.60 to 0.70. So, in this way these are objects are having a some words reflectors value and as well as some colors. So, when we use some paint colors on the wall. So, even if the colour is white so the reflectance is 0.85, if it is green it is 0.65, it is medium blue or dark blue. So, these are the values you can take it from here if some calculation need to be carried out while calculating and while estimating the reference reflectance value of the particular, of particular surface that has been coated with some colour or if it is some coated with some material. So, now, we will try to understand what does visibility is all about.

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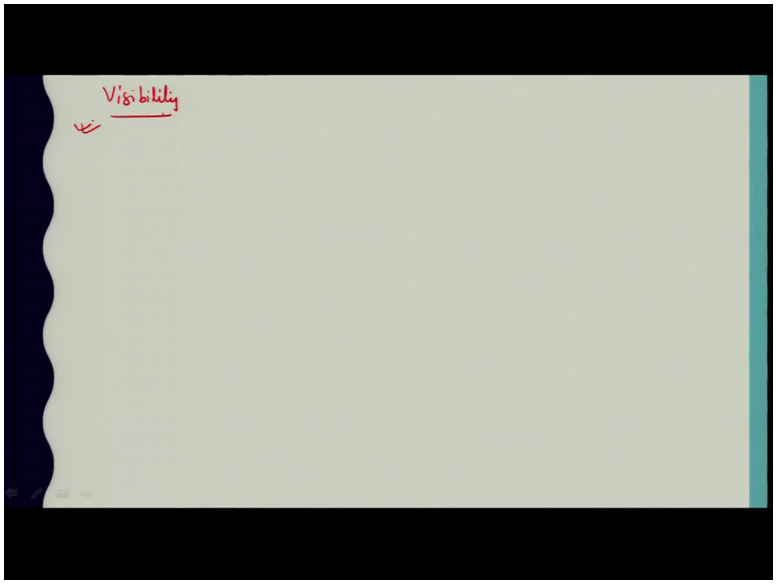

Basically this visibility it refers to the relative possibility of being seen under the prevailing conditions of lighting, distance and related aspects. So, in this particular we will try to cover to important factors that affect visibility and visual performance.

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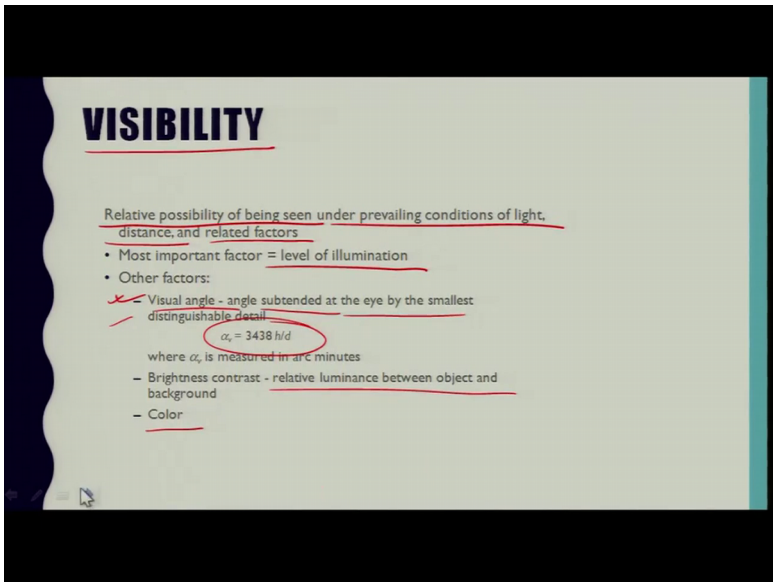

So, basically there are various recommended illumination levels, we can know that so before that we will understand that what this particular visibility is all about. So, this is it disability refers to the relative possibility of being seen under prevailing conditions of light, distance and related factors and most important factor is level of ill lamination. Other factors including visual angle and this particular formula we developed and we

understood in the previous class when we were talking about the different human sensors in cognitive ergonomic part.

So, in that we calculated this alpha b equals to 3438 ash up on d. So, this particular visual angle in a summary it is defined as the angle subtended at the I by the smallest distinguishable detail as far as brightness is concerned so brightness contrast. So, relative luminous between object and background and the other factors is also colour. So, as far as recommended illumination level is concerned.

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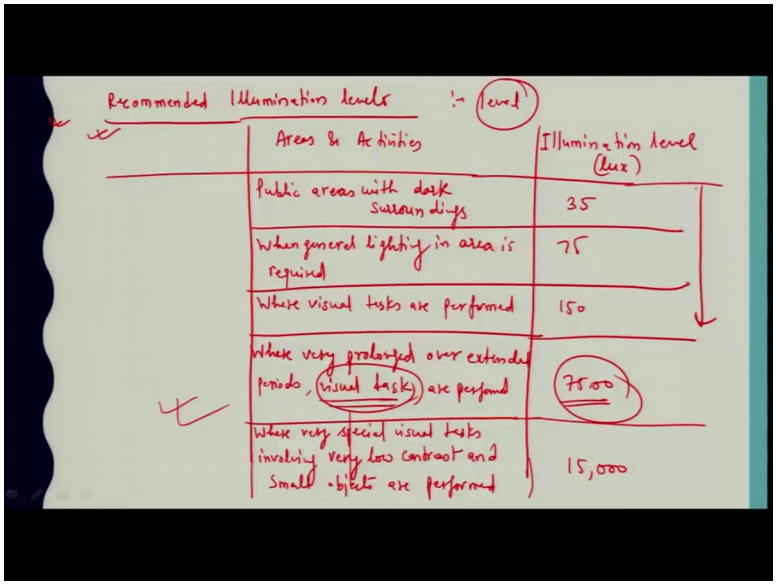

So, the most important factor for a good visibility is the amount of light shining on the object. So, that is the level of illumination in the working area. So, basically this recommended illumination levels have been developed by eliminating engineering society of North America. So, some of these accommodations have been adopted for our analysis also. So, I am giving you some of the values through which we can predict the recommended interior illumination levels for some work situations. So, there are various categories through which we can predict the corresponding illumination level and the areas and activities. So, the areas and activities and this is the, here we will put the illumination level. So, like public areas with dark surroundings. So, illumination level is around 35 it is expressed in lux, when general lighting is required.

When general lighting in area is required so it is around 75 illumination level is there, when where let us say visual task are performed and that is too occasionally. So, 150

illumination level is required where very special like where one more category we can define here. So, where very pro long and exacting visual task are performed so this particular illumination keep on increasing depending on the, depending on the visual task with the low contrast or high contrast is performed. It is like a when very pro longed well very prolonged over extended period the visual, visual task means the task which is including which is which can be done in the visual environment. So, those task are visual task so visual task are performed. So, here around 7500 illumination level is required and there are various categories. So, just few categories I am defining here like where very spatial visual task involving very low contrast and a small objects are performed.

So, the illumination level is very very high. So, there are several categories and possible recommended illumination level of various areas and activities. So, as your requirement is bit higher and stress on the eye is large and where you are dealing with the small objects. So, the illumination level must be higher.

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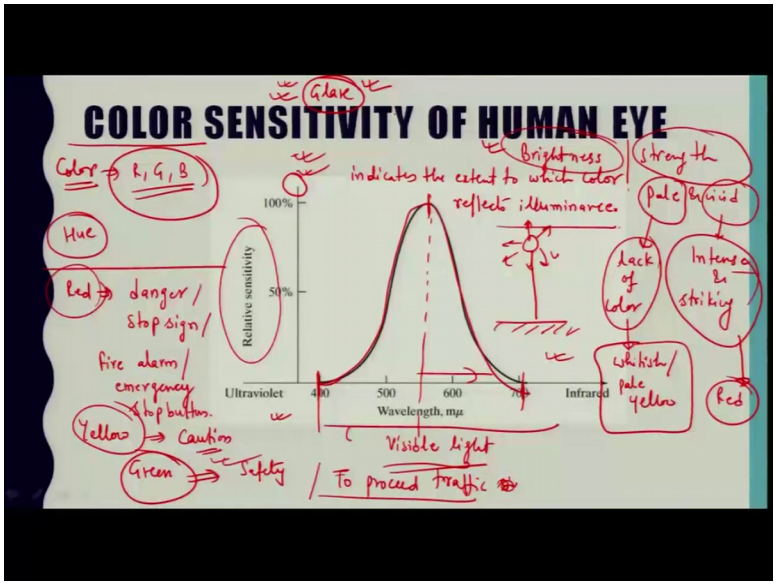

So, now basically there are other factors affecting visibility and visual performance also. So, those factors are how much angel you are standing towards a particular object that is your visual angle and second is the brightness and contrast, there is also considering one of the main factors affecting visibility and its visual performance and the other thing is like colour. So, here you can see that the colors sensitivity of the human eye. So, if we discuss about the colour, because the intensity of the colour or the type of colour is also

factor which is affecting the, our visual performance. So, the colour is normally characterized by its hue. So, which is the attribute of the, of a colour that allows it to be classified as a red, green or blue or something intermediate between any pair of these primary colors.

So, these red, green, blue are the primary colors which we know as a basic knowledge. So, hue is determined by primarily by the dominant wavelength of the light waves anything by an object. So, they basically colour and hue are synonyms. So, the human eye more sensitive to certain colors, than to others so as you can see from this particular figure that is showing the colour sensitivity of a human eye.

So, there you can see that as the wavelength is put increasing and if it is from let us say 400 this 400 to 700 range is of visible light which is, which is the only wavelength range which a particular human can capture or can visualize. So, this 400 to 700 nanometer. So, as the wavelength is increasing the relative sensitivity is becoming higher and at certain this particular sensitivity goes on decreasing when I have at a certain value of the wavelength and beyond the certain value of wavelength it goes on decreasing. So, this colour sensitivity can sometimes be exploited in the design of task requiring visual performance. So, you can see from this figure and understood, develop understanding to towards the colour sensitivity which particular human does have apart from the colour there are other attribute which are brightness and strength.

So, as far as this brightness is concerned it indicates the extent to which colour reflects in luminous. So, it this basically brightness indicates the extent to which the colour reflects ill luminance, light colors reflect more light than dark colors as it is clear and this fact can be used to establish the desired level of contrast between objects in the workplace, basically the brightness of an object refers to its luminescence, which depends on the amount of light, so amount of light illuminating it and reflectance of its surface as per as strength of the colour is concerned. So, it indicates how it is positioned on a scale between pale and vivid. So, the question will be coming in mind that what is pale and what is vivid. So, this pale means lack of the colour and this vivid means intense and striking. So, I hope you have understood with this pale and vivid.

So, pale means the weakest of the wavelength of light. So, that can be this pale means lack of colour and which can be like white, whitish colors or pale yellow and where is as

far as vivid color is concern or intense which is intense and a striking. So, the example of that colour can be red. So, now, the colour can be used to enhance the ambience of the or can enhance the condition of the environment and comfortable of the workplace as well, that is why this comes as a major component in the, in explaining the ergonomic environment. So, as far as to create an perfect or suitable ergonomic system. So, the proper coloration is required and as well as its strength and brightness is also one of the key factor for making a ergonomically perfect in environment.

So, though certain colors are associated with certain common meanings like in workplace or in any industry or in any traffic signal generally a colour signifies some meaning. So, the significance of those colors you can identify like red, the meaning of that particular colour is mostly taken as a danger sign or stop sign in like to stop traffic light and traffic signal and red is also used for a fire alarm box or emergency stop buttons which you can find in your surrounding as well this yellow is also having some meaning. So, it means caution, another colour that is frequently used in various places just particular dream means safety or to proceed it is used to proceed for in traffic signals or in traffic.

To proceed traffic the green signal is used to be given, apart from clear color there is opposite situation where that situation can be named as glare. So, it is a basically it is defined as a harsh and uncomfortably bright light in the field of vision, to bright light maybe a source of light or a reflected light from a object. So, there are basically 3 levels of glare. So, that I am going to illustrate here in fact.

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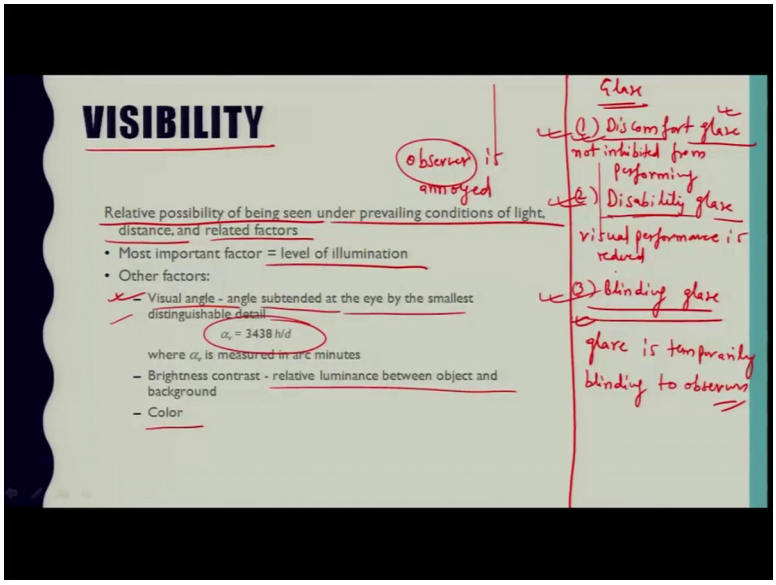

So, we will try to know what that glare is. So, there are basically three levels of glare the first kind of distinguished level is discomfort glare, the second is disability glare and the third is blinding glare. So, what the meaning of these 3 distinguish glare are like in discomfort glare observer is annoyed, but not necessarily inhabited from performing a visual task in this disability glare what it happens that observer is annoyed, observer is annoyed and visual performance is reduced.

And in that discomfort what we just know that in discomfort glare the observer is not necessarily inhibited from performing a given task, in the blinding glare it is the kind of glare in which this glare is temporarily blinding to the observer. So, in this the glare is temporally blinding to observer. So, there are several categories through which this glare is defined. So, it is just for the knowledge and what kind of these glares are defined in certain places because these are the situations where in workplaces where you face this kind of situations. So, these are done in a nutshell the factors affecting a visual performance and this visibility as well. So, before that there is a fact for you that do you know that Leonardo Da Vinci is credited with writing the first kind of resume.

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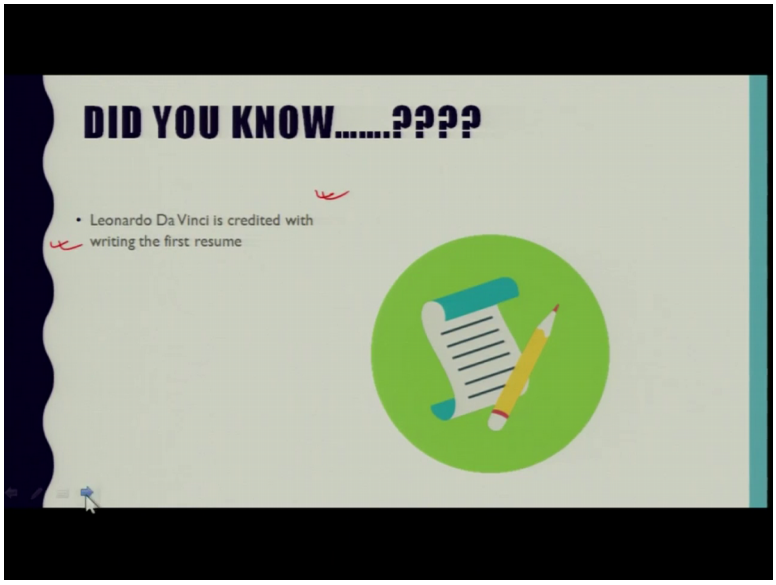

There is a one book in which its resume has been written that what kind of achievement he has occupied in his whole life can you or. So, if you were if you were a interior designer.

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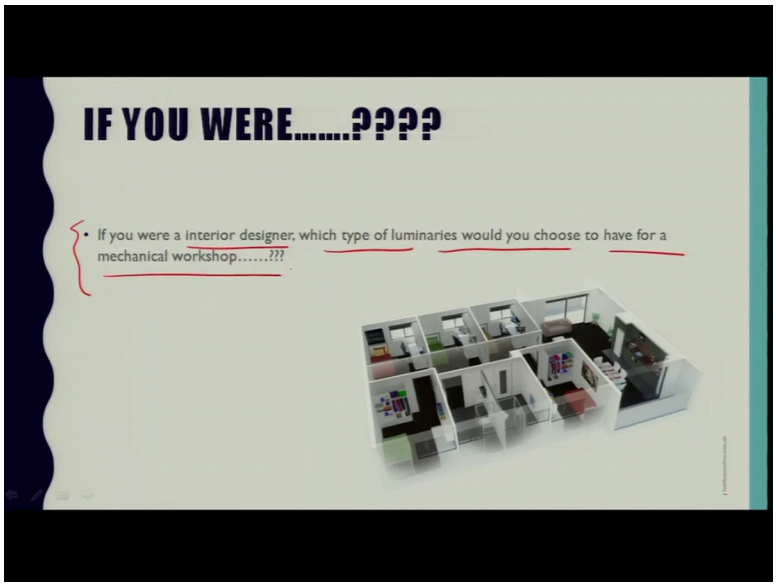

Which type of luminaries would you choose to have a for mechanical workshop.

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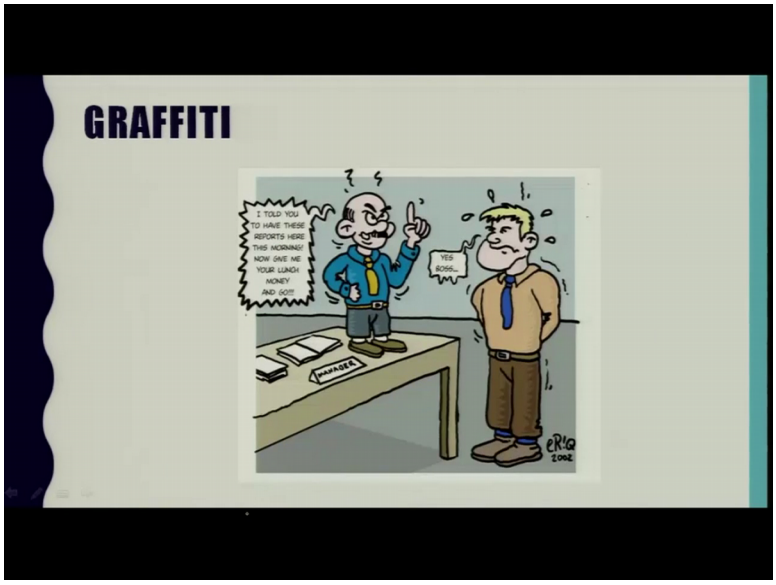

There is a graffiti for you and just read and enjoy that is all for now.

Thank you.