Introduction to Ancient Indian Technology
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Module 2
Lecture No 07

Let us start this lecture with a thought process.

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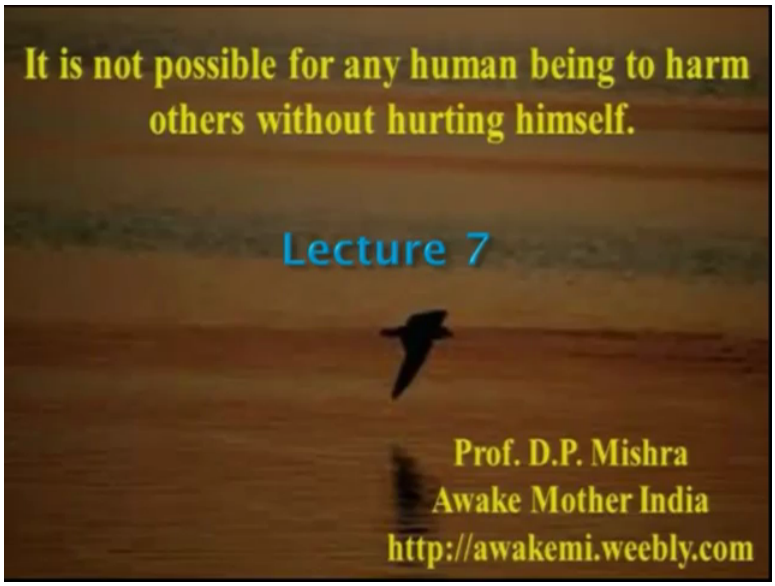

Basically it is not possible for any human being to harm others without hurting himself. That means if you want to hurt anybody you will have to hurt yourself first. That we must understand. So for that is the thing I felt myself and let us now recall what we learnt in the last lecture. And if you look at we started with basically what we call like how our ancestors were doing science using the basic principle enact to the human being that is like your anumana, pramana and then artha.. arthapati and other things.

And later on we looked at like about how our ancestors very good in mathematics and giving importance to the mathematics and also how they have really expressed the mathematics in a very poetic and also very I want to call cryptic way and later on we looked at the physics how they were having that and then some of the physics I have already discussed but we will be discussing little more what it is.

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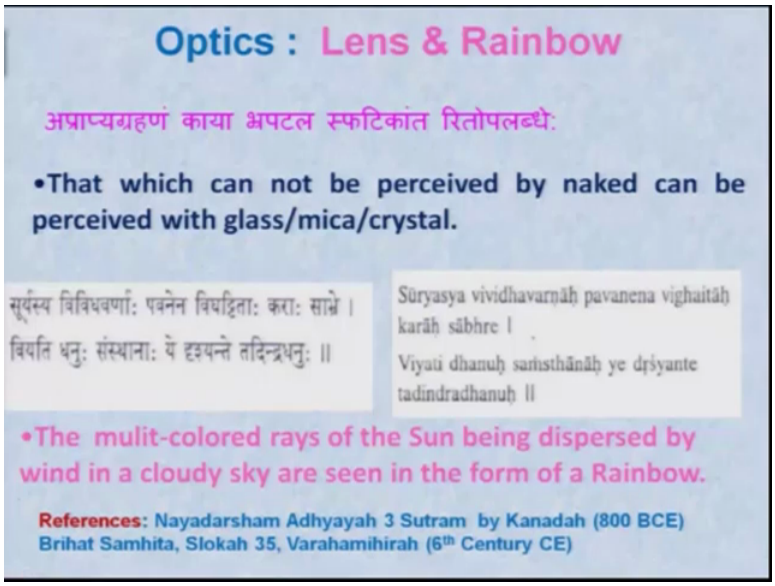

Like your optics. If you look at they have told that you know that optics wise “Aprapyagrahan kaya Bhrapatala Sfatikaant Ritoplabdha that is the basically that which cannot be perceived by naked eye; can be perceived with the glass or mica or crystal. So this is the things they have talked about and beside this basically this things I have taken from Nayadarsham adhyayah 3 and Sutram by Kanadah. It is something 800 BC. And he also says that multicolour rays of the sun being dispersed by wind in a cloudy sky are seen in the form of rainbow.

All of you might have observed the rainbow. I am afraid some of you may not because you people don’t have time to watch the sky. But I had a very great experience. I always like to watch this rainbow. Particularly in the when there is a rain and there is a sun together you know. I always enjoy it of doing that. So that is being of course out ancestor might have observed and they have talked about it very clearly.

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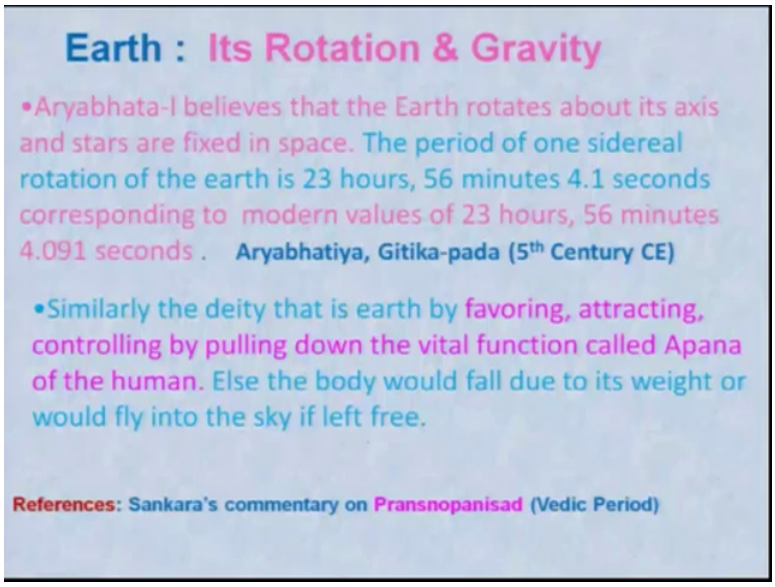

So if you look at earth and its rotation and gravity is being talked about even like around 500 CE that is the common era and before that it was there but he has Aryabhatiya has put into together assemble and then edited the earlier things and put in Gititka-Pada. Aryabhatiya believed that earth rotates about its axis and stars are fixed in space. The period of one sidereal rotation basically it is the yearly, right. And this is a latin word and then kind of things. So rotation of the earth is 23 hours 56 minutes and 4.1 seconds. That was the prediction.

And corresponding to the modern values it is almost the same. That is 23 hours 56 minutes 4.091 seconds. So accurately they could predict at that time. It is mind boggling what they were using, how they were doing, you know it is the thing to be wondered about and also explore so that we can relearn and then do that. But how to do is a one million dollar question so as to be looked at because we do not know that. And similar deity that is earth. Keep in mind that the our ancestors were right, talking in different languages than what we think. Deity means basically we think god but the earth itself is a god you know they consider.

By favoring, attracting, controlling by pulling down the vital function called apana of the human. See and in other words let us say. In other words say. Else the body would fall due to its weight or they would fly into sky if left free. But this word if you look at if you get into those details

you will find these are all different things. But now interpretation and whether to map into that era is a very challenging job.

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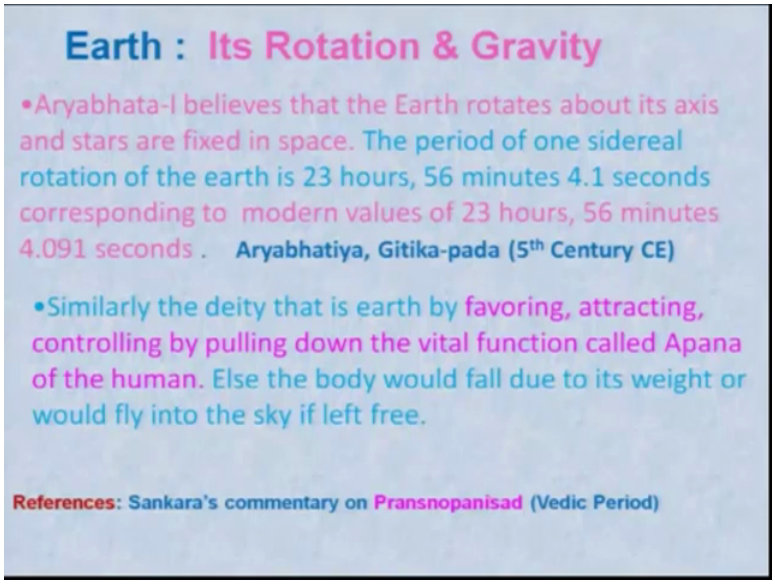

And this being taken by the Sankara's commentary, the last portion of on the pransnopanisad in the vedic period. Actually just now I was telling to you on a informal chat that Adi sanakara has given commentary. Tika means basically commentary in Pransnopanisad which is during vedic time.

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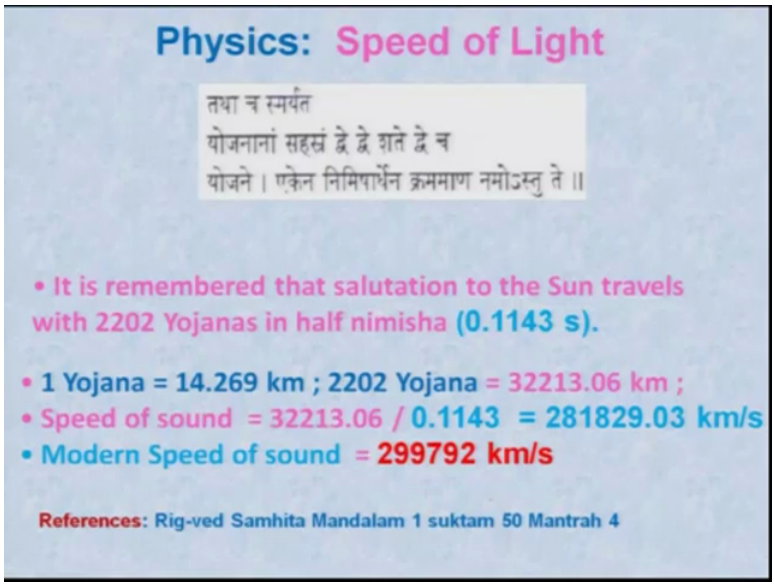

So in physics you know like speed of light is very important in this Shloka which is taken from the rig-ved samhita and of course mandalam suktam is given 50 and mantra is 4. Tathachya smariyata yojanaan sasrang dwey dwai satae dwai cha jo jane Aekena nimisardham kramanam namastutete. See actually this namaskar you like posted kind of things altogether this is a little high one has to interpret. So it is remember that salutation to the sun travels with 2202 yojana is half nimisha. 1 nimisha is 0.1143 seconds in modern time. And if you just calculate that 1 yojana is 14.269 kilometre of course there might be little reservation about that. There is a controversy also one has to look at it.

But if you consider that 2200 Yojana is basically 32213.06 kilometer. That means 32213.06 kilometer and if you divide this 32213.06 divided by 0.1143 that is half nimisha, right. You will get something 281829.03 km/s. And modern speed of light is basically the 299792 km/s. Right, so if you look at it, it is approximately similar. Right.

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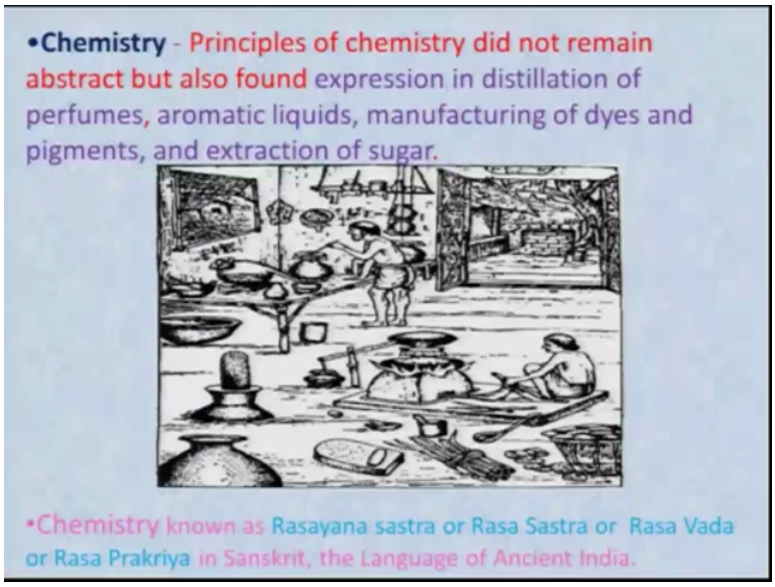

So let us look at the chemistry. Chemistry of course you know, it's a very old but people have looked at and also lot of ancient scriptures is there like rasayana sastra, rasa sastra, rasa vada, rasa prakriya in Sanskrit. You know these are the chemistry in the language of ancient India. Let me tell you that during this independence, just before the independence there is a PC Roy. He has written the Hindu chemistry. You can look at that. It is a beautiful book in English. You can look at that.

And chemistry is actually is not that what we study. Remain in the abstract form. But it was very profound in you know in application like in the distillation of perfumes, aromatic liquids, manufacturing of dyes and pigments. Like you know we are very good in textiles. I will be discussing about later on. But there you need to have used dyes and pigments you might be have gone to Ajanta and Ellora. Some of you have gone Ajanta and Ellora. You should see the paintings which is very old. There you need dyes, Okay. So those are still existing today. So many years, the weather condition is changing you know like so old but still it is existing but today modern paints if you use, it just vanishes within maybe 5 years or 3years or 4 years or sometimes earlier also. So what things they were doing, these are all chemistry stuff. So a lot of things we need to look at it and not only the chemistry but the fine arts.

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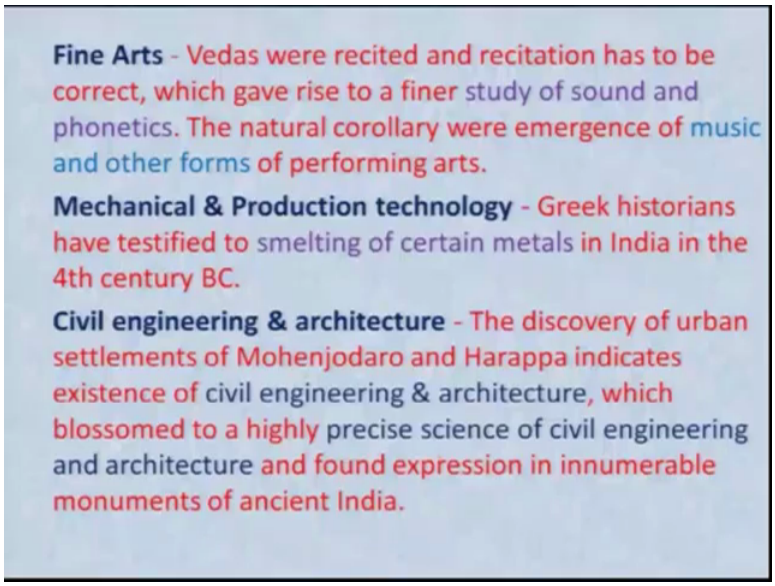

You know were very much because if you look at, Vedas were recited and recitation has to be correct. You know it is very important to be. Because now we call it vedparthi, the person who can learn and I am afraid that very few vedparthis are there in the country where veda was originated. I am trying to search a person who will teach me but I am not getting you know in Kanpur. And which was the people say this is the place where you know, northern region where the veda was originated and people are saying but today we don't have.

And which gave rise to the finest study of sound and phonetics. Sound is a very important so also the phonetics. And we don't care today about pronunciation and the natural corollary was immergence of music or you know if you look at Indian musics are varieties and also it is quite profound. And this depth and rigor. Other forms are performing arts, right. So art was a thing and if you look at mechanical and production technology, if you go to the arthashastras and also the Greek historians.

They have actually talked about how you know our people were doing smelting of metals and then processing and then you know like we will be talking about that little later on, that is about metal and mining and then metal works and how they were you know distillations of the (()) (10:18) and other things we will be talking about. And it goes back to the 400 you know BC. Before common era, right. So if you look at civil engineering architecture and we have already

discussed about Mohenjodaro and Harappa which were something around you know accepted by all people is 3500 BC but recently it has dated back to the 6000 BC which is one of the oldest other, the oldest civilization.

And with blossom to highly precise science of civil engineering and architecture, I will be discussing about that when I will be discussing about town planning. And found expression in innumerable monuments of the ancient India. We are having some of the monuments although a lot of being destroyed because of foreign invasions for thousand years. So therefore still we are having which is mind boggling, which is some of the wonders of world.

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So let us look at is not only the about architectures and production or the arts or the chemistry. It is also games. They were also doing lot of games, right. So let us look at this. If you look at this game is what you call. Any idea. Snake and ladder. Was it originated in India. It was. Okay. And this was not snake and ladder this is the Dharmapatha. The game name was Dharmapatha. Means you take the right path, if you take the right you know path. Right you know things. If you do carry out right things. Right.

Dharma, dharma is basically the which is in it in the old things. Jadhara yete dharma that means dharma of a man and rather ethical atheist. Proper rules regulation other thing, then you will go up. Otherwise you will go down. Right, go up and down. Ladder is basically right path. If you

take then again if you take a wrong path, then you will be going coming down. And that is the spirituality. Even in the game, they put in spiritual into it. Okay. So let us look at this game, right. What you call this game. What you call. Like you know there will be boxes. You will have to go from here and then pass through that.

Student 1: I think this is chopper. Chopper.

Sir: Chopper, right. This is known as pachisi and this game is across the world. In north America it is also known as pachisi. Right. Parchisi, they call. But it is commonly known as ludo. But we do not know it was. Earlier if you ask people. They do not know. It was originated in India. Let me tell you there is a lot of evidence that and I was told that evidence is there in Ajanta and Ellora. If some of you visit find it out. I have not visited. Okay. I feel of going to see and Akbar the Mughal king was very fond of this pachisi. I was told. So I mean like this was all originated. We do not know. We are modern that's why we do not know that it was there. Our people have devised it. And what is this game. These are the point and then . What do you call?

Student 2: This is chaupat.

Sir: Chaupat, what is chaupat?

Student 2: Chaupat.

Sir: Solitaire. No. This is chaturanga. What is been used in Mahabharat. Shakuni. Right. He was using this pasa. This portion he was you know misusing it rather and that technique he got. That is the being in our Mahabharat. Now this game was converted into chess. And that is an this I have given you some example. There might be several as others are there and all lost and all renamed you know. We do not know. So therefore we need to look at it. We need to also communicate to our youngsters. The look these are the things and people have accepted. Not that I am telling you will accept it. Okay.

We do not know and if I and that is would be a part of education as well. So if you look at the ancient India is the birth place of several games like chess, ludo, snake and ladder, playing cards. Cards also. And several others which you are not aware.

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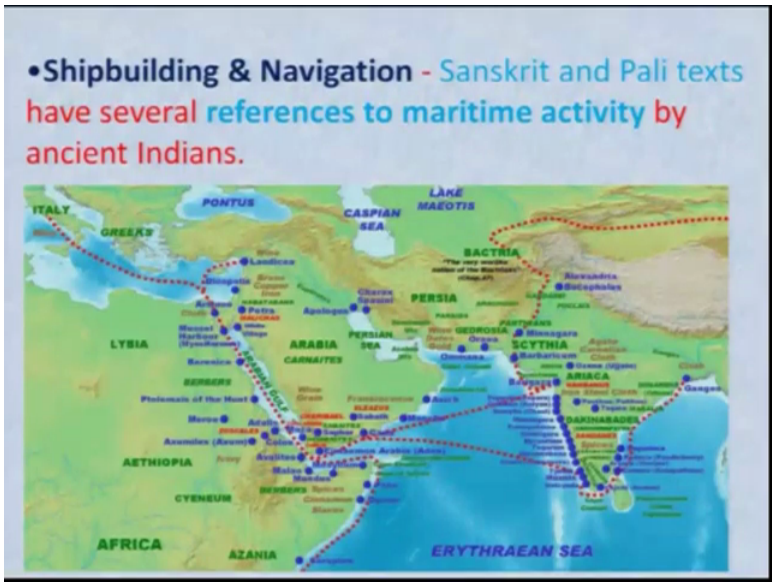

So therefore and it is not only about the games I just now move into ship building and navigation. If you see the Sanskrit and then Pali, I guess in Tamil it will be there. Okay. Because Tamil is one of the oldest language of India so I have several reference to maritime activity by ancient Indians, particularly the coastal area you know. You go back to Harappan time. I told you that Harappan time we are having dockyard. Maybe I will show you when I am talking about town planning. Okay. So and it will be definitely there but those things has to be looked at it and re-established that. And of course there is a lot of evidence in coastal India that we are having because you know kind of thing.

So if you look at that in ancient India we are having, these are the roots which is being followed. And so also here in Gujarat, this is the silk road what was having in the land and people are having from Ganges moving over here and then going through that. And these are the coastal areas of different places. You know these ports. These are all old names. Miligigara, like all those names today you may not be knowing. And there is a several materials are going like iron, steel, cloth. If you look at. Spices, right. All those thing we are exporting.

We are the let me tell you that if you read the Abdul Kalam's book you know. You will see, he has written that we are having something around 1800, 24% of the world GDP was with us before Britisher's. Okay. We are a very rich country not a not a under developed country as of

now. Okay. We are very rich and today also we are rich. Let me tell you. Rich in natural resources, rich in our what you call fertile land. I have already discussed that earlier that what we need to do is that we need to relook at it and consolidate ourselves so that it will be a very good country. They will be rich country and it will be having lot of potential to contribute not only in the science and technology and also other areas because we are intellectuals, sounds great.

But today our youth are in different direction. If they will be coming forward and we are having youth power and if they will be directed properly, educated properly. I am sure that we'll do wonders and give direction not only for our country upliftment, for others as well.

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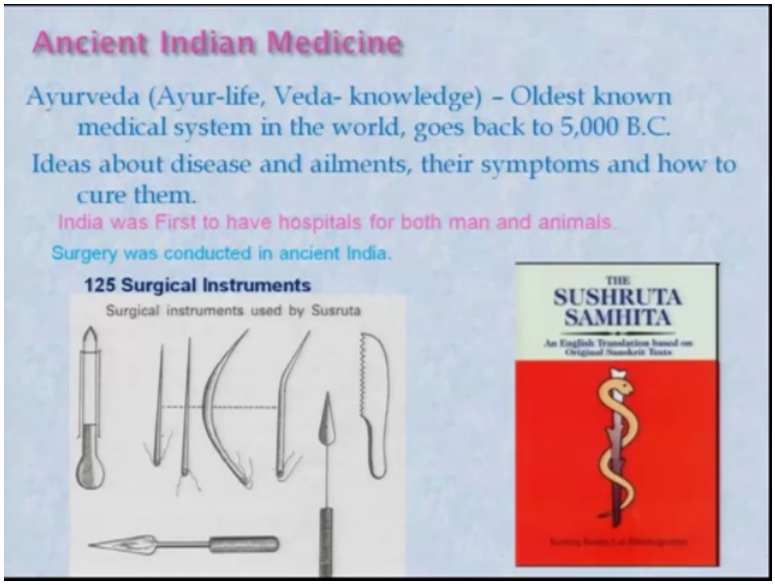

So we need to learn from this lecture that we need to relook at ourselves and intrigate it with our culture and heritage. Whichever is good, we should accept, we should learn and which is a bad, we need to skip aside and go ahead. So if you look at ancient Indian medicine. It is basically Ayur means life, veda basically Veda means knowledge, about knowledge about the life, about a human being and also the animals and it is one of the oldest known medical system in the world goes back to 6000 BC you can think of. 5000-6000 BC and India's about disease and ailments and their symptoms and how to cure them and if you look at it is a beautiful system. People have understood and then that is more intrigated with the nature than the modern medicine what we are having.

That is of course my personal belief and you can experience that and try to understand the tenants. The basic principles of that and then try to you know process it, then to use it and then get into. You will feel that way. And a lot of also research in modern times have proved that it is a quite a bit good thing to have that. And we need to also research and further the knowledge to the betterment. So India was the first to have hospitals for both man and animals. It is not only the man. So and surgery was conducted in ancient India and if you look at surgery was considered to be originated in India by Susruta. This thing and there is a lot of 125 surgical instrument I have shown you few of them. Here's.

It's not that nothing was there and surgery is a new thing. It is a part of Ayurveda. This is known as Salya sikista. And you can look at this book Sushruta Samhita which is English translation based on original Sanskrit of course and this is you can see and read it and also feel good about it and use it.

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So we need to have a house. We do housing right, yes or no. And we use concrete, isn't it. These are if you look at these are concretes and cements these are your iron rods for enforcing reinforced concreted. And we will have a flat roof, okay. Yes or no. Right and we use a lot of iron and as a result we produce a lot of pollution also and we take out the metal from the earth and we also you know cut the mountains and make great gravels. And then we use it and then if we are

having 130 crore people and if everybody wants to have a this kind of house then where will go and this house life is around something what is the life span of this kind of houses.

Any idea, maybe around 50-60 years kind of things and 56 years again I will have to go and cut the thing. Get the iron and other things. So is it possible that we will afford to give this kind of houses to all the people. But everybody wants to have that. Is there any other way of doing it. So can you make a roof of a house without concrete and iron rod, of course you will have to go back and then this thing that beam.

You know earlier days we used to give wooden beam. You might have seen in olden house. I had seen in my house we are having. Wooden beam, right. And then stiffs will be given, right. But let us say we don't want to give. Where is the wood because jungles are not there. All the human being have being filled with the land in India. Right. 130 crore people.

So is there any other way of doing it. Any idea. So let me tell you. I visited this place. This is a place in Kanpur. Right. And this is Shivrajpur temple in Kanpur and this is the roof of the house which is located just on the side of river Ganga. Okay. And that is maybe 300-400 years or more than that. I do not know. I have not dated it. But if you look at these are the bricks and then choona. Choona mean lime and sand. You can make that and it is so strong lastly. Nobody is lying there is there. And nobody is taking care of it.

And it is on the bank of Ganga subjected to water, rain and what not and then you know force of the Ganga water of the Ganga during what you call rainy seasons, flood. Now it is a doable but I do not know the technology, right. So therefore we need to relook at it. It is important to look at the science in ancient time and use it today.

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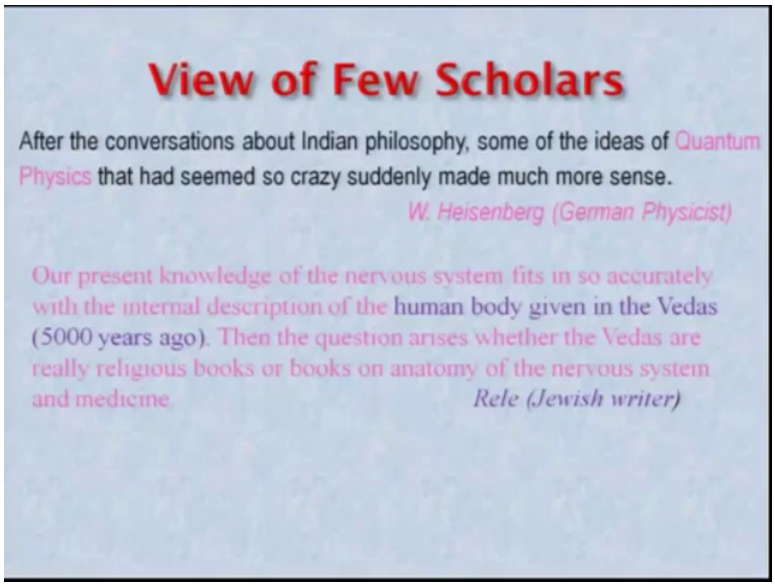

Let us look at the view of few scholars and you must be knowing Heisenberg, German physicist. Who says that after the conversations about Indian philosophy some of the ideas of quantum physics that had seem so crazy suddenly made much more sense. It is the Heisenberg who is saying not me. It means you know we need to look at our own you know Indian philosophy. How many of you are aware. We showed at least if not all of you, some of you should take interest. Okay. So similarly Rele who is the Jewish writer who says our present knowledge of the nervous system fits in so accurately with the internal description of the human body given in the Vedas something 5000 years ago, what it will.

Says, then the question arises whether the Vedas really religious books or books on anatomy of the nervous system or medicine. But let me tell you. We are not aware what is there. They are saying we should know. With this I will stop over. Thank you very much.