Robotics
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Lecture – 10
Introduction to Robot and Robotics (Contd.)

Now I am going to start with one numerical example based on this economic analysis which I have already discussed.

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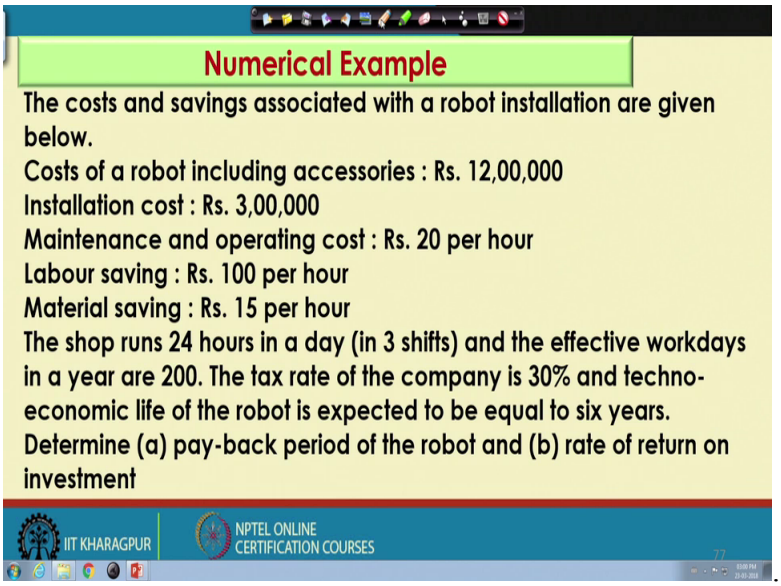

Now, here I am just going to solve one case study sort of thing the problem is as follows supposing that the constant savings associated with a robot installation are given below for example, the cost of a robot including accessories is say rupees 12 lakhs, the installation cost is rupees 3 lakhs.

The maintenance and the operating cost is say rupees 20 per hour, then the labor saving is say rupees 100 per hour, then material cost is rupees 15 per hour, and supposing that the shop this particular shop is running for 24 hours in a day; that means, there will be three shifts each shift is equivalent to 8 hours and the effective work days in a year say 200, the tax rate of the company is a 30 percent and techno economic life of the robot is expected to be equal to 6 years.

Now, we will have to determine the payback period of this particular robot and the rate of return on investment and ultimately we will have to take the decision whether we should go for purchasing this particular robot by taking loan from the bank, so that decision I am just going to take.

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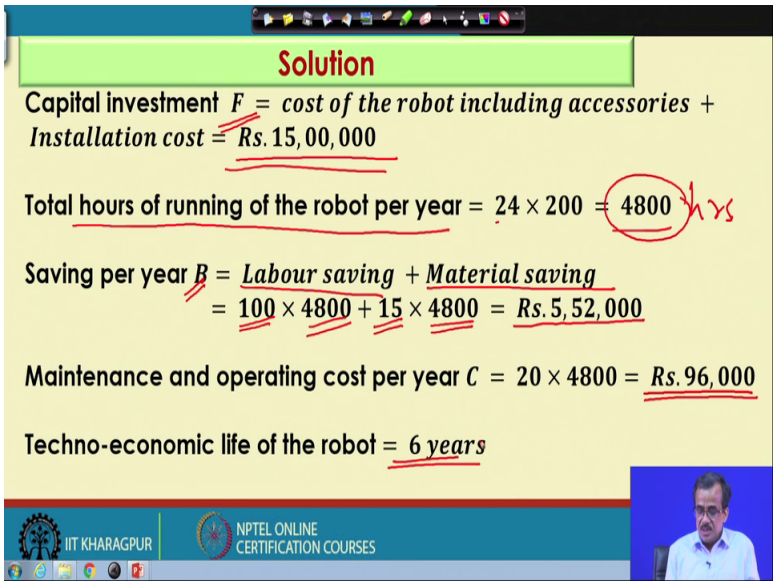

Now, here the capital investment is denoted by F and this is nothing, but the cost of the robot including accessories plus installation cost. So, rupees 12 lakhs and 3 lakhs total is rupees 15 lakhs. So, this is nothing, but the capital investment denoted by F.

Now, here the shop is running 3 shifts; that means, 24 hours in a day; that means, the whole day it is running and 200 days are the number of working days in a year. So, the total hours of running of the robot per year is nothing, but 24 multiplied by 200 that is your 4800 hours. So, this is the total hours of running.

Now, saving per year say denoted by B that is the labor saving and the material saving. Now the labor saving is rupees 100 per hour. So, rupees 100 multiplied by 4800 total number of hours plus the material saving rupees 15 per hour multiplied by. So, this total number of hours 4800, and if you add them up will be getting rupees 5, 52000. So, this is nothing, but the total saving per year by using this particular the robot.

Then maintenance and operating cost per year and that is nothing, but rupees 20 per hour. So, rupees 20 multiplied by 4800, so this is nothing, but the maintenance and the

operating cost and this is coming to be equal to your 9600 and techno economic like of the robot is given as 6 years.

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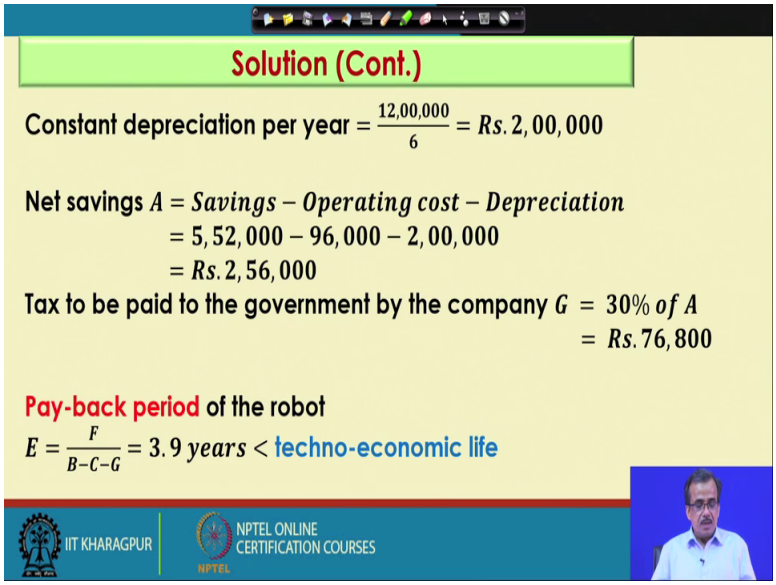

Now, capital sorry the depreciation of this robot a per year and that is nothing, but the constant depreciation which I have considered. So, the constant depreciation for simplicity you have considered now while calculating this particular depreciation. So, depreciation we should not consider the installation cost. So, actually by definition depreciation is the falling value of an asset.

So, we will have to consider the cost of the robot with accessories only, but not that installation cost and that is why for calculating the depreciation we consider rupees 12 lakhs divided by 6, but not rupees 15 lakhs divided by 6. So, this particular the constant depreciation per year is coming to be equal to your rupees 2 lakhs and this is as I told almost similar to the standard deduction whenever we calculate our income tax.

Now, the net saving is denoted by a is nothing, but the saving which I have already calculated as rupees 5,52,000 minus the operating cost and operating cost is coming to be equal to 96000, and depreciation is nothing, but rupees 2 lakh and if you calculate the net saving this will become equal to rupees 2,56000.

Now, a certain percentage of the net saving that will be paid as tax and here the tax rate is 30 percent. So, the tax to be paid to the government and that is denoted by g is nothing,

but 30 percent of the net saving that is a and that is coming to be equal to rupees 76800. So, this is the tax to be paid to the government.

Now, this payback period which is denoted by E is nothing, but the capital investment that is F divided by B minus C minus G and your. So, you we know the numerical values of all BCGF and if we just insert here and calculate. So, we will be getting 3.9, 3.9 years and which is found to be less than the techno economic life that is nothing, but 6 years.

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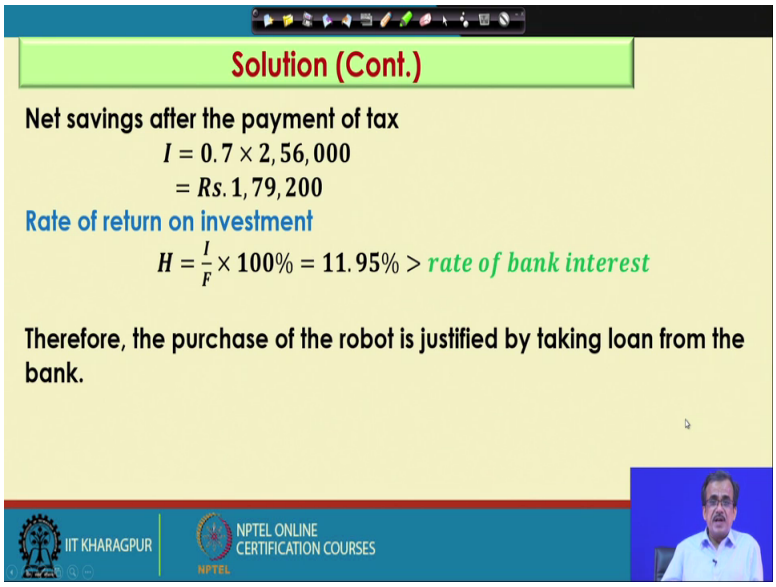

Now, next we try to find out what should be the rate of return on investment now as I told the thirty percent of the net saving we have paid as tax. So, the remaining amount, so the net saving after the payment of tax that is denoted by I. So, I is nothing, but 70 percent of rupees 2,56,000 that is nothing, but rupees 1, 79, 200.

Now, rate of return on investment is denoted by H and that is nothing, but I divided by F. So, F is the capital investment I is the net saving after the payment of tax multiplied by 100 percent and this is nothing, but 11.95 percent, and the rate of bank interest is around 10 percent 10 point something.

So, this particular rate of return on investment is more than the rate of bank interest and moreover the payback period was less than the techno economic life. So, both are favorable. So, we should purchase this particular robot by taking loan from the bank. So, this is the decision that we can purchase the robot by taking loan from the bank through

this economic analysis. So, this is the way actually it helps to take the decision that whether we should take loan from the bank to purchase a particular the robot.

Now, similar type of analysis, we can carry out for other machines also for example, other conventional machines for your own manufacturing unit. If you want to purchase the similar type of analysis we can carry out. So, this is the way we actually carry out the economic analysis for the robots.

Thank you.