UNIT 6 TECHNICAL CHANGE AND PROGRESS

Structure

6.0 OBJECTIVES

After going through the unit, you would be able to:

- Define technical progress;
- Distinguish between technical change and technological change;
- Explain the various types of technical progress;
- Describe augmented, embodied and neutral technical progress; and
- Analyse the neoclassical growth model with technical progress.

6.1 INTRODUCTION

We studied two growth models in block 1. In the Harrod-Domar model, we considered the model without any technical change, In the Solow model as well, we discussed the model without technical change. Technical change, however, is a fact of life, which is taking place all the time in modem economies. We have seen the experiences of developed countries that have progressed due to technical change and progress. But what is technical progress? How does it differ from technological change? How do we show it in the econoinic production process and growth? These are some of the issues that this unit takes up for discussion.

In this unit we discuss the various conceptions of technical change **and** also look at the neoclassical growth model in the presence of technical change. In the previous unit you have been acquainted with growth accounting and total factor productivity growth. This unit explains technical change more generally and broadly, and also brings out the relationship between technical change and total factor productivity growth.

6.2 TECHNICAL CHANGE AND THE PRODUCTION PROCESS

You would have guessed by now that technical change has something to do with improving the production process, and indeed so it is. We depict the change in technical level by looking at the production function. At this point we are going to give you some suggestion: pick up your course on microeconomics and go over the unit on production. Although now we are discussing the story at an economy-wide level, the concepts of production function, isoquants, and so on, go through just fine.

Let us suppose for simplicity that there is one single 'homogeneous' good in the economy. This good gets produced by using capital and labour. (This is what we have assumed in units 3 and 6). The simplest way to conceptualise technical progress is to understand that technical progress means that more output is produced using the same amount of inputs. If you visualise a production function, you can see that the production function shifting upward over time as technical progress takes place. Another way to look at technical change (improvement) is to say that the nature of the production function has changed to a superior one, or that the same amount of output can be produced by using less of one or more factors than before.

The general way we have used to represent technical change as shifts in the production function (it may also be depicted as shifts in the position of each isoquant) can be expressed by bringing in time into the production function explicitly. The production function now becomes:

$$Y = F(K, L, t)$$

The argument t is a production function shifter.

If we take k=K / L and y = Y / L then we can write the per-worker production function as

$$Y = f(k, t)$$

Although the above formulation is the most general way of depicting technical progress, there is another way of depicting technical change, where technical progress takes place through shifts in the production function even though the amount of inputs used may not have increased. It is as though the factors of production (one or both – we have only two in our simplified picture of the economy) were somehow *augmented* and they are able to produce more output than before. This can be represented as

$$Y = F(J(t)K, Z(t)L)$$

Now Y is no more merely a function of quantities of labour and capital. The stock of capital and labour are multiplied by factors J and Z respectively which are both functions of time. The expressions J(t) and Z(t) are referred to as effective capital and effective labour respectively. These can be explained as follows: if dZ / dt, the rate of change of Z is greater than zero, then over time, the effective labour force is increasing even though the actual labour force stays constant. Similarly, if dJ / dt is greater than zero, then the effective capital stock goes up even though actual capital stock does not increase. You can think of factor augmenting technical change by visualising that after technical change five workers and /or three machines can produce as much as seven workers and/ or four machines did previously. Alternatively, you can think that the seven workers and / or four machines can now produce much more than they were doing previously.

If dJ/dt is positive and Z(t) = 1, then technical progress is said to be **purely capital augmenting,** and if, on the other hand, dZ/dt is positive and J(t) = 1, then technical progress is said to be **purely labour augmenting.** If dJ / dt and dZ / dt are both positive, then technical progress is said to be **equally capital and labour augmenting.** However, it must be remembered that this type of formulation says nothing about cause or source of technical change.

Suppose $(dJ/dt) / J(t)$, that is, the rate of growth of effective capital is a constant u, then pure capital augmenting technical change is supposed to be taking place at a constant rate u, while if $(dZ/dt) / Z(t)$ is a constant u then pure labour-augmenting technical change is said to be taking place arate u. Suppose both effective capital and effective labour are growing at the rate u, then factor augmenting technical progress is said to be taking place at the rate u. In the presence of constant returns to scale, the production function can be written as

$Y = A(t)F(K, L)$. This depicts that the technical change is equally capital and labour augmenting at the constant rate in.

Whether technical change should be taken to be happening at a constant rate is open to question. It seems to be reasonable if technical change is considered exogenous, or given from outside the model. If however, there is conscious decision to invest in R and D, then technical change might not be quite exogenous. The later units on endogenous growth models and Schurnpeter's theory of capitalistic development will have much to say on this.

Check Your Progress 1

1) Explain the concept of effective capital and effective labour in aggregate production function.

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2) Distinguish between pure capital augmenting; purely labour augmenting; and equally capital and labour augmenting technical change.

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6.3 CLASSIFICATION OF TECHNICAL CHANGE

To understand technical change, we have to bear in mind that there are several types of technical change. They have mostly to do with the capital-labour intensity, and by implication, on the relative shares of capital and labour in the total product. This has repercussions on the remunerations of capital and labour, that is, on the wage rate and rental of capital.

To discuss the various types of technical change, let us briefly review the theory of production, particularly the production function. You can also refer to the courses on microeconomics and quantitative techniques. We have output as a function of only two factors of production labour and capital. Thus other factors like land are not being considered for simplicity.

$$Y = F(K, L)$$

Let us denote output per worker by y and capital per worker by k. Let us denote worker-output ratio by $m = I/y$.

Then capital / output = (capital / labour) X (labour/ output)

= k X m. Let us denote it by n. Then

$$n = km, \text{ or, } k = n/m.$$

Here, m and n are called **technical coefficients** (capital-output ratio and worker-output ratio are technical coefficients) and k is called **capital intensity.** If the capital-labour ratio capital intensity) goes up, it is called **capital deepening.**

Getting back to the production function, differentiating output with respect to capital and labour, we get

$\partial Y/\partial K$ and $\partial Y/\partial L$ respectively.

These are called **marginal product of capital and labour** respectively. Let us denote these by F_K and F_L respectively.

It so happens that in general,

$$F_K > 0,\ F_L > 0 \text{ and } F_{KK} < 0 \text{ and } F_{LL} < 0$$

Thus the marginal product of capital is positive but decreases as increasing amount of capital is used. It is the same in the case of labour.

Along an isoquant $F = (K, L)$ is constant. Hence, for any change along an isoquant, with Y constant, we have

$$F_K dK + F_L dL = 0.$$

If L is substituted for K for a given Y, then the **marginal rate of substitution** is:

$$- dK / dL = F_L / I;,$$

Let us denote the wage rate by w and the rental of capital by r.

Then, according to marginal productivity theory, which states that the factors of production are paid their marginal product,

$$\partial Y / \partial L = w, \text{ and } \partial Y / \partial K = r.$$

We have a theorem, called the **product exhaustion theorem,** which states that if there are constant returns to scale, it must be true that

$$(\partial Y / \partial L)\, w + (\partial Y / \partial K)\, r = Y.$$

The first expression on the left hand side shows the total amount of remuneration to labour (marginal product of labour times the number of workers). Similarly the second term denotes the total remuneration to capital. Thus the theorem says that provided there are constant returns to scale, the gross output is exhausted in meeting the total remuneration to labour and capital. You can think of the reward of labour either as rental r (as we have done till now), or profits, denoted by π. You may think of 'owners' of capital, rather than a homogeneous production unit that 'hires' capital.

Another concept that is of relevance here is that of **elasticity of substitution,** introduced by Sir John Hicks in his book ***The Theory of Wages, in 1932.*** It is defined as the proportionate change of the ratio of capital to labour with respect to a change in the ratio of the prices of capital and labour. Since we have invoked the marginal productivity theory and have seen that the prices of the factors of production are equal to their marginal products, the elasticity of substitution can equally well be defined as the proportionate change of the ratio of capital to labour with respect to a change in the ratio of the marginal productivities of capital and labour.

6.3.1 Embodied and Disembodied Technical Change

Now let us begin our study of the classification of technical change. Before doing so, let us recall our discussion of factor augmented technical progress. We introduce **a** related concept here. Technical change can be **embodied** or **disembodied.** Embodied technical change means that technical change assumes the form in the change in the type of factor of production, usually capital. In other words, embodied technical change is embodied in the form of new types of machines (a new process or new technology). Disembodied technical progress, on the other hand, means that regardless of the type of machines, new or old, the same amount of factors can produce greater amounts of output, or the same amount of output can be produced using lesser quantities of inputs; in other words, the isoquant shifts inwards. The factor augmenting technical change that we studied in the previous section is a depiction of disembodied technical change. For most of this unit, we will have occasion to consider disembodied technical change. Only in the final section do we touch upon embodied technical change, and once you grasp the concept, you will find greater use of the concept in some of the later units. In embodied technical change, investment in new equipment or new skill is the essential vehicle of improvements in technique.

Another concept with regard to technical change is neutrality. Neutrality broadly means that technical change is neither labour saving nor capital saving. We shall now present the classification of various types of technical change in terms of how neutrality has been viewed. We discuss Hicks's, Harrod's and Solow's concepts of neutral technical change.

6.3.2 Hicks's Classification of Technical Change

Sir John Hicks presented a classification of technical progress in his book The Theory of Wages , published in 1932. Hicks looked at technical progress in terms of the effect of technical change on the ratio of marginal product of capital to that of labour. If after the technical change the ratio icreases, in Hichs's terminology it is to be called labour saving. If the ratio stays the same it is neutral and if the ratio falls, it is called capital saving.

To explain this further, let us use some notation. Let

$F_K(t1)$ be marginal product of capital before technical progress.

$F_K(t2)$ be marginal product of capital after technical progress.

$F_L(t1)$ be marginal product of labour before technical progress.

$F_L(t2)$ be the marginal product of labour after technical progress.

Then

If $[F_K(t2) / F_L(t2)] > [F_K(t1) / F_L(t1)]$ then the technical progress is labour-saving according to Hicks

If $[F_K(t2) / F_L(t2)] = [F_K(t1) / F_L(t1)]$ then the technical progress is neutral in the Hicksian sense.

If $[F_K(t2) / F_L(t2)] < [F_K(t1) / F_L(t1)]$ then the technical progress is capital-saving in the Hicksian classification of technical change.

There is another way of looking at the Hicksian classification of technical progress. We know that in equilibrium the marginal product to each factor of production equals its price. Thus the marginal product of capital F_K equals rental on capital r and the marginal product of labour F_L equals the wage rate w. In Hicks's classification, a labour saving technical progress increases the ratio r/w while a capital saving technical progress reduces the ratio r/w. A technical change that saves labour reduces the wage rate relative to the rental of capital. A similar argument carries through in the case of capital saving technical progress.

Think of the concave-below upward sloping curve (the per-worker production function) showing the relationship between Y/L and K/L with the former plotted on the vertical axis and the latter on the horizontal axis. This kind of diagram you have encountered in unit 3 on the neo-classical growth model. A technical progress (over time) merely shifts this curve upwards. The Hicksian classification of technical progress, if it is to be used to compare the ratios of marginal productivity on two distinct points on the two curves can only be used to compare two points at which the K/L ratio is same because the K/L ratio changes at every point on each of the two curves. Thus to compare the ratios of marginal product on one curve with the ratios of marginal product on the other curve, the two points must lie vertically above the same point on the horizontal axis which represents K/L..

We can now state the Hicksian classification of technical progress in the following way: A technical progress will shift the per-worker production fimction upward. This technical progress is said to be **labour-saving** if at any given value of capital-labour ratio, the ratio of marginal product of capital to the marginal product of labour has increased. If this ratio decreases for a given value ofcapital–labour ratio, the technical progress is said to be **capital saving,** and if the ratio stays the same it is **Hicks-neutral.**

Since we are looking at technical change by making use of marginal product of factors and factor prices, we can represent technical change in terms of share of factor remuneration in terms of the relative share of the factors in the total product or total national income.

The relative share ofcapital in total product is rK/Y while the relative share of labour in total product is wL/Y. The ratio of the relative shares is $[rK/Y]/[wL/Y] = rK/wL$. Let us denote this by S. Since the title of Hicks's book is Theory of Wages you can understand that he was interested in studying what happens to the share of labour as technical change takes place. We have seen that in the Hicksian classification we see what happens to $F_K / F_„$ to r/w. we have also seen that Hicksian classification is relevant where K/L is constant. You can understand that if K/L stays constant and r/w changes, rK/wL, that is, S will be affected. So we could state I-Iicks's classification in terms of relative factor shares. We say that technical progress is labour saving in the sense of Hicks if, at any constant value of K/L, the ratio of relative shares $S = rK/wL$ is increasing, that is dS/dt is positive where dS/dt is the derivative with respect to time. Technical progress is capital saving in the sense of Hicks if, at any constant value of K/L, the ratio of relative shares $S = rK/wL$ is decreasing, that is dS/dt is negative. Technical progress is Hicks-neutral if, at any constant value of K/L, the ratio of relative shares $S = rK/wL$ stays the same, that is dS/dt is equal to zero.

It has been proved by Uzawa that Hicks-neutral teclmical progress is equivalent to factor augmenting, that is equally labour and capital augmenting technical progress. In other words, Hicks neutrality implies that the production function can be written as

$$Y = F(J(t)K, Z(t)L)\text{, or, equivalently as}$$

$$Y = A(t)F(K, L).$$

6.3.3 Harrod's Classification of Technical Change

Sir Roy Harrod (whose growth model you studied in blockl) put forward a classification of technical progress which was different from Hicks's classification, and came some years after Hicks's contribution. Harrod first put forward his classification in an article in 1937, but expanded it in a book published in 1948. He defined as neutral a technical change one where the capital coefficient (capital-output ratio) does not change in the presence of a constant interest rate. Broadly, he suggested that if, when the interest rate is constant, the distribution of the total national product between capital and labour stays constant, then it is neutral technical progress.

If we consider perfect competition and take interest rate as equal to the rental of capital and hence equal to tlie marginal product of capital, then Harrod-neutral technical progress is a statement about the relationship between capital-output ratio and the marginal product of capital. If we consider the per-worke production function, then an upward shift in the per-worker curve is said to represent Harrod-neutral technical change if at any constant value of capital-output ratio, the marginal product of capital stays the same.

Technical change is said to be labow-saving in Harrod's classification if, at any constant value of the capital-output ratio, the ratio of relative shares $S = rK/wL$ is increasing, that is. if K/Y is constant and dS/dt is greater than zero. Technical change is capital saving in Harrod's sense if when K/Y is constant, dS/dt is < 0, that is, S is decreasing. If in the presence of constant K/Y, S remains constant, that is, dS/dt is $= 0$, then technical progress is Harrod-neutral. Thus in Harrod-neutral technical progress, if K/Y is constant, rK/wL is unchanging.

Mrs. Joan Robinson in 1938 provided a geometric proof that Harrod- neutral technical progress is exactly equivalent to labour-augmenting technical progress. In other words, if technical progress is Harrod-neutral, and is proceeding at a constant rate u then the aggregate production function can be written as

$$Y = F(K, Z(t)L) \text{ with } [dZ(t)/dt] / Z(t) = u$$

Is there any form of technology where technical progress can be interpreted as either Hicks-neutral or Harrod-neutral, that is. the two forms of neutrality are equivalent. It can be shown that for this to be true, the distribution of income will be the same at all levels of capital-labour ratio. This can happen only if the elasticity of substitution will be equal to one. The Cobb-Douglas production function

$Y = K^{\alpha}L^{1-\alpha}$ is the production function where elasticity of substitution is constant and equal to 1.

6.3.4 Solow's Classification of Technical Change

Solow's classification of technical progress is similar to Harrod's and I-Iicks's classification except in one respect. Hicks's classification compares points on different per-worker output curves at points of constant capital-labour ratio and Harrod's scheme compares points on different per-worker output curves at points of constant capital-output ratio. Solow's classification compares points on old and new per-worker production at points at which the labour-output ratio is constant. Thus Solow-neutrality is when at points where L/Y is constant, $dS/dt = 0$ that is, the relative shares of capital and labour remains constant. It can be shown that a Solow-neutral technical progress is capital augmenting.

Check Your Progress 2

1) Explain the concept of elasticity of substitution.

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2) Bring out the difference Harrod neutrality and Solow neutrality.

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6.4 THE NEO-CLASSICAL MODEL WITH TECHNICAL CHANGE

We have studied the neo-classical model in unit 3 but that was without technical change. We merely took an aggregate production function and elaborated upon the model. However, we know that in the Solow model the key to growth is not accumulation of capital, or increasing the saving rate. The mainspring of growth in the Solow model is technical progress. We have got an idea of this in the previous unit where we came across a concept called Solow residual in accounting for growth. After capital accumulation and growth in labour force or population had been accounted for, some part is left over which is roughly an indicator of technical progress. Let us now look at the neoclassical growth model in the light of our discussion in the previous sections.

Which classification of technical progress is likely to serve us well in analysing growth models, in particular the neoclassical one? Let us first take Hicks's scheme. Consider the simple neoclassical model that you studied in unit 3. Given the rate of growth of labour force, say g, and propensity to save s, we know the economy will reach an equilibrium level of output per worker (let us denote it by y*)and an equilibrium level of capital per worker (let us denote it by k'). Here $f(k, t_0) = (n/s)k$, where t_0 denotes initial time period. Suppose in the next time period t,, the per-worker production function shifts up to $f(k, t_1)$, and the economy gets new equilibrium levels of q and k (say q^{**} and k^{**}). If the economy is on a balanced growth path, and the rate of growth of the labour and saving rate are fixed constants, any upward shift in the per-worker production function will mean that the equilibrium value ofk has changed, that we get a new capital-labour ratio. Recall that Hicks's technical progress classification requires that comparison of points pre-technical progress and post-technical progress per-worker output curves are restricted to points having the same capital-labour ratio. So to study steady-state models of technical change, the Hicksian scheme of classification is not of much use. We shall see that it is Harrod's schema is of more useful in studying steady-state growth.

This point can be repeated by saying that if long-term, sustained steady-state has to take place with technical progress, then the technical progress has to be of Harrod-neutral, that is, of a labour-augmenting form. Get this well. It is not Harrod's entire classification schema that is being talked about. Specifically, for steady state growth to occur in simple growth models with technical progress, the technical progress must be specifically Harrod-**neutral**, or **labour-** augmenting.

Let us consider the Solow model of growth. Earlier we took the aggregate production function as Y= F (K, L), but now we need to consider a labour-augmented production function Y = F (K, Z(t)L). The only difference is that instead of measuring the labour force in natural units, we need to measure them in efficiency units, that is, consider effective labour force Z(t)L. Earlier we had y =Y /L, but now we need to consider output per effective worker (denoted by say y^) so that y^=Y/ Z(t)L and similarly k^ = K / Z(t)L, that is capital per worker in efficiency units.. Let us suppose Z(t) L is growing at the rate u, that is, [dZ(t)L/dt] / dt-is u. this means Harrod-neutral technical change is taking place at the rate u. then the fundamental equation of the Solow model becomes

$$\dot{k} = sf(k) - (n+u)k$$

The expression $sf(k)$ here represents savings per 'effective' worker and steady-state growth occurs where this curve intersects the line $(n+u)k$. we have not drawn the diagram here but it is analogous to the diagram in unit 3.

We can summarise the neoclassical growth model in the presence of technical change as follows. With Harrod neutral technical change and in the steady state, output Y will grow at the constant rate of $n+u$; capital stock Kwill grow at the constant rate $n+$ u; the labour force will grow at the rate n when measured in natural units and will grow at the rate

$n+u$ when measured in efficiency units, capital per worker k will grow at the rate u when measured in natural units,(k = K/L) and will remain constant when measured in efficiency units, that is k = $K/Z(t)L$. Output per worker grows at the rate u when measured in natural units and remains constant when measured in efficiency units. In steady state K N stays constant, that is why it is only Harrod-neutral technical change that is compatible with steady state growth. Output per worker and capital per worker, that is, the capital-labour ratio stay constant when measured in efficiency units.

6.5 SOME ISSUES RELATED TO TECHNICAL CHANGE

We have discussed the nature of technical change and seen Hicks, Harrod and Solow have classified technical progress. In this section, we briefly discuss some issues that have been raised in the course of the discussion in the earlier sections. We merely raise the issues here and do not provide anything like an exhaustive discussion as that would take us beyond the scope of our presentation. However, this is as good a place as any to tell you, and we have mentioned this point earlier as well, that the theme of technical progress is a recurrent one in this course and will present itself to you in several of the subsequent units, like the units on endogenous change, on multi-sector growth models and on Schumpeter's theory of capitalistic development.

6.5.1 What about Embodied Technical Progress?

Recall that we had said that disembodied technical progress does not depend on the nature of machines or shape of technology but proceeds as though factors have just got augmented. In the real world technical progress is often in the form of new machines and techniques, which may sometimes even render old machines obsolete. Therefore disembodied technical progress is often only a simplifying device which makes the analysis easier. Disembodied technical progress, in many growth models, is exogenous and it is as though it just drops from heaven.

Solow, in a 1960 paper *Investment and Technical Progress,* provided some analysis of technical progress that is embodied. He took technical progress to proceed at a constant rate but took it to be embodied which affected only new capital goods. Another fact about embodied technical progress is that in the economy capital goods or machines may be of different vintages. The economy has a large stock of machines of different ages, and modern machines may be more efficient simply because they embody new technology. Solow in his paper provided an index of effective capital.

6.5.2 Nature of Capital

This is just an elaboration of the point made above. Recall that output or income is a flow while the capital stock is just that, a stock. Moreover, it is hard to speak of *the* stock of capital, and there are machines of different ages and types. It is difficult to ascribe a value to the capital stock, and there may be an 'index number problem. Measurement of capital is a tricky issue, and to use the notion in models of technical progress one has to be careful.

Kaldor has been a critic of the idea of representing technical change by a shift of the per-worker production function.. according to him, it is sometimes difficult to distinguish the effect of capital accumulation shown by a movement along the curve from the effect of technical progress shown by a shift of the curve. He also gave the germ of a suggestion which was later developed into the modern endogenous growth theory.

Check Your Progress 3

1) Discuss the neoclassical growth model in the presence of Harrod-neutral technical change.

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2) Discuss the problems that may be created for analysis if technical change is taken to be embodied.

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6.6 LET US SUM UP

This unit presented a detailed discussion of technical change. The unit began by defining technical change and discussing the concepts of capital augmenting, labour augmenting and factor augmenting technical progress. The unit then went on to discuss various types of technical progress. In doing so, first certain concepts arising out of the production and production function were discussed, like factor exhaustion theorem and elasticity of substitution.

The unit then went on to discuss various conceptions of neutral technical progress. Specifically, Hicks's, Harrod's and Solow's conceptions of neutral technical progress were discussed. Subsequently the unit discussed the neoclassical growth model in the presence of technical progress. Finally the unit brought up for discussion the idea of embodied technical progress, and certain controversies about the nature of capital.

6.7 KEYWORDS

Capital augmenting — If effectiveness is multiplied by capital K but not by labour L, then we say the effectiveness variable is capital-augmenting.

Capital deepening — It is an increase in capital intensity, measured by something analogous to the capital stock available per labor hour spent., or the amount of capital available for a worker to use. but this use is rare.

Embodied Technical Progress	Embodied or disembodied is an attribute of the way technological progress affects productivity. If any improvement in technology instantaneously affects the productivity of all factors of production, we say productivity improveinents are disembodied. If on the other hand, technical change is a property of only of new capital investment, we say technologies are embodied in the new equipment.
Harrod neutrality	A technological innovation is Harrod neutral if the technology is labor-augmenting.
Wicks neutrality	A technologicalinnovation is Hicks neutral if the ratio of capital's marginal product to labour's marginal product is unchanged for a given capital to labour ratio.
Labour-Augmenting	If effectiveness is multiplied by labour L but not by capital K, then we say the effectiveness variable is labour-augmenting.
Neutral technological change	Neutral technological change refers to the behaviour of technological change in models.
Putty-putty	Putty-putty describes an attribute of capital in some models. Putty-putty capital can be transformed into durable goods then back into general, flexible capital. This contrasts with putty-clay capital can be converted into durable goods but which cannot then be converted back into re-investable capital.
Solow Neutrality	A technology is Solow-neutral if it is capital augmenting
Technical change	Technical change technical change is a change in the amount of output produced from the same inputs. Such a change is not necessarily technological; it might be organizational, or the result of a change in a constraint such as regulation, prices, or quantities of inputs. A technological change is a change in the set of feasible production possibilities. This is different than a technical change

6.8 SOME USEFUL BOOKS

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Stiglitz, J.E., and Uzawa, H. (eds). (1969) ***Readings in the Modern Theory of Economic Growth. M.I.T.*** Press, Cambridge, Massachusetts.

6.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Press 1

I) Read section 6.2 and answer.

2) Read section 6.2 and answer

Check Your Progress 2

1) Read section 6.3 and answer.

2) Read Sub-sections 6.3.3 and 6.3.4 and answer.

Check Uour Progress 3

1) Read section 6.4 and answer.

2) Read Sub-section 6.5.1 and answer.