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## UNIT 5 AGGREGATE SUPPLY\*

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### Structure

- 5.0 Objectives
- 5.1 Introduction
- 5.2 Aggregate Supply in Macroeconomics
- 5.3 Classical and Keynesian Aggregate Supply Curves
- 5.4 Aggregate Supply Curve in the Short Run
- 5.5 Aggregate Supply Curve in the Long Run
- 5.6 Aggregate Supply Curve in the Medium Run
  - 5.6.1 Slope of Medium Run Aggregate Supply Curve
  - 5.6.2 Shifts in the Medium Run Aggregate Supply Curve
- 5.7 Let Us Sum Up
- 5.8 Answers/Hints to Check Your Progress Exercises

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### 5.0 OBJECTIVES

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After going through this Unit, you should be in a position to

- distinguish between the concept of Aggregate Supply (AS) curve used in microeconomics and macroeconomics;
- explain the price-output response curve;
- differentiate between the underlying differences between the Classical and the Keynesian views on the AS curve;
- identify the reasons behind the slope and position of the Keynesian AS curve; and
- differentiate between the AS curve in short run, medium run and long run.

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### 5.1 INTRODUCTION

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In the previous Unit we discussed about the slope and the shifts of the Aggregate Demand (AD) curve. Now let us look into the other side of the market, i.e., Aggregate Supply (AS). Recall the supply curve of a firm – it shows the maximum quantity that a firm would supply or produce at different prices. The quantity supplied by a firm depends upon the market structure apart from input and output prices. While some firms operate in a perfectly competitive market, some others are monopolistic in nature.

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The AS curve describes the total quantity of goods and services that an economy will produce at different price levels. The AS curve however needs further discussion as several issues come up when we derive the supply curve for the economy.

Time horizon is a very important factor in the case of the AS curve, as the economy behaves differently in the short run and the long run. Hence the shape of AS curve is not the same in the short run and the long run. A reason behind this difference in the shape of the AS curve also is the differences in Classical and Keynesian views on output and prices.

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## **5.2 AGGREGATE SUPPLY OF AN ECONOMY**

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It may seem logical to derive the aggregate supply curve by adding together the supply curves of all the firms in the economy. However, the logic behind the relationship between the overall price level in the economy and the level of aggregate output (income) – that is, the AS curve – is very different from the logic behind an individual firm’s supply curve. The AS curve is not a market supply curve, and it is not the simple sum of all the individual supply curves in the economy (recall a similar caution provided for the aggregate demand curve in the last unit). Thus you should be cautious in interpreting the AS curve. Let us see how.

The reason is that many firms do not simply respond to market prices. Recall that firms operating in a perfectly competitive market are price takers. Monopoly firms, on the other hand, set their own prices. We see that some firms act as leaders when the market they operate is one of imperfect competition. These firms decide both output and price based on their perceptions of demand and costs. Only in perfectly competitive markets do firms react to prices determined by market forces.

When the overall price level changes, the input prices change and because many firms in the economy set prices as well as output, it is clear that the AS curve in the traditional sense of the world supply does not exist. What exists is the *price output response curve* - a curve that traces out the price decisions and output decisions of all firms in the economy under a given set of circumstances.

Price-setting firms (existing only in the imperfectly competitive structure) do not have individual supply curves because these firms are choosing both output and price at the same time. To derive an individual supply curve, we need to imagine calling out a price to a firm and having the firm tell us how much output it will supply at that price. We cannot do this if firms are also setting prices. If supply curves do not exist for imperfectly competitive firms, we certainly cannot add them together to get an aggregate supply curve.

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### 5.3 CLASSICAL AND KEYNESIAN AGGREGATE SUPPLY CURVES

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We discussed about the classical and Keynesian views on determination of output in Unit 4 of BECC 133: Principles of Macroeconomics-I. The classical economists hold the view that resources are fully employed in all the firms and hence the manufacturing units are working at their full capacity.

When the economy is operating at full employment level, further increase in output cannot take place. In case of increase in AD, only the price level will increase and the output level will remain the same as the firms are already working at their capacity. So, the increase in AD does not lead to any increase in output level. Further, if there is a decline in AD, there will be a decline in prices and wage rate. Decline in prices will increase the demand for goods and services. Similarly, decline in wage rate will increase the demand for labour. Therefore, decline in prices and wage rate will ensure full employment of resources. It indicates that the same amount of goods will be supplied whatever be the price level. Such a level of output is also known as the full employment level of output or the 'potential GDP'. Thus, we can say that the classical AS curve is vertical. It is known as the 'classical AS curve'.

The origin of the Keynesian AS curve can be ascribed to the Great Depression, when actual output in most economies was very low compared to potential output. In that environment, Keynes suggested that output can be increased without any rise in prices by putting idle capital and labour to work. Keynes argued that prices are not flexible. There are certain rigidity in prices and wage rate, particularly when a downward change is required. Today we have over-emphasised this notion with what we call 'short-run price stickiness'. In the short run, firms are reluctant to change prices when demand shifts. Instead, at least for a little while, they increase or decrease output. As a result, the AS curve is quite flat in the short run. The key point is that in the short run the price level is unaffected by current levels of GDP. Hence, we will see that in the short run, the AS curve is horizontal. It is also known as the 'Keynesian supply curve'.

So, if we consider the output level, we can say that in Classical view economy always operates at the full employment level of all the available resources while from the Keynesian view, the economy observed excess capacity which can be put to use in case of higher demand in order to produce more and achieve a higher output level overall. If we look at the price level, under the Classical view price changes will take place without any movement in the output level but from the Keynesian point of view, the price changes will accompany the output level changes too.

**Check Your Progress 1**

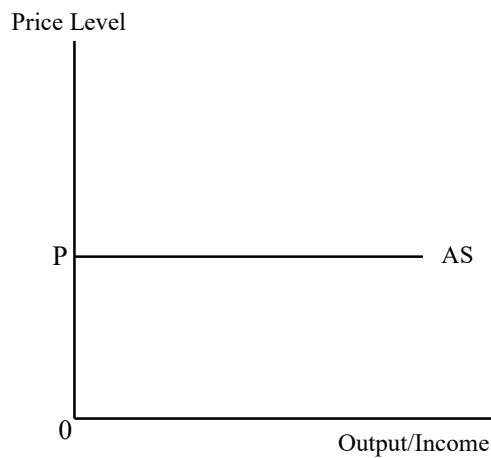
- 1) Explain the concept of price-output response curve in macroeconomics.  
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- 2) Bring out the differences between Classical and Keynesian views on aggregate supply.  
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- 3) What are the implications of the classical view on the output and price levels?  
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**5.4 AGGREGATE SUPPLY CURVE IN THE SHORT RUN**

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As pointed out above, the short run AS curve (Keynesian AS curve) is horizontal indicating that firms will supply whatever amount of goods is demanded at the existing price level. The idea underlying such a curve is that in the short-run the economy has excess capacity (capital or labour) in hand. It implies that the economy has factors of production which are not needed to produce current level of production. Because there is unemployment, firms can obtain as much labour as they want at the current wage rate. Firms are operating below capacity so the extra cost of producing more output is likely to be small. In such circumstances, there will be no or very little increase in the overall price level.



**Fig. 5.1: Short Run Aggregate Supply Curve**

The average cost of production of firms therefore is assumed not to change as the output level change. Firms are accordingly willing to supply as much as is demanded at the existing price level. The AS curve is likely to be horizontal during periods of recession when the total output in the economy is at lower levels.

As you know, there are two important phases of a business cycle, viz., expansion and recession. During the recession phase, overall output in the economy has a tendency to decline. When the economy is passing through the recession phase, there is excess capacity in the economy. If firms expect the recession in the economy to be short, they would choose to hold the excess capacity. In that case if demand increases the firms would increase output much more than the increase the prices.

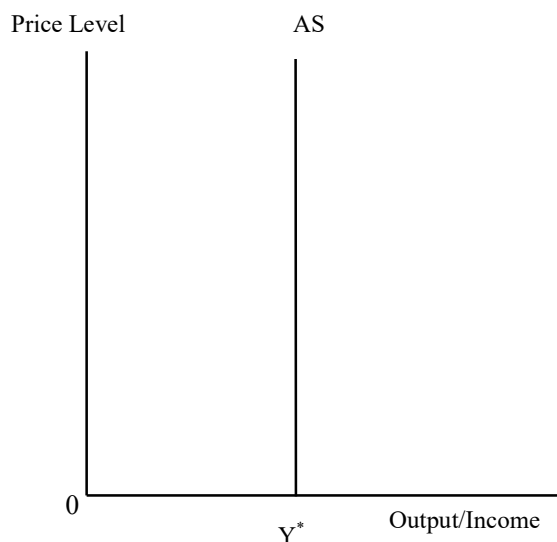
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## 5.5 AGGREGATE SUPPLY CURVE IN THE LONG RUN

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According to the classical economists the AS curve is vertical, indicating that there is full employment level of output. The classical AS curve is based on the assumption that the labour market is in equilibrium with full employment of the labour force. If in certain sector the manufacturers face high demand, they raise the price for their product. As the sector witnesses high growth due to high demand, they plan to invest more (buy more machineries, more materials, more labour, etc.). It has the side effect of shifting factors of production away from lower demand sectors to high demand sectors. But if higher demand for goods and services is economy wide and all the factors of production are already employed, there is not any way to increase overall production. It will result in price rise while supply will not increase. The level of output corresponding to full employment of the labour force is called the potential GDP,  $Y^*$  (see Fig. 5.3).

## GDP and Price Level in Short Run and Long Run



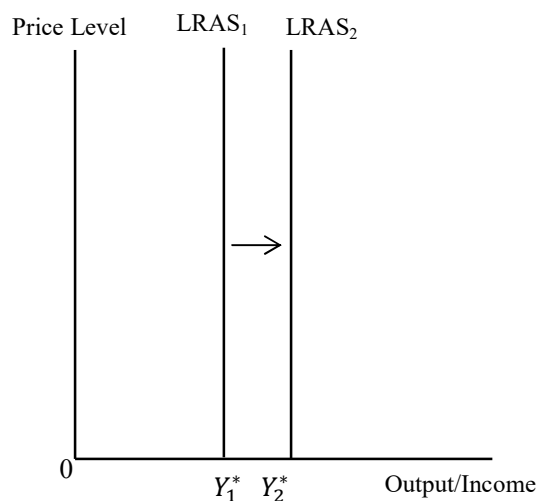
**Fig. 5.3: Classical Aggregate Supply Curve**

We derived the short-run AS curve under the assumption that wages were sticky. It does not mean, however, that stickiness persists forever. Over time, wage rates adjust to higher prices. When workers negotiate with firms over their wages, they take into account two issues: price rise in the recent past, and expected price rise in near future. In the long run, input prices change at exactly the same rate as output prices. Hence the aggregate supply curve becomes vertical. Thus, actual output in the long is equal to potential output.

### Shifts in the Long Run AS Curve

The level of potential output changes over time. Let us find out the reasons for such changes in potential output. You should note that potential output will change if there are changes in the quantity of labour, stock of capital, amount of natural resources, or the state of technology. Thus there are two sources of growth: (i) growth of inputs, and (ii) technological progress. The potential GDP increases over time as the economy accumulates resources. There are more machinery, more buildings, more raw materials, etc. These inputs lead to an increase in the production capacity of the economy. The other source, i.e., technological progress takes place over time in many fields. You would have noticed how more and more powerful computers and mobile phones have been invented over the years. Such improvement in technology is taking place in most fields. Technological progress leads to increase in productivity or efficiency. It implies we can produce more output from the same level of inputs.

Thus, the position of the classical AS curve moves to the right over a period of time. You should note that the changes in the level of potential output do not depend on the price level.



**Fig. 5.4: Shifts in Long Run Aggregate Supply Curve**

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## 5.6 AGGREGATE SUPPLY CURVE IN THE MEDIUM RUN

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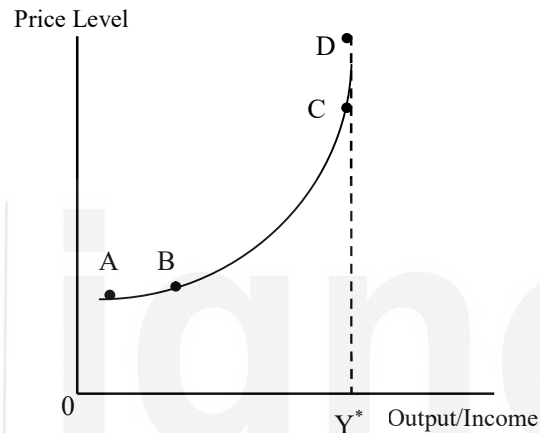
Medium run is a period of time during which the economy adjusts its fixed inputs (say, capital) to its long run level. In macroeconomics we can assume a period of about 5 to 10 years to fall under the category of medium run. We learnt above that the AS curve is vertical in the long run (Classical) and horizontal in the short run (Keynesian). We can say that the AS curve is somewhat in between the two; it is upward sloping in the medium run.

Let us understand the medium run dynamics. In case the firms face high demand for their goods and services, they respond by producing more in short run. As the aggregate output continues to increase, firms and economy move closer to their full capacity. It is not likely that the whole economy suddenly reaches the full employment level of output. As the AD increases, the firms' response would be to increase output in the beginning. As AD keeps on increasing further, firms' will start increasing prices. The firms also begin to reach their full capacity constraints; they cannot increase their production capacity in the short run.

As you know from microeconomics, certain inputs such as capital and top management are fixed in the short run. Some firms and industries will reach their maximum production capacity before others; so there will be no kink in the AS curve. Simultaneously, there will be a decline in the unemployment rate as the economy is moving towards the full capacity level. At some level of output ( $Y^*$ ), it is virtually impossible for the firms to expand any further because all factors of production are fully utilized. At that level of output, whatever be the price level, output cannot increase further.

## GDP and Price Level in Short Run and Long Run

In Fig. 5.5, we depict the upward sloping AS curve. The segment A to B shows the flatter portion (Keynesian zone), while the segment C to D shows the steeper portion (Classical zone) of the AS curve. We notice that all the three time periods (short-run, medium-run and long-run) are summarised in the above figure. The characteristic described in the AS curve are as follows: till about point B, it is the short run. Medium run is from point B to about point C (intermediate zone). Point C onwards, it is the long run (output  $Y^*$ ). During recession the economy is operating on the flat part of the AS curve (Keynesian view). The maximum an economy can produce is  $Y^*$ , i.e., full employment output (classical view).



**Fig. 5.5: Medium Run Aggregate Supply Curve**

The Keynesian position of horizontal AS curve and the classical position of the vertical AS curve are exceptions. In normal circumstances, the AS curve is upward sloping. Therefore, we consider the medium-run AS curve for further analysis.

### 5.6.1 Slope of the Medium Run Aggregate Supply Curve

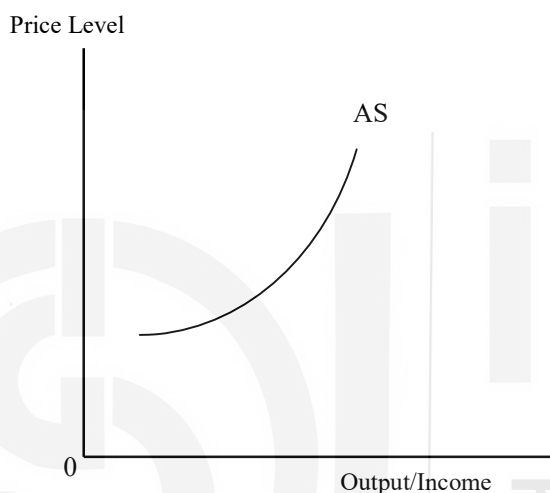
Response of input prices to changes in overall price level is the basis of difference between classical and Keynesian views. According to the Classical economists, price changes are fully anticipated. It means the expectations of producers and households are realised. For example, if producers expect that prices will increase by 10 per cent in the coming year, prices actually increase exactly by 10 per cent (neither more than 10 per cent, nor less than 10 per cent).

The Keynesian view, however, holds that an increase in price level is not fully anticipated every time. There is some time lag between the changes in input prices and the changes in output prices. In other words, the wage rate is sticky.

There are several reasons for this: (i) Nominal wages are slow to adjust to changing economic conditions. This could be attributed to 'long term contracts' between workers and firms. Usually wage rate is decided in advance, as part of the contract. (ii) Firms have to incur costs for adjusting prices. Let us take an example of a restaurant. Vegetable prices in the market change so frequently; but restaurants maintain the same prices of food items on the menu card. If



restaurants wish to change prices of food items according to vegetable prices, they have to print menu card so frequently. The printing and distribution cost of menu cards will eat away major part of their profits! A similar situation applies to other firms and they keep their prices unchanged, unless price trend in the economy is clear and significant. Keynesian economists term this reason as 'menu cost'. (iii) Customers are accustomed to certain prices of the goods and services they purchase. They expect prices to be maintained at the same level and resist increase in prices. In order to retain their market share and customer goodwill, firms do not increase prices frequently. Thus, prices change only slowly over time. Hence, the aggregate supply curve slopes upward (See Fig. 5.6).



**Fig. 5.6: Medium Run Aggregate Supply Curve**

### 5.6.2 Shifts in Medium Run Aggregate Supply Curve

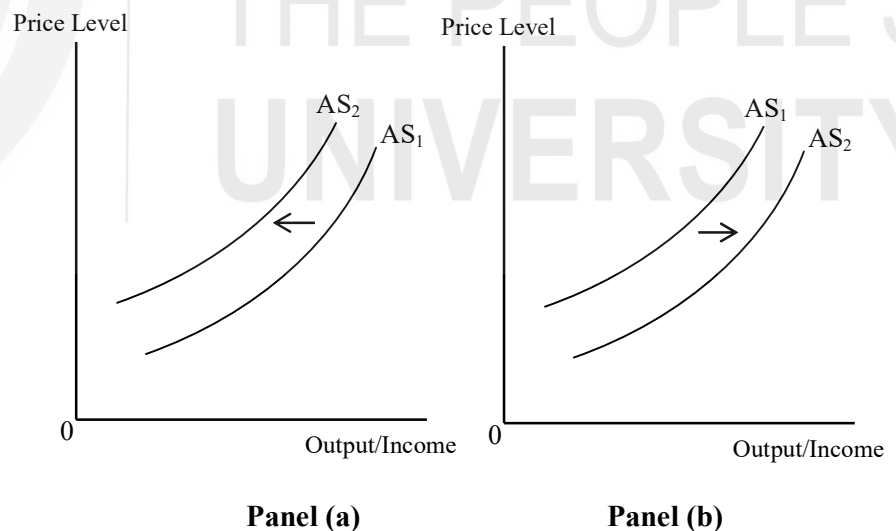
By now, you know that the AS curve describes the relation between output produced in the economy and price level. Thus any change in prices will result in a movement along the AS curve. There are several factors, apart from prices, that influence aggregate output. When we draw an AS curve, we assume these other factors to remain constant. Thus, any change in these factors results in a shift in the AS curve. Let us identify these factors.

Anything that affects (apart from the price of the good) the individual firm decision can shift the aggregate supply curve in the short run. Thus there are several factors that shift the AS curve: supply shocks, economic growth, stagnation, public policy, and natural disasters. We discuss about these factors below.

- (i) **Input Prices:** If the input prices fall, the cost of production also falls. It means that the firms can produce more in the given budget. Thus there is a shift in the AS curve to the right. Such a shift is depicted in panel

(b) of Fig. 5.7. Similarly, if there is an increase in input prices, production cost will increase. The AS curve will shift to the left, as shown in panel (a) of Fig. 5.7. Fluctuation in input prices is a common phenomenon. You might of observed periodical increases in crude oil prices which severely affects the Indian economy.

- (ii) **Technological Progress:** We have discussed about the impact of technological progress on the AS curve in Section 5.5. Advancement in technology increases productivity of firms. The AS curve shifts to the right (see panel (b) of Fig. 5.7) as a result of technological progress.
- (iii) **Public Policy:** There government provides incentives to firms so that economic growth accelerates. These incentives could be in the form of tax cuts for firms or higher government expenditure on infrastructure creation (such as roads, power supply, communication, etc.). Such incentives reduce the cost of production of firms, as a result of which the AS curve shifts to the right. Conversely, if the government policies are such that it increase the cost of production (such as stricter environmental norms, increase in tax rate, reduction in public expenditure on infrastructure), there is a left-ward shift in the AS curve. You should note that changes in tax rate on household income influences the AD curve, not the AS curve.



**Fig. 5.7: Shifts in Medium Run Aggregate Supply Curve**

- (i) **Recession:** Business cycles affect the AS curve. During recession there is accumulation of inventories and firms are pessimistic about the future. There is not much demand for goods and services also. In such circumstances, the AS curve shifts to the left (as shown in panel

(a) of Fig. 5.7). Conversely, during the expansion phase of a business cycle, firms are optimistic in their business operations. The AS curve will shift to the right (as shown in panel (b) of Fig. 5.7) during the expansion phase.

- (ii) Natural Disasters: An economy is often struck by natural disasters such as flood, drought, earthquake, etc. Such disasters affect production adversely and the AS curve shifts to the left.

**Check Your Progress 2**

- 1) As per the Keynesian view, explain why the short run aggregate supply curve is horizontal.

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- 2) State the reasons for the upward slope of the medium run aggregate supply curve.

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- 3) Explain the factors that will result in a rightward shift in the aggregate supply curve (use appropriate diagram).

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**5.7 LET US SUM UP**

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The aggregate supply (AS) curve in macroeconomics is different from the supply curve in microeconomics. In this Unit, we discussed about the classical and Keynesian views on aggregate supply, which have strong implications on the price and output levels in an economy. As the time horizon is very important from the Keynesian view, we discussed the different shapes of aggregate supply

curve with respect to short run, long run and medium run. The aggregate supply curve is horizontal in the short run; vertical in the long run; and upward sloping in the medium run. The factors behind the shift of the AS curve are also discussed. We explained that the classical aggregate supply curve and the Keynesian long run aggregate supply curve are both vertical; although for different reasons.

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## **5.8 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES**

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### **Check Your Progress 1**

1. The *price output response curve* is a curve that traces out the price decisions and output decisions of all firms in the economy under a given set of circumstances.
2. The classical view holds that resources are fully employed in the economy and hence the firms are working at their full capacity. As per the Keynesian view, the economy observes excess capacity which can be put to use in case of higher demand in order to produce more and achieve a higher output level.
3. As per the classical view, price changes will take place without any change in the output level. From the Keynesian point of view, however, price changes will accompany changes in output level also.

### **Check Your Progress 2**

1. Keynesian aggregate supply curve is horizontal in the short run, indicating that firms will supply whatever amount of goods is demanded at the existing price level. The idea underlying such a curve is that, in the short run, firms have excess capacity. It means that firms have excess capital or labour that is not needed to produce the current level of output.
2. The reasons for upward sloping AS curve are: (i) Nominal wages are slow to adjust to changing economic conditions; (ii) Firms have to incur cost for adjusting prices which are called menu costs; and (iii) Social norms and notions of fairness expect that firms do not change prices frequently.
3. There are several factors that affect aggregate supply and result in a shift in the AS curve. These could be supply shocks, public policy, business cycle, and natural disasters. Identify the situations that will shift the AS curve to the right. Go through Sub-Section 5.6.2 for details.