5. THE KEYNESIAN THEORY OF DETERMINATION OF NATIONAL INCOME

ASSIGNMENT SOLUTIONS

PROBLEM NO: 1

Given, MPC = 0.75

To find

i) MPS = 1 - MPC = 1 - 0.75 = 0.25

ii) Investment Multiplier (k) = $\dfrac{1}{MPS}$ = $\dfrac{1}{0.25}$ = 4

PROBLEM NO: 2

Given,

Investment Multiplier (k) = 5

i.e. $\dfrac{1}{MPS}$ = 5 $\Rightarrow$ MPS = $\dfrac{1}{5}$ = 0.2

To find

MPC = 1 - MPS = 1 - 0.2 = 0.8

PROBLEM NO: 3

Given, Income increases due to increase in investment

Increase in Investment (ΔI) = + 200 Crores

Increase in Income (ΔY) = +1,000 Crores

To find, MPC with the given information, Calculate Investment Multiplier (k)

k = $\dfrac{\Delta Y}{\Delta I}$ = $\dfrac{1,000}{200}$ = 5

k = 5 = $\dfrac{1}{MPS}$

MPS = $\dfrac{1}{5}$ = 0.2

MPC = 1 - MPS = 1 - 0.2 = 0.8

PROBLEM NO: 4

Given, Income increases due to increase in investment

Investment increases from Rs.300 crores to Rs.500 crores (ΔI) = + 200 Crores

Total income increases from Rs.1000 to Rs.2000 crores (ΔY) = + 1000 Crores

To find,

i) Investment Multiplier (k) = $\dfrac{\Delta Y}{\Delta I}$ = $\dfrac{1,000}{200}$ = 5

ii) MPS = $\dfrac{1}{k}$ = $\dfrac{1}{5}$ = 0.2

Note: Students are advised to rectify the hint answer for Investment Multiplier as 5 instead of 2.

PROBLEM NO: 5

Given,

MPC = 0.75

MPS = 1 - MPC = 1 - 0.75 = 0.25

$K = \dfrac{1}{MPS} = \dfrac{1}{0.25} = 4$

Increase in Investment (ΔI) = Rs. 300

To find Increase in Income (ΔY)

$k = \dfrac{\Delta Y}{\Delta I}$

$4 = \dfrac{\Delta Y}{300} \Rightarrow \Delta Y$ = Rs. 1,200

PROBLEM NO: 6

i) The government spending multiplier when the MPC is 0.6, is 1/1 - MPC = 2.5

ii) Change in Government Expenditure (ΔGE) = Rs.5 billion

To find its effect on GDP (ΔY)

Government Expenditure Multiplier (k) = $\left(\dfrac{\Delta Y}{\Delta GE}\right) = \left(\dfrac{1}{1 - MPC}\right) = \left(\dfrac{1}{MPS}\right)$

$= \dfrac{\Delta Y}{\Delta GE} = \dfrac{1}{1 - MPC} \Rightarrow \dfrac{\Delta Y}{5} = \dfrac{1}{1 - 0.6} = \dfrac{1}{0.4} \Rightarrow \Delta Y = \dfrac{5}{0.4}$ = 12.5 billion

PROBLEM NO: 7

a) At equilibrium output, Income = Expenditure

i.e. Y = C + I + G

or Y = 160 + 0.6 (Y - 100) + 150 + 150

Y (1 - 0.6) = 460 - 60

Y = 1,000 which is the equilibrium level of output

b) When G increases to 200

At equilibrium, Output = Expenditure

Y = C + I + G

Or, Y = 160 + 0.6 (Y - 100) + 150 + 200

Y (1 - 0.6) = 510 - 60

Y = 1,125 which is the new equilibrium output when G increases to 200

Now, increase in G = dG = 200 - 150 = 50

Increase in Output Y = dY = 1,125 - 1,000 = 125

Government expenditure multiplier = $\dfrac{dY}{dG} = \dfrac{125}{50}$ = 2.5

Hence with an increase in government expenditure, real output increases. Output increases. Output increases by 2.5 times of increase in government expenditure.

c) When T falls to 50

At equilibrium, Output = Expenditure

i.e. Y = C + I + G

or, Y = 160 + 0.6 (Y - 50) + 150 + 100

or, Y (1 - 0.6) = 460 - 30

or, Y = 1,075 which is the new equilibrium output when T falls to 50

Now, decrease in T = dT = 100 - 50 = 50

Increase in output Y = dY = 1,075 - 1,000 = 75

Tax multiplier = $\dfrac{dY}{dT}$ = $\dfrac{75}{50}$ = 1.5

Hence with a decrease in tax, real output increases. Real output increases by 1.5 times of decrease in tax.

ANSWERS FOR TEST YOUR KNOWLEDGE QUESTIONS

QUESTION NO. 1

Aggregate demand in a Four Sector Model or Open Economy:
AD = C + I + G + (X - M)

Aggregate Income or Aggregate supply in a Four Sector Model or Open Economy:
AS = C + S + T

QUESTION NO. 2

Aggregate Demand in a Three Sector Model or Closed Economy:
AD = C + I + G

Aggregate Income or Aggregate Supply in a Three Sector Model or Closed Economy:
AS = C + S + T

QUESTION NO. 3

Aggregate Demand in a Two sector model:
AD = C + I

Aggregate Income or Aggregate Supply in a Two Sector Model:
AS = C + S

QUESTION NO. 4

Equation of consumption function: C = a + bY

Where, C = aggregate consumption expenditure; Y = total disposable income;

a is a constant term i.e. *b*, the slope of the function or MPC

Slope of Consumption Function or Marginal Propensity to Consume (MPC): MPC describes the relationship between change in consumption (ΔC) and the change in income (ΔY). It is the slope of consumption function and is represented by 'b'.

$$MPC = \frac{\Delta C}{\Delta Y} = b$$

QUESTION NO. 5

Equation of Saving Function:

$$\boxed{S = Y - C}$$

Where, S = aggregate savings; Y = total disposable income; and C = aggregate consumption expenditure.

Marginal Propensity to Save (MPS): The slope of the saving function is the Marginal Propensity to Save. This increment to saving per unit increase in disposable income (1 - b) is called the Marginal Propensity to Save (MPS).

$$MPS = \frac{\Delta S}{\Delta Y} = 1 - b$$

Note: Also MPS 0 < b < 1.

QUESTION NO. 6

MPC + MPS = 1

Where Slope of Consumption Function = Marginal Propensity to Consume (MPC); and Slope of the saving function = Marginal Propensity to Save (MPS).

QUESTION NO. 7

The more powerful the leakages are the smaller will be the value of multiplier.

E.g.: Consider the leakage of Savings. As change in savings are more MPS will be more.

$$\text{Investment multiplier (K)} = \frac{1}{1 - MPS}$$

The value of the multiplier is the reciprocal of MPS

The higher the MPS, the lower will be the value of multiplier and vice-versa.

QUESTION NO. 8

If the aggregate effective demand falls short of that output at which all those who are both able and willing to work are employed, consequently a fall in demand leads to reduction in supply, it will result in unemployment in the economy.

QUESTION NO. 9

The multiplier in a closed economy is K = $\dfrac{1}{(1-b)}$

Where, K = Investment multiplier
b = Marginal propensity to consume

QUESTION NO. 10

The autonomous expenditure multiplier in a four sector model includes the effects of foreign transactions and is stated as $\dfrac{1}{(1-b+v)}$

Where, b = Marginal Propensity to Consume
v = Marginal Propensity to Import

QUESTION NO. 11

$$K = \frac{1}{1 - MPC} = \frac{1}{1 - 0.75} = \frac{1}{0.25} = 4$$

QUESTION NO. 12

The maximum value of multiplier is infinity when the value of MPC is 1

$$K = \frac{1}{1 - MPC} = \frac{1}{1 - 1} = \frac{1}{0} = \infty$$

QUESTION NO. 13

The value of the multiplier is the reciprocal of Marginal Propensity to Save (MPS).

QUESTION NO. 14

Savings and Personal taxes.

QUESTION NO. 15

Basis of difference	Leakages	Injections
Definition	A leakage is an outflow or withdrawal of income from the circular flow.	An injection is non-consumption expenditure.
Effects	Leakages reduce the flow of income.	Injections are exogenous additions to the

		circular flow and add to the total volume of the basic circular flow.
Examples	Savings, Imports and Taxes	Investment, Government Spending (Government Expenditure), Exports etc.

QUESTION NO. 16

Savings of Households leakage flows into financial markets.

QUESTION NO. 17

Flow of tax payments of households and business sectors leakage flows into government sector.

QUESTION NO. 18

Investment injection is shown as a flow between Financial market and Business sector.

QUESTION NO. 19

The process behind the multiplier can be compared to the 'ripple effect' of water. Let us assume that the initial disturbance comes from a change in autonomous investment (ΔI) of 500 units. The economy being in equilibrium, an upward shift in aggregate demand leads to an increase in national income which in a two sector economy will be, by definition, distributed as factor incomes. There will be an equal increase in disposable income. Firms experience increased demand and as a response, their output increases. Assuming that MPC is 0.80, consumption expenditure increases by 400, resulting in increase in production. The process does not stop here; it will generate a second-round of increase in income. The process further continues as an autonomous rise in investment leads to induced increases in consumer demand as income increases.

THE END