{ Formula Sheet }

National Income Accounting :-

UNIT : 2 Keynesian Theory

Two Sector Model

1) $AD = C + \bar{I}$

2) $C = f(Y)$ or $C = a + bY$

3) $MPC = \frac{\Delta C}{\Delta Y} = b$ where, $0 < b < 1$

4) $APC = \frac{C}{Y}$

5) $Y = C + S$ or $S = Y - C$

6) $MPS = \frac{\Delta S}{\Delta Y} = 1 - b$ where $0 < MPS < 1$

7) $APS = \frac{S}{Y}$

8) $MPC + MPS = 1$

9) $AS = C + S$

10) In equilibrium, $I = S$ or $C + I = C + S$

11) $Y = C + I$ = Income function

12) Saving function : $S = -a + (1-b)Y$ or

$S = -a + (MPS)Y$

13) Investment Multiplier;

$$k = \frac{\Delta Y}{\Delta I} \quad \text{or} \quad \Delta Y = k \Delta I$$

or

$$k = \frac{1}{1 - MPC} \quad \text{or} \quad \frac{1}{1 - MPC}$$

or

$$k = \frac{1}{MPS}$$

Three Sector Model

14) $Y = C + I + G$

where, G = Govt. expenditure.

$AD = AS = C + \bar{I} + \bar{G}$ in equilibrium only

15) $AD = C + \bar{I} + \bar{G}$ *G is autonomous i.e constant.

16) $AS = C + S + T$

where T = Tax receipts.

Equilibrium national Income;

$Y = AD = AS$

$C + I + G = Y = C + S + T$

$I + G = S + T$

Tax is not autonomous. It may be or may not be fixed.

[In India we follow progressive taxation]

(17) I Income determination with lump sum tax

We know that Equilibrium level of national Income

AD : AS

⇓

AD = Y

Y = C + I + G

W.k.T C = a + b(Y)

But here, Y = Yd (disposable income)

Yd = Y - T (after deducting tax)

Thus, C = a + b(Y - T)

→ Y = a + b(Y - T) + I + G

Y = a + bY - bT + I + G

Y - bY = a - bT + I + G

Y [1 - b] = a - bT + I + G

Y = 1/(1-b) [a - bT + I + G]

[b = MPC]

Y = 1/MPS [a - bT + I + G]

$$\boxed{Y = k\,[a - bT + I + G]}$$

II With lumpsum tax and transfer payment

(18)

W.k.t.; in equilibrium;

AD = AS

↓

AD = Y

Y = C + I + G

C = a + b(Yd)

Here, Yd = Y - T + TR [TR = transfer payment]

C = a + b(Y - T + TR)

$$Y = a + b(Y - T + TR) + I + G$$
$$Y = a + bY - bT + bTR + I + G$$
$$Y - bY = a - bT + bTR + I + G$$
$$Y(1-b) = a - bT + bTR + I + G$$
$$Y = \frac{1}{(1-b)}[bT + bTR + I + G]$$

$$\boxed{Y = k[bT + bTR + I + G]}$$

19) Tax function :

$$\boxed{T = \bar{T} + tY}$$

where,
$\bar{T}$ = Autonomous tax / constant tax
t = Income tax rate
T = total tax.

Tax as a function

20) In equilibrium w.k.t ; AD = AS

$$Y = C + I + G \quad \text{---} \quad (1)$$

w.k.T; $C = a + b(Yd)$

where $Yd = Y - Tax$

w.k.t, $tax = \bar{T} + t(Y)$

Thus, $C = a + b[Y - (\bar{T} + t(Y))]$

$$C = a + b\{Y - [\bar{T} + tY]\}$$

$$C = a + b\{Y - \bar{T} - tY\}$$

$C = a + bY - b\bar{T} - btY$ — Sub. in (1)

$$Y = \underbrace{a + bY - b\bar{T} - btY}_{C} + I + G$$

$$Y - bY + btY = a - b\bar{T} + \bar{I} + \bar{G}$$

$$Y[1 - b + bt] = a - b\bar{T} + I + G$$

$$Y = \frac{1}{1-b+bt}[a - b\bar{T} + I + G]$$

[taking '-b' common]

$$Y = \frac{1}{1-b(1-t)}[a - b\bar{T} + I + G]$$

$$\boxed{Y = \frac{1}{1-b(1-t)}[a - b\bar{T} + I + G]}$$

Here, if they ask the value / size of Multiplier;

$$\boxed{k = \frac{1}{1-b(1-t)}}$$

21) Tax, Govt expenditure and Transfer payment [everything is included here]

W.r.t-T; AS = AD

$$Y = C + \bar{I} + \bar{G} \quad \text{—— (i)}$$

where, $C = a + b(Yd)$ —— (ii)

Here, $Yd = Y - tax + TR$

where $tax = \bar{T} + t(Y)$

So, $Yd = Y - [\bar{T} + t(Y)] + TR$

Hence $Yd = Y - \bar{T} - tY + TR$ [sub. in (ii)]

$$C = a + b(Y - \bar{T} - tY + TR)$$

$$\therefore C = a + bY - b\bar{T} - btY + bTR \quad [\text{sub. in (i)}]$$

$$Y = a + bY - b\bar{T} - btY + bTR + \bar{I} + \bar{G}$$

$$Y(1 - b + bt) = a - b\bar{T} + bTR + \bar{I} + \bar{G}$$

$$Y = \frac{1}{(1-b+bt)}\left[a - b\bar{T} + bTR + I + G\right]$$

$$\boxed{Y = \frac{1}{1-b(1-t)}\left[a - b\bar{T} + bTR + I + G\right]}$$

22) Equilibrium National Income in Four sector Model

$$\boxed{AD = Y = C + I + G + (X - M)}$$

$$\Downarrow$$

$$\boxed{\text{Net X}}$$

$$\boxed{AS = C + S + T + M}$$ where M ⇒ Imports

23) Import Function

$$\boxed{M = \bar{M} + mY}$$

where $\bar{M}$ = autonomous imports

m = Marginal propensity to import.

$$\boxed{MPM = m = \frac{\Delta M}{\Delta Y}}$$

24) Equilibrium level of National Income in 4 sector

$$\boxed{Y = \frac{1}{1-b+m}\left[a - bT + I + G + X - \bar{M}\right]}$$

How it is derived? see TB ⇒ 6.63

25) Relation between change in Income (ΔY) and change in exports (ΔX)

$$\Delta Y = \frac{1}{1-b+m} \Delta X \quad \text{or} \quad \frac{\Delta Y}{\Delta X} = \frac{1}{1-b+m}$$

26) Foreign Trade Multiplier :

$$\frac{1}{1-b+m}$$

where ; b = MPC

m = MPM

27) Trade balance = X - M

28) Tax Multiplier :

$$= \frac{1}{(1-b)(1-t)}$$