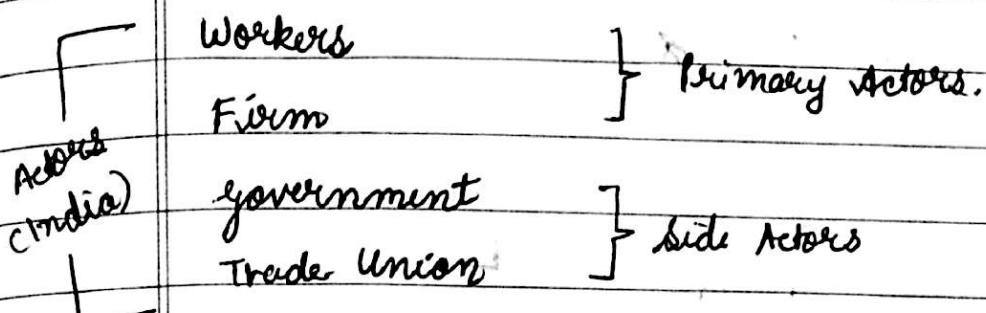


Basic Labour Economics Model



Workers \Rightarrow supply labour

Individuals

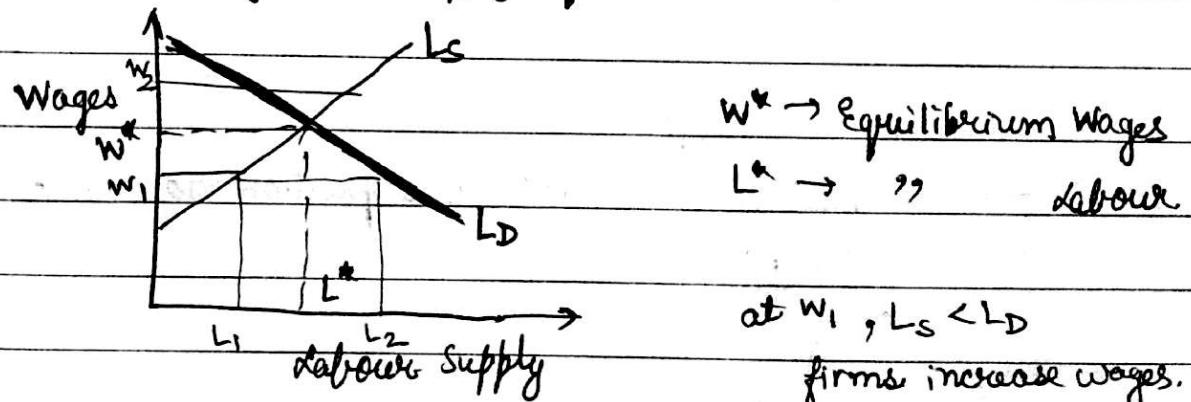
labour \neq Person

Firms \Rightarrow Demand labour.

Physical / Mental
Ability of a person
provided for some
duration

* workers supply labour and
hence want remuneration known as wages
(units more of wages)

Increase in wages \propto Supply of labour (L_s)



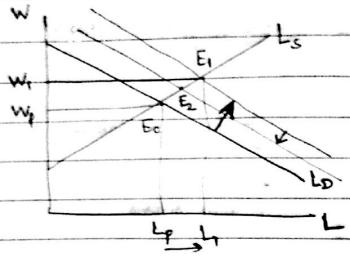
Firms \Rightarrow labour demand = DERIVED labour demand.

\downarrow
Paying Wages.
 \therefore tries to minimise it

\downarrow
demand decided by something else
demand

CONSUMER demand for goods translates
to labour demand.

Wages \uparrow Demand for labour \downarrow
(L_D)



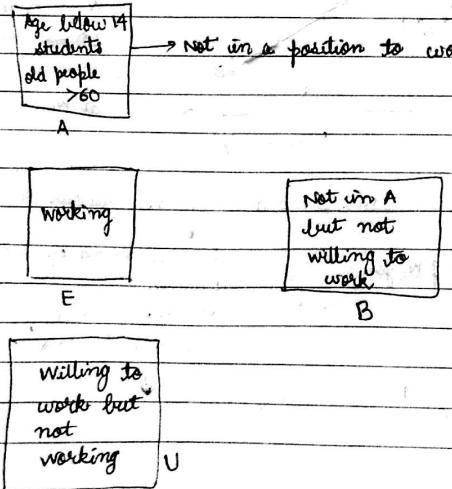
w_1, l_1 (employment, wages both go up when there is a demand for labour)

Oil discovered at a place, engineers required which are called from different parts, LOCAL LABOUR is needed to serve them, so wages go up and so does employment.

E_1 : Initial phase of oil discovery (setting up infrastructure).

E_2 : Next phase of oil discovery. (less people needed - for maintenance)

Demographic
Population
distribution



Labour \rightarrow Physical / Mental Skills

Labour Force \rightarrow Individuals

$$\text{Total Population} = A + B + E + U = P$$

$$E + U = \text{Labour Force}$$

$U \rightarrow$ Unemployed

$E \rightarrow$ Employed / Work Force

$$\text{Labour Force Participation Rate} = \frac{E+U}{P} = \frac{LF}{P}$$

$$\text{Work Force Participation Rate} = \frac{E}{P}$$

$$\text{Unemployment Rate} = \frac{U}{E+U} = \frac{U}{LF}$$

B: voluntary unemployed (inactive)

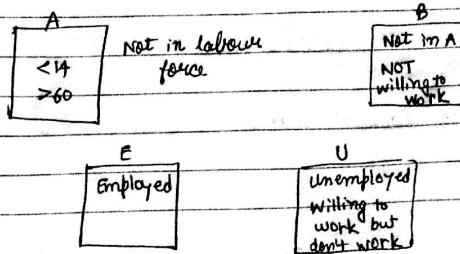
$$\text{Voluntary unemployment rate} = \frac{B}{LF}$$

$$LF = \boxed{\text{Labour Force} = E+U}$$

12th Jan Labour Force

Work Force

Unemployment



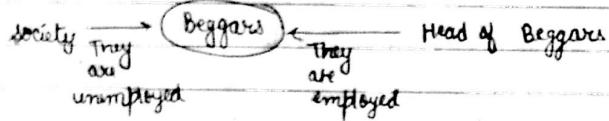
What's Employment?

Beggars are unemployed, Models are not?

Employment is a trivial concept,
it is given.

Beggars selling tact and sympathy

Employment is a thing of perspective



In economic terms, employment means:

Generating income

Producing (goods or services)

Recognition in the society.

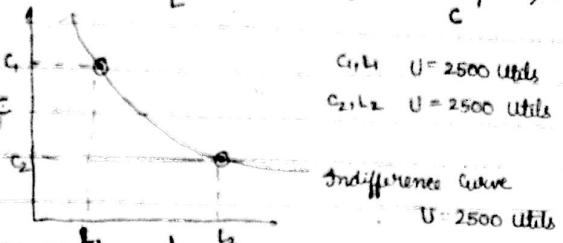
Individual must have self-esteem in doing that thing

Robbery isn't a job (no recognition in society and no self esteem)

Labour supply

Neo-classical model for leisure and consumption

Individual — (Figure, ~~leisure, consumption~~)
Utility = $f(L, C)$ (commodity consumption)



Assumptions

① IC is downward sloping.

Both C and L are 'goods', not 'bads'

i.e., individual wants more of C and more of L

$$f_L > 0, f_C > 0$$

(same for both are 'bad', some nature, just move to lowest IC curve, i.e., origin)

② Two IC cannot intersect each other

③ IC is convex to origin. (diminishing marginal rate of substitution)

④ Higher IC \approx Higher Utility.

Budget Constraint

$$U = f(X_1, X_2)$$

$$P_1 X_1 + P_2 X_2 = M$$

$$U = f(L, C)$$

$$\hookrightarrow W(T-L)$$

\underbrace{h}
Income from labour.

$W \rightarrow$ Wages

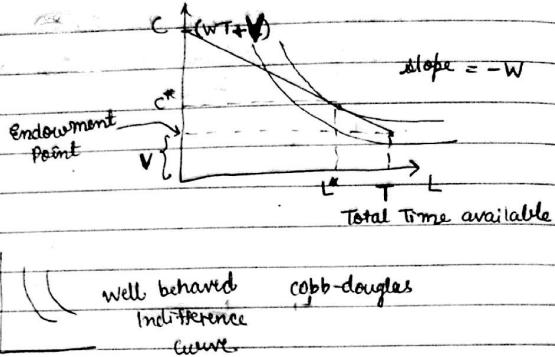
Non labour income = V

(Interest, House rent)
which you get

$$\therefore \text{Total Income} = W(T-L) + V = C$$

$$\Rightarrow (WT + V) - WL = C$$

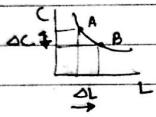
Endowment
(y-axis of leisure or income)



At optimum point, tangents are equal.

Slope of ΔC

$$\frac{\Delta C}{\Delta L} = -\frac{MUL}{MUC}$$



\therefore Total sacrifice of $\Delta C MUC$ = gain of $\Delta L MUL$

$$\Rightarrow -\Delta C MUC = \Delta L MUL$$

$$\Rightarrow \boxed{\frac{\Delta C}{\Delta L} = -\frac{MUL}{MUC}} = W \quad (\text{Take care of the signs of slopes})$$

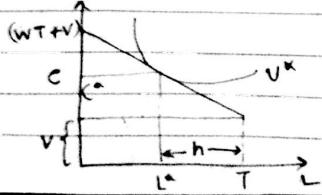
13th Jan

Supply of labour

$$u = f(c, l)$$

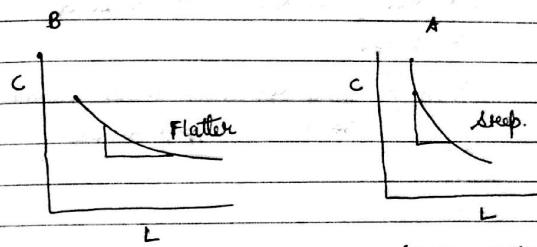
$$\text{Budget constraint } (WT + v) - WL = C$$

$$v^*, L^*, c^*$$



$h \rightarrow$ hours of work individual is willing to work
Taste and Preferences WORKAHOLIC

LEISURE LOVING.



gives less of commodity
to gain same leisure

giving more commodity
to gain same leisure

$$U = ac^{1/2} + bl^{-1/2}$$

$$\text{s.t. } (WT + v) - WL = C$$

(HW)

Logitrange $\Rightarrow ?$

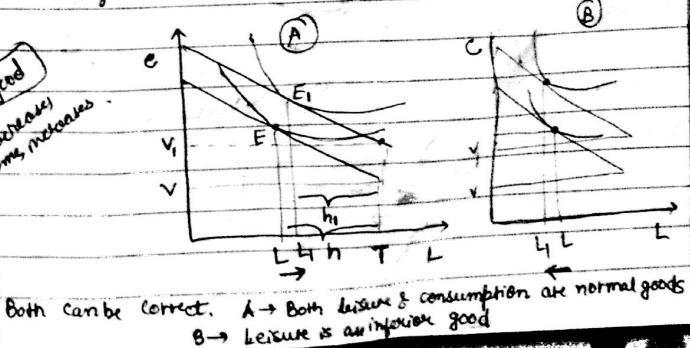
$$\therefore U = a [(WT + v) - WL]^{0.5} + bl^{-0.5}$$

$$\frac{dU}{dL} = a^{0.5} [WT + v]$$

$v = \text{Non labor income}$

changes from v to v_1 , $v_1 > v$

inflict good
! demand decreases
as income increases



Both can be correct.
A \rightarrow Both leisure & consumption are normal goods
B \rightarrow Leisure is an inferior good

Is leisure an inferior good?
Usually leisure is a NORMAL GOOD.

Both Normal Goods, New solution must lie in North-East.

$h^* < h$: when Non-labour income increases,
then labour supply decreases

$$U = f(C, L)$$

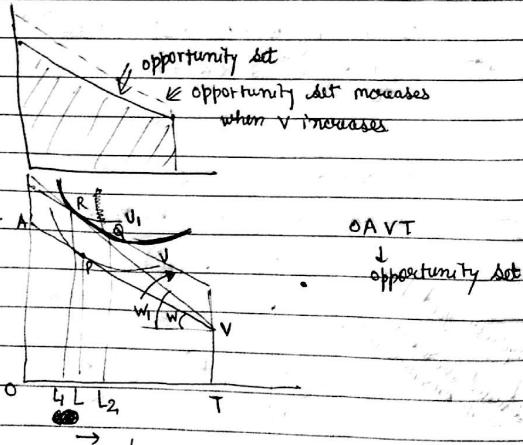
$$\text{at } (Wt + V) - WL = C$$

$$h^*, C^*, L^*$$

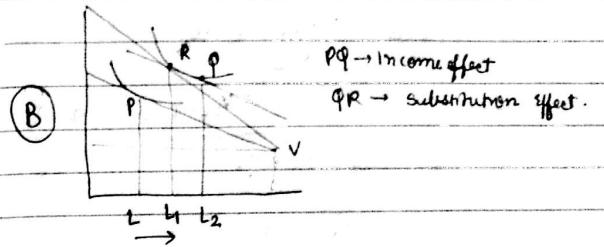
$$h^* = T - L^*$$

$$h^* = f(W)$$

$$\frac{\partial h^*}{\partial V} = -ve$$



LAGRANGE OPTIMIZATION



Both can be true. Why?

wages ↑, LS ↑ or $\begin{cases} \text{LS } \downarrow \\ \text{increase in opportunity cost.} \end{cases}$

Step 1 NO change in wages, change in ~~non~~ Non-labour income.

PQ (INCOME EFFECT) $L \rightarrow L_2$

Step 2 QR $L_2 \rightarrow L_1$ substitution effect

because of opportunity cost

NET -ve EFFECT of Leisure

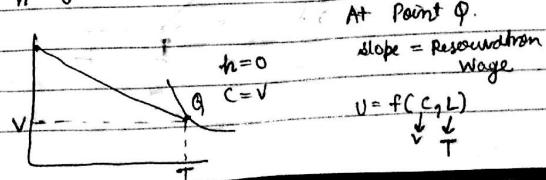
$$h^* = f(W, V)$$

$$\frac{\partial h^*}{\partial W} = \boxed{\text{sign}} \rightarrow + (A) \quad \rightarrow - (B)$$

What wage rate, individual is indifferent between WORKING and NON-WORKING.

\Rightarrow This wage = RESERVATION WAGE.

$$h^* = 0$$

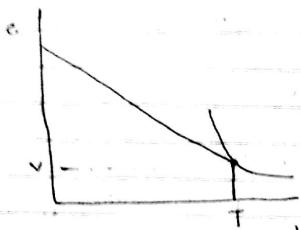


$$\left(\text{Slope} = \frac{MU_L}{MU_C} \right) = W_R$$

$C = V, L = T$

$W_R = f(V, T)$
↑ fixed
 $\therefore W_R = f(V)$

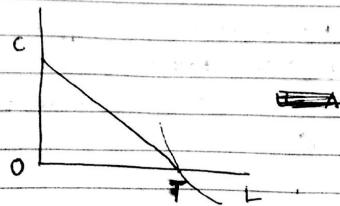
16th Jan. Reservation Wage.



$$\left. \text{Slope of IC} \right|_{L=T, C=V} = W_R$$

If the non-labour income is zero.

$$U = AC^\alpha L^\beta$$



$$MU_C = AL^\beta \alpha C^{\alpha-1}$$

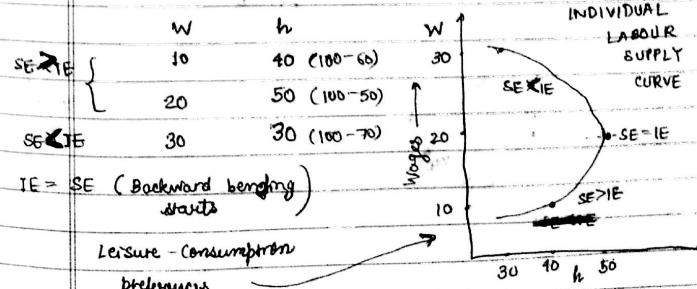
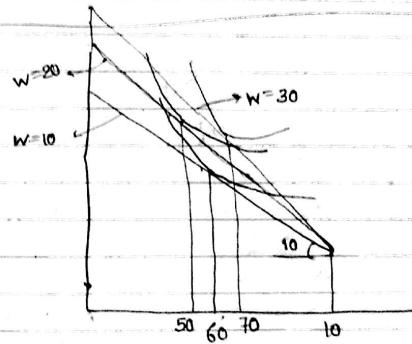
$$MU_L = AC^\alpha \beta L^{\beta-1}$$

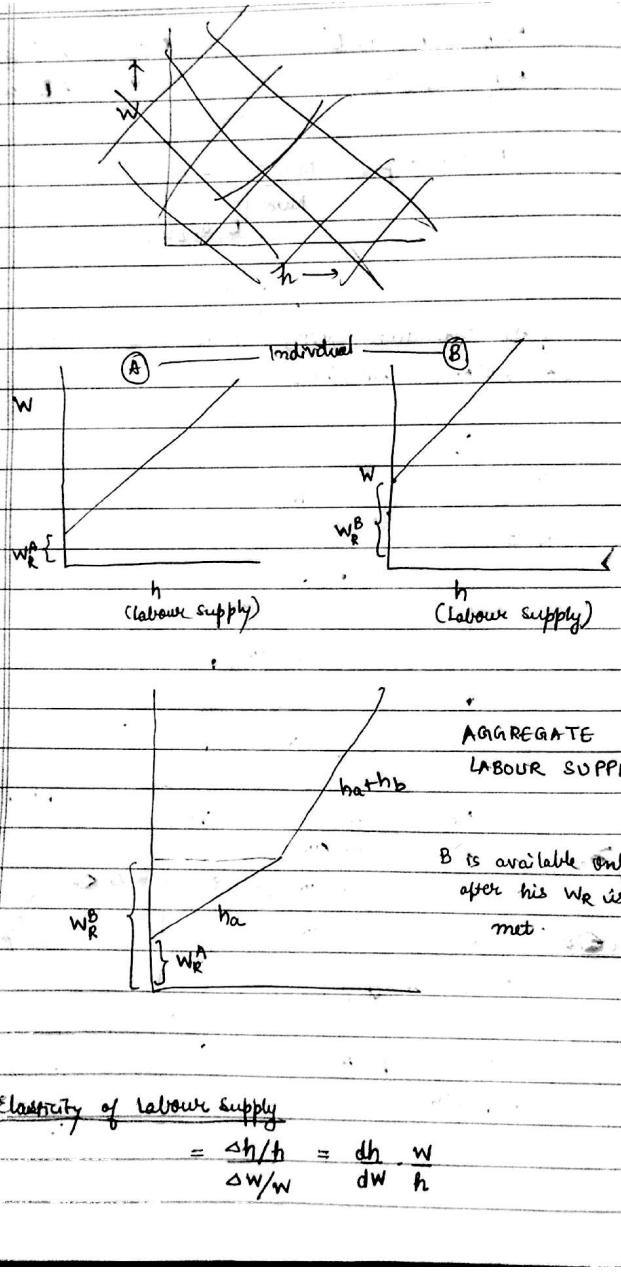
$$\frac{MU_L}{MU_C} = \frac{-AC^\alpha \beta L^{\beta-1}}{AL^\beta \alpha C^{\alpha-1}}$$

∴ For the slope, $\left. \frac{MU_L}{MU_C} \right|_{C=0, L=T} = 0$

$$\Rightarrow W_R = 0$$

If the individual having no non-labour income, he has to work to survive.

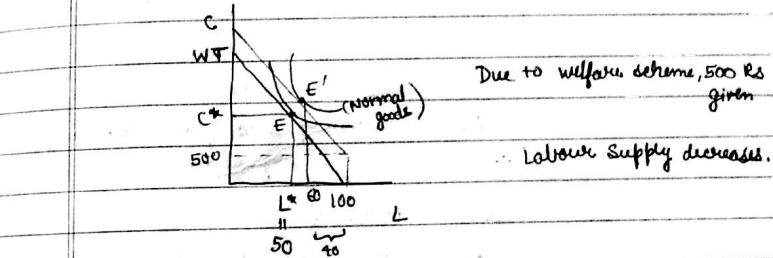




the slope is +ve upto the point where $SE = 1E$. (then -ve)
To get the point, double derivative should be negative

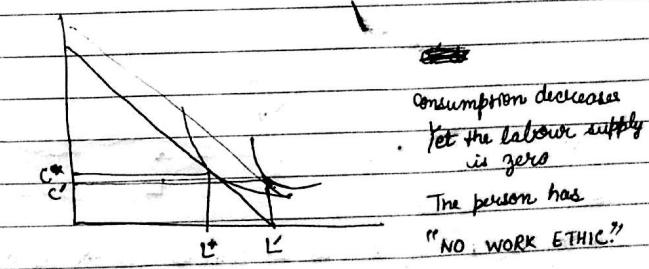
Effects of welfare scheme on labour supply

Individual is poor (no non-labour income)



TWO WAYS

- (1) when welfare compensation $\geq C^*$ (before compensation)
- (2) leisure loving person.



Dependent var. Independent var. error

$$\ln h_i = \alpha + \beta \ln w_i + e_i$$

$$Y_i = \alpha + \beta X_i + e_i$$

β = Elasticity of labour supply

regression

In economics,
 $\ln I = \alpha + \beta \ln Y + e$
 β is elasticity

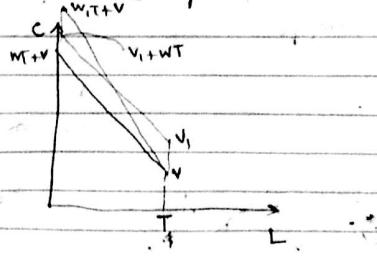
Worker	Hours	Wages
1	10	100
1	1	1

OLS → Ordinary least squares Method of regression.

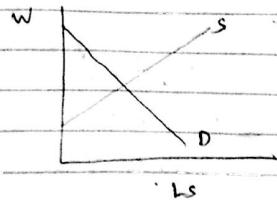
error → gender discrimination

- ∴ β may be under or over estimated
- error term is included.

Jan Neo classical model assumption.

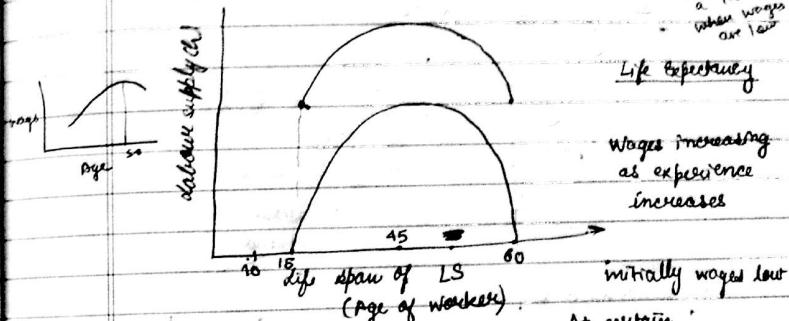


Strong Assumption : Wage is exogenous to the labour supply



Validity overtime, greater wages \Rightarrow Wages are not exogenous

- life-cycle labour supply (individual)



Wages increasing as experience increases

initially wages low

At certain

At this point, wages are maximum
 individual tries to enjoy more leisure
 for some consumption

∴ after this, h decreases

- Is there any relationship between fertility rate and labour supply

(H.W) How does LS depend on fertility rate?

No. of children raises a woman's reservation wage &
 reduces probability that she will work

3:3 \Rightarrow increase in
 2:1 labour force
 participation

Rise in Market Wage, increases female part'n rate,
 makes child bearing expensive.

$$MRTS = \frac{\Delta K}{\Delta L}$$

LABOUR DEMAND) LONG RUN

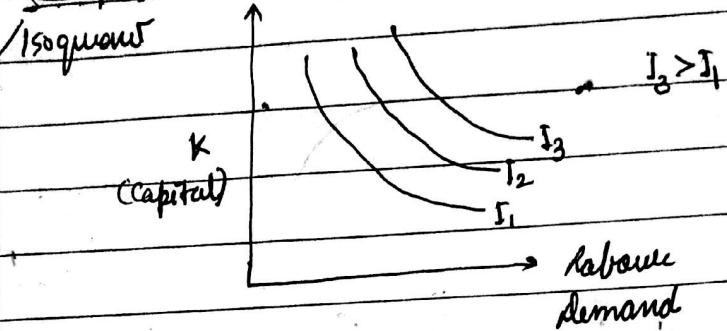
(Firms) - choice

Consumer's choice \rightarrow optimize satisfaction

Obj: optimize Profit

Set constraints (Labour Demand vs any other)

No-profit line (like IC)

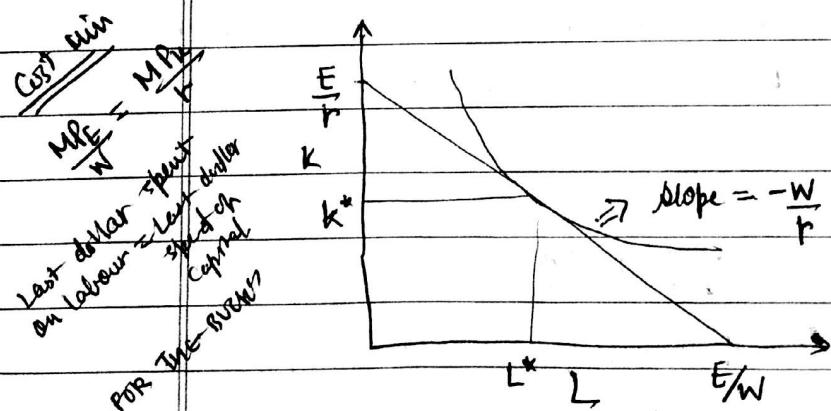


- * Downward sloping
- * Convex to origin (Marginal rate of "technical" substitution diminishes (dim MRTS))
- * Two IP lines cannot intersect
- * Higher IP line represents higher level of profit/output

$$WL + rK = E \Rightarrow K = \frac{E}{r} - \frac{WL}{r}$$

↑ Total Expenditure

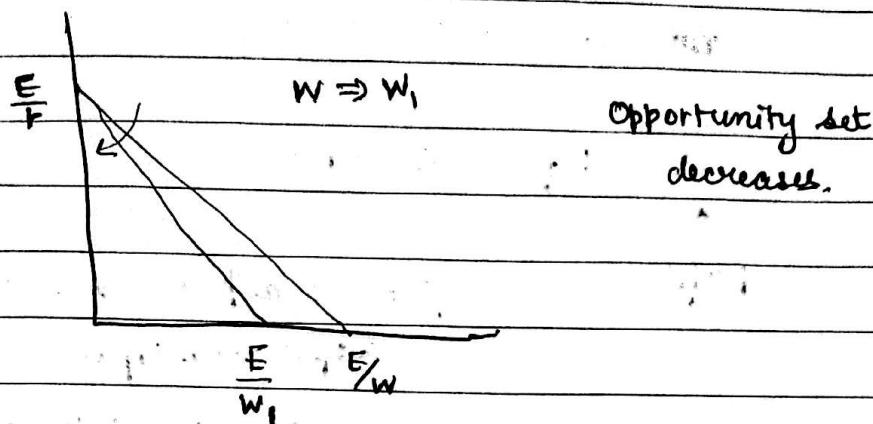
rate of return to the capital OR (interest rate)



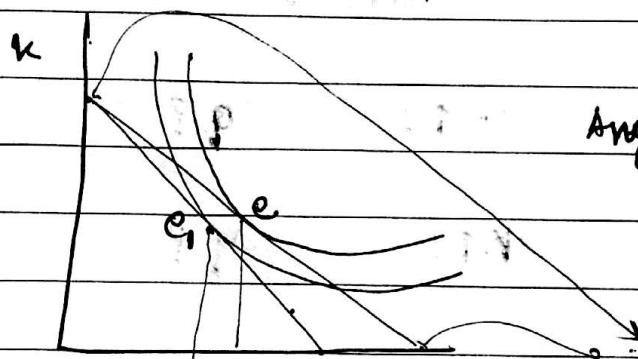
$$\text{slope of IP line} = \frac{MP_L}{MP_K} = -\frac{\Delta K}{\Delta L} = -\frac{W}{r}$$

$$W \Rightarrow L^*$$

W increases to W_1



Opportunity set decreases.



Any point to the right of e is not possible

prod "fun"
for perfect
substitutes
 $q = k + l$

$$\begin{array}{cccc} & 50 & L^k & L^k(W) \\ & & (W_1) & (W) \\ & & 20 & (10) \\ & & 0 & (0) \end{array}$$

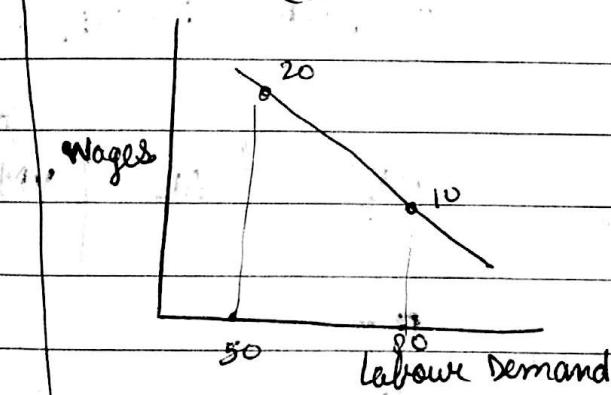
what about corner solution?

Is it feasible

(Assume Capital perfect substitute of labour)

$$q = f(E_1, E_2)$$

skilled unskilled



23th Jan

Short Run Demand for Labour.

$$q = f(E, k)$$

↑ Employment Capital

production funⁿ

E = Number of workers? ✓ (No. of hrs fixed)

= Hours of work in labour? } Complication

$$10 \times 8 = 20 \times 4$$

No. of workers

E : heterogeneous (Actually)

Assumptions

- ① E \rightarrow No. of Workers
- ② All workers are equal

$$\Pi = Pq - WE - rK$$

Profit

firm is a price taker in terms of output and input

\therefore PERFECTLY COMPETITIVE FIRM.

$$f'_E = MP_E = \Delta E \uparrow 1 \quad \Delta q?$$

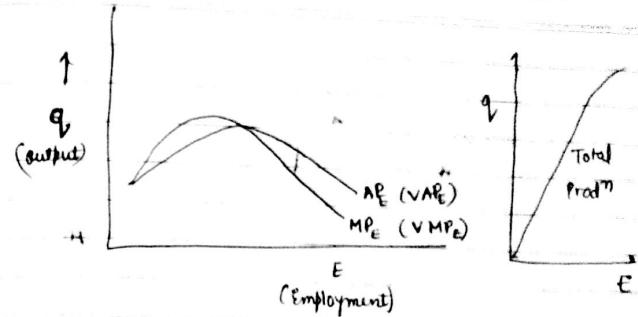
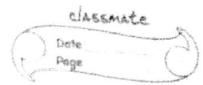
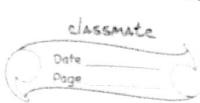
$$f'_K = MP_K = \Delta K \uparrow 1 \quad \Delta q?$$

$$\text{value of } MP_E = P \times MP_E = VMP_E$$

$$\frac{MP_E}{MP_K} > 1$$

$$\text{value of } MP_K = P_K \cdot MP_K = VMP_K$$

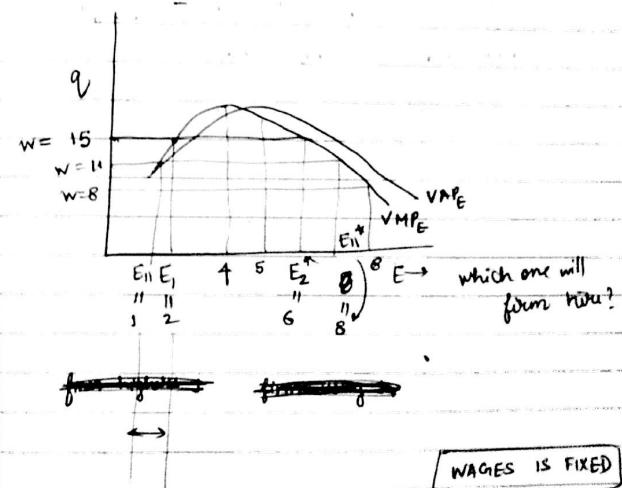
E	Total Output	MP _E	AP _E	VMP _E (P=2)	
				VMP _E	VAP _E
0	0	-	-	-	-
1	11	11	11	22	22
2	27	16	13.5	32	27
3	38	11	12	22	24.5
4	40	2	10	4	20
5	41	1	8.2	2	16.4



$$\Pi = Pq - WE - rK \quad \partial \Pi = P \partial q - W \partial E = 0$$

$$\frac{\partial \Pi}{\partial E} = 0 \Rightarrow VMP_E = W$$

$$W = P \frac{\partial q}{\partial E}$$

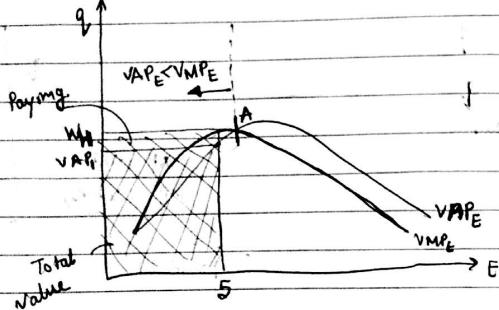


WAGES IS FIXED

can't be changed.

firm will hire 8 workers rather than 1

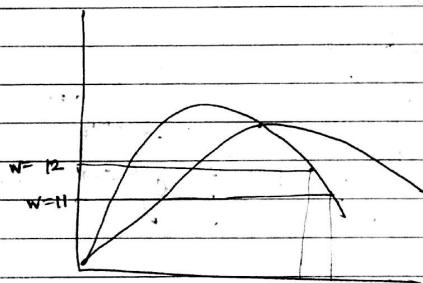
before 8, the firm pays 11, but worker adds more than 11.



Why doesn't firm operate at W_1 ? (Actually it packs business and gold).

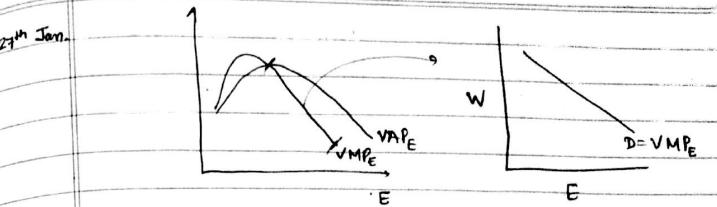
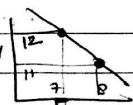
Firm won't operate at any point left of A. (Payments > Value)

FIRM OPERATES : $VAP_E > VMPE$



wages	E
11	8
12	7

PERFECTLY
ONE COMPETITIVE
FIRM DEMAND

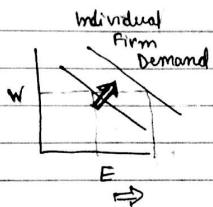


$$\Pi = Pq - WE - rK_0$$

- Price of Output & Demand for Labour

$$P \uparrow \quad VMPE = p \times MPE \uparrow$$

$$E \uparrow$$



There are n firms

what is aggregate demand?

n firms

$$w_1 \rightarrow E_1, E_2, \dots, E_n$$

$$w_2 \rightarrow E_1^2, E_2^2, \dots, E_n^2$$

$$\begin{array}{ccccccc} 15 & \rightarrow & 10 & 10 & 20 & = \\ 10 & \rightarrow & 15 & 17 & 30 & = \end{array}$$

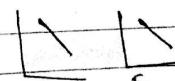
when every firm increases number of workers

they produce more \uparrow

Supply

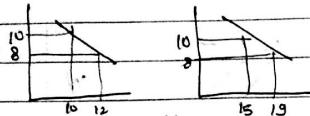
Price \downarrow

Employment \uparrow



$\frac{w_1}{w_2} < 1$

Don't add horizontally



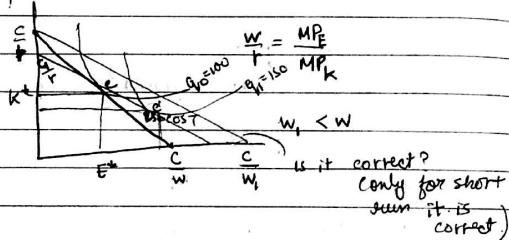
Aggregate Industry demand for Labour is NOT the horizontal summation of individual firms' demand for labour in the short run.

[HW] * In the Long Run does industry demand for labour curve exist?

$$q = f(E, K)$$

30th Jan

LONG RUN DEMAND FOR LABOUR

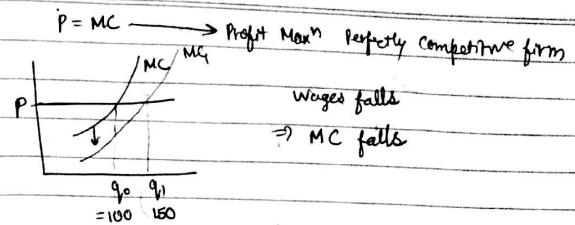


they are different \Rightarrow Minimize cost

\Rightarrow Maximize profit (from quantity produced)

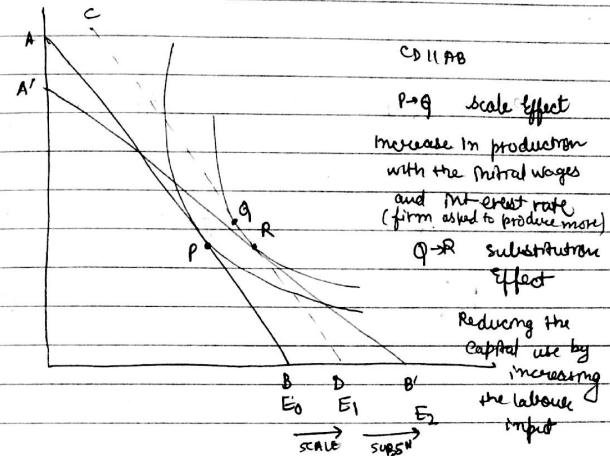
K, E are not perfect substitutes

when labour becomes cheap, firm moves from capital intensive to labour intensive, so it can hire more labour so that it benefits from cheaper labour.



Scale effect

Substitution effect



Total Demand increased due to change in wages.

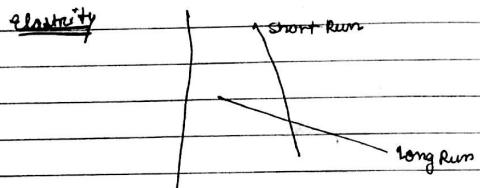
- Elasticity of labour demand in long run = $\frac{\partial E/E}{\partial w/w}$
- Elasticity of technical substitution = $\frac{\text{proportionate change in } (K/E)}{\text{proportionate change in } (W/R)}$

What's the use of NC model?

done intuitively by market players or they'll be out of the market.

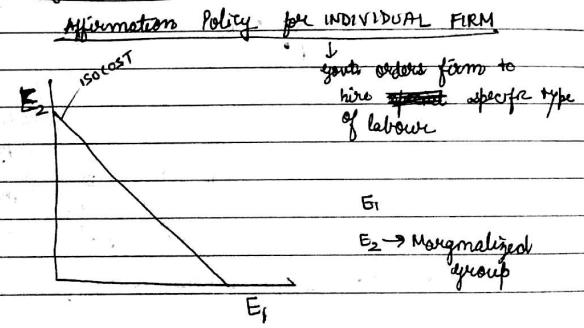
HIT & TRIAL to reach the solution

Electricity



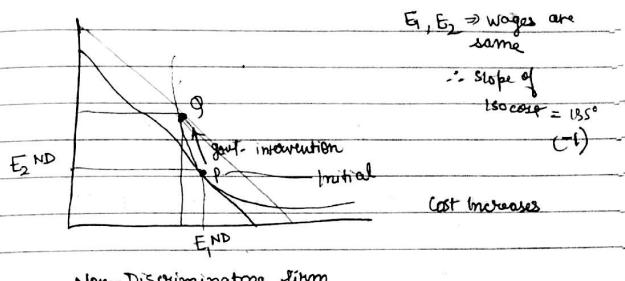
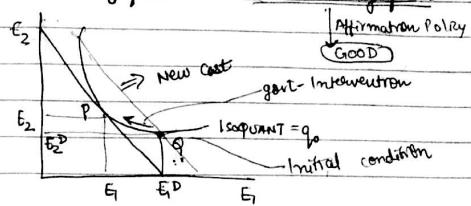
• Effect of Reservation Policy (Affirmation)

9th Feb Policy Interventions



$$q = f(E_1, E_2)$$

NB: Discriminating firm vs Discriminating firm



Non-Discriminating firms

Effect of the Affirmation Policy → depends on initial conditions and shape of isocost and the intensity of affirmation

∴ Govt. has to find a suitable combination of E_1 and E_2

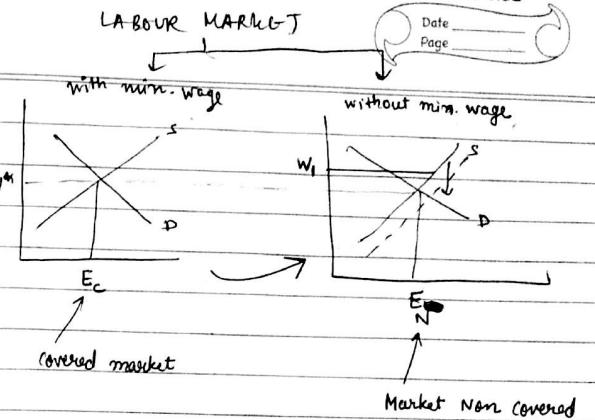
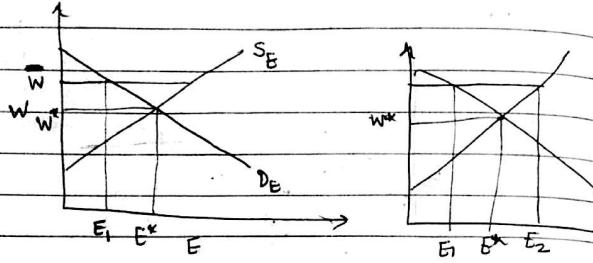
Why doesn't firm change isoquant?

Because moving to a higher isoquant

⇒ higher production

⇒ trying to change the price

⇒ contradictory to PERFECTLY COMPETING FIRM



- Minimum Wage = \bar{W}
 $\bar{W} > W^*$

unemployed: $E_2 - E_1$

UNEMPLOYMENT INCREASES DUE TO:

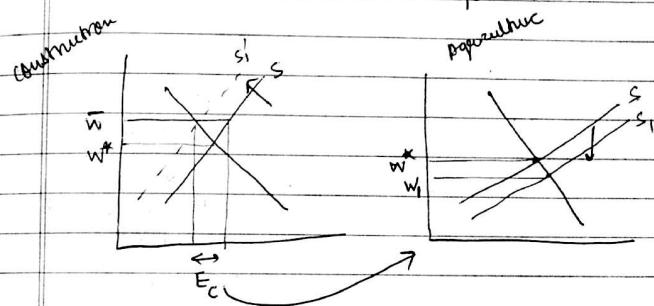
- (1) $(E^* - E_1) \Rightarrow$ Reduction in Demand
- (2) $(E_2 - E^*) \Rightarrow$ Increase in Supply

$$D = a - bE$$

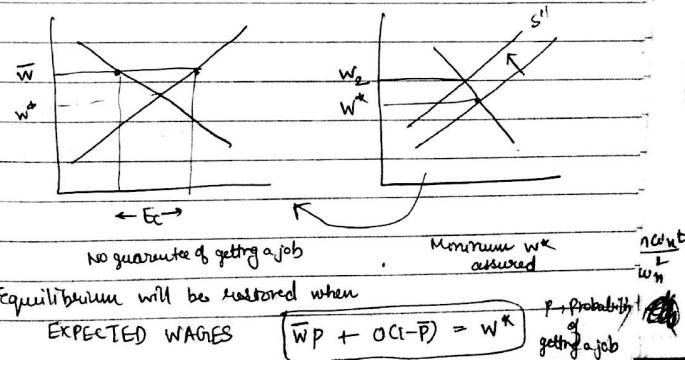
$$S = c + dE$$

min wage $\bar{W} = \$100$

what is extent of unemployment



Afia would like to work in construction (assuming costless mobility)



straightline is tangent, greater the elasticity of substitution.

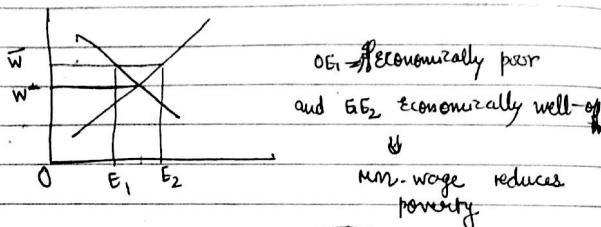
MARSHALL'S RULE OF ELASTICITY OF SUBSTITUTION

Find this

Q1 MFB. Why does govt. introduce minimum wage?

- ① Employer doesn't exploit the worker
- ② To reduce the poverty.

Minimum Wage \rightarrow Increases Unemployment
 Increases living standard of those employed.
 \therefore May increase or decrease poverty.



NOT ALWAYS THE CASE

Empirically it has been seen that \bar{W} increases poverty as those well-off are employed & those who are poor are generally laid-off.

Employment in India

Sector	Informal	Formal			
Unorganised			Self-employed	3 months advance, suitable reason	
Organised			(1) Employee (2) Wage Act		

heterogeneity of workforce
 India has around 500 minimum wages.
 Unions enforce minimum wages
 Employers can seek legal help if needed

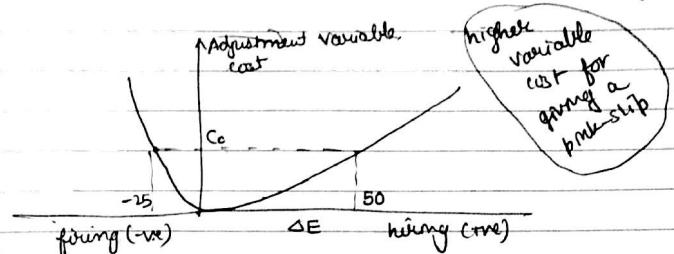
No min. wage act

Giving pink slip \Rightarrow laying off

Adjustment Cost for rapidly hiring or laying off workers

Variable
 Fixed \Rightarrow Offers for hiring & firing.

Adjustment to hiring takes longer than adjustment to firing



This shows laying-off is more difficult than hiring because govt. has protected the workers.

India \Rightarrow Notify the ministry of labour

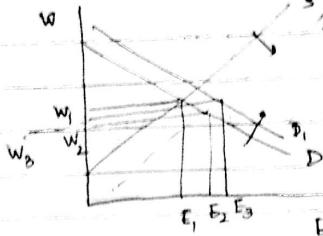
\Rightarrow Notify the workers 2 months advance
 \Rightarrow Hence pay 2 months wages. (severance)

Lay-off Policy \Rightarrow discourages employment
 Indian government job

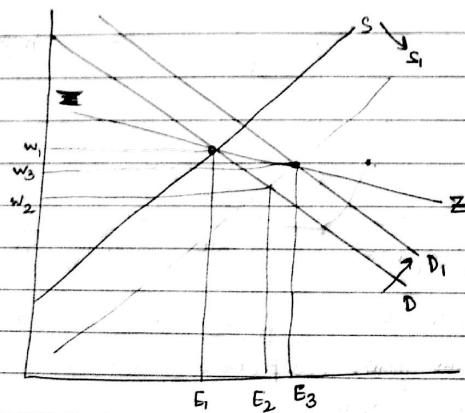
leaving is difficult, losing it is near to impossible

Hence there is a rise in contractual or informal workers.

"This leads to INFORMALISATION of the WORKFORCE"



shift in
with a shift in LS, there is a LD. \leftarrow [real world]



In real world, we observe

only (W_1, W_3) and (E_1, E_3)

How to measure β ? ZZ \leftarrow combo of supply & demand.

measured by

Instrument Variable

\rightarrow some variable affects only LS and not LD

hence we can calculate from it

e.g. Raise Roverter

WW2 \rightarrow Mobilisation of Adult Men is different in different places

(Urban \rightarrow high Rural \rightarrow low)

\therefore Supply of female LS is high in Urban and low in rural.

$$\% \text{ of FLS} = \alpha + \beta \text{ Mobilisation Rate}$$

$$\text{Wage Rate of Female} = \alpha - \beta_1 \text{ Mobilisation Rate}$$

$$\sigma_{LS} = \frac{\beta}{\beta_1} = \frac{2.62}{-2.52} = -1.02$$

\therefore "Mobilisation rate" acts as a variable to calculate elasticity of LS.

$$W = 10$$

$$r = 30$$

$$p = 50$$

$$q = E^{1/2} K^{1/2}$$

If $K = 1600$, how many workers would firm hire?

$$\begin{aligned} \frac{\partial q}{\partial E} &= \frac{1}{2} E^{1/2} \\ \text{MP}_E &= \frac{1}{2} \sqrt{E} \\ \frac{\partial q}{\partial K} &= \frac{1}{2} K^{1/2} \\ \text{MP}_K &= \frac{1}{2} \sqrt{K} = MP_K \end{aligned}$$

$$\frac{MP_C}{MP_K} = \frac{P}{W} = \frac{50}{10} = 5$$

$$\begin{aligned} \frac{1600}{E} &= 30 \\ \Rightarrow E &= \frac{1600}{3} \end{aligned}$$

$$\begin{aligned} VMPE &= W \quad \therefore PMPE = W \\ \Rightarrow P \times \frac{1}{2} \sqrt{\frac{K}{E}} &= W \Rightarrow E = 10000 \end{aligned}$$