

# Economics

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COST

Spend on producing, marketing, selling

Direct cost

Indirect cost

- Exact / accurate cost  
can be calculated exactly  
for specific job / output.  
— area prime cost

→ those items of which  
cannot be exactly  
calculated for  
job specific jobs  
overhead cost.

Total cost = Direct cost + Indirect cost

= Prime cost + overhead cost.

PCC	$\Rightarrow (1:4) \text{ Lm}^3$		
Names	Qty.	Rate	
cement	,	,	
sound	,	,	
Aggregate	,	,	

(Telephone, transport, supervision)

contractor's overhead  $\Rightarrow 15\%$   
profit on  $\Rightarrow 10\%$ .  
+ 5%.

Material cost  $\Rightarrow$  Direct cost.

Supervisor cost  $\Rightarrow$  indirect cost

insurance cost  $\Rightarrow$  overhead cost to indirect cost.

Energy Bills  $\Rightarrow$  Variable overhead

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### Cost

#### Fixed cost

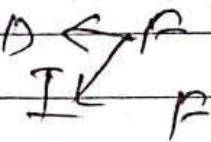
Those items or cost which do not vary directly with output or job is fixed cost.

may be direct or indirect.

D/I PIV

Teacher  $\rightarrow$  4000

Marker  $\rightarrow$  50



#### variable cost

- Paper cost

- tea break t. cost

Total cost = Fixed cost + variable cost

= DC + IC

= prime cost + overhead cost

also  
direct cost may be (indirect, ~~fixed~~)

a) fixed

b) variable

c) Both

Break even value [Break even analysis or point]

class  $\Rightarrow$  to determine

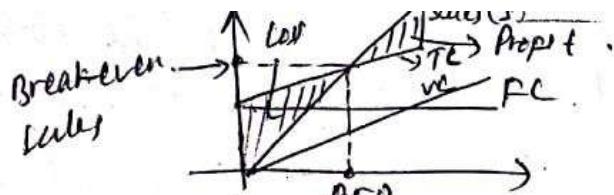
teacher cost  $= 60 \times 4000 = 240,000$

marker/electricity heat  $\rightarrow 50,000$

other  $= 10,000$

$300,000/-$

Profitability  $= 500/- = \text{variable cost}$



$$BEP = \frac{FC}{SP/\text{unit} - VC/\text{unit}}$$

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$VC \Leftrightarrow (C_v) = \text{variable cost/unit}$

$$VC = C_v \cdot n$$

$$TC = FC + VC = FC + C_v \cdot n \quad \text{---(1)}$$

Break-even in terms :-  
no profit/no loss

other  
equivalent condition

TC = income at Break-even

$$SP \cdot n = FC + C_v \cdot n$$

selling price  $n = \frac{FC}{SP - C_v} \Rightarrow \frac{300,000}{15000 - 500} = 22,000$

If no. of std. > BEV 22,000  $\Rightarrow$  Profit

- \* Break-even analysis is a part of cost analysis
  - only one variable is used in the analysis
  - it is also a type of risk analysis
  - used to determine cut-off production volume

- \* Opportunity cost
  - $\rightarrow$  cost of opportunity forgone
  - $\rightarrow$  cost of best rejected alternative

- \* sunk cost
  - $\rightarrow$  a) part cost which cannot be recovered
  - (i) is not used for further analysis at all

2016  $\Rightarrow$  multiparty system.

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ALE-1 ~~50000~~ 10000 80 units ✓  
10 units advance (₹ 80/-)

ALE-2 another offer ~~10000 in 15 units~~  
 $\Rightarrow$  60 units -

10 units advance gone in second alternat.  
native Best one

\* Marginal cost  
~~cycle~~  $\rightarrow$  unit add ₹ 80/- and ₹ 10/-  
d/c ₹ 20/- ₹ 80/-  $\uparrow$  Eg: ₹ 9000 unit  
21 ~~₹ 1334/-~~ ₹ 1045

\* Demand, Supply and Production of ~~the marginal cost~~ 21 units = ₹ 45

Demand is the desire for goods / services supported by

- fed by
- a) willingness (F1801)
- b) affordability (F1A01)

	willingness	Affordability	Demand
Offer car	✗	✓	✗

$\Rightarrow$  To increase demand either increase willingness (or advertisement)  $\Rightarrow$  increase affordability (reduce price)  
 $\Rightarrow$  instalment.

\* Economic Efficiency =  $\frac{\text{worth}}{\text{cost}} \times 100\%$ .

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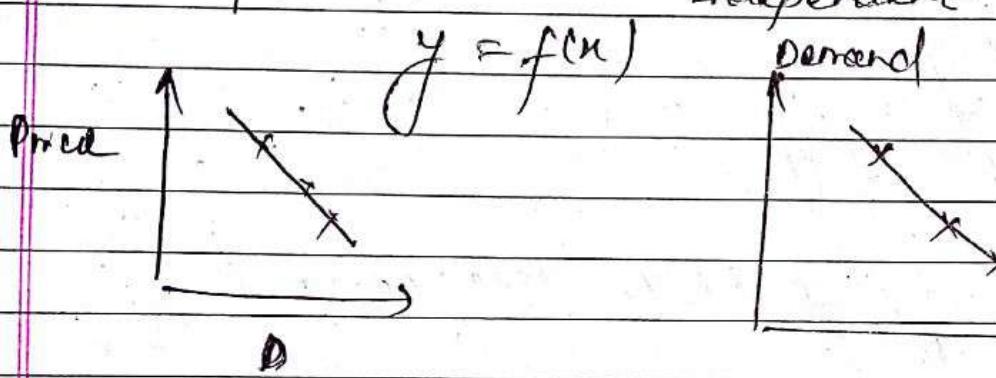
\* Law of Demand (L.O.D).

other things remaining constant, demand increase if price decreases or vice-versa.

$$\text{Demand } (D) = f(\text{price}, n)$$

dependent

independent



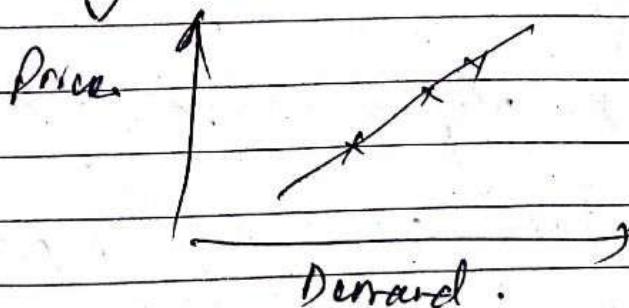
Price always increases in  
years in economics.

X (price in years  
in economics)

Def Rule 2: If demand increases price rises.  
- Yes.

$$P = f(D)$$

$$y = f(n)$$



Not Law of demand

\* Profit/volume ratio (P/V ratio)

$$= \frac{\text{Sales} - \text{VC}}{\text{Sales}}$$

$$\text{BEP} = \frac{\text{FC}}{\text{P/V ratio}}$$

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According to law of demand

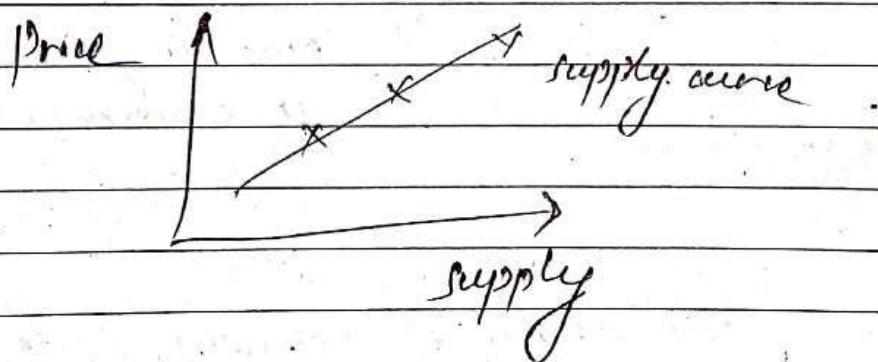
- a) price increases if demand increase.
- b) demand increase if price decrease.
- c) demand increase if price decrease.
- d) price increases if demand decreases.

\* Law of supply:

~~other things constant, supply is a function of price~~

$$S = f(P)$$

Supply increases, if price increases and vice versa.



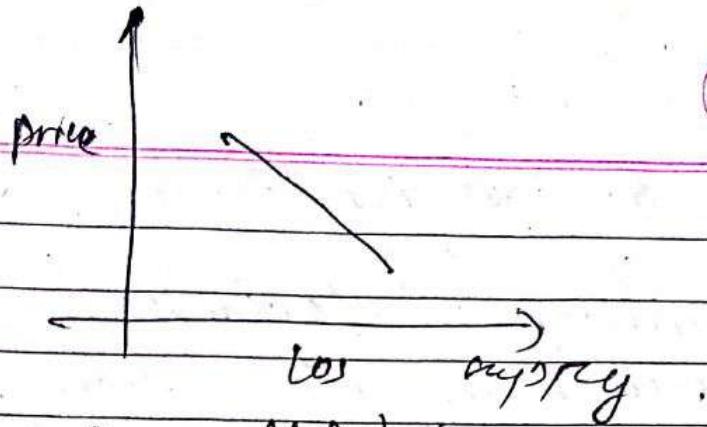
tomato in summit = Rs 20/kg (less supply)  
 = Rs 50/kg (more supply  
 for more profit).

Rule ②

If supply increases price decreases

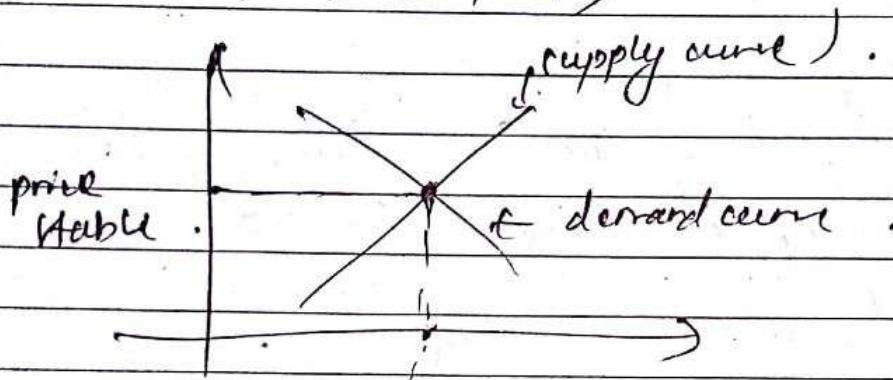
(not law of supply)

$$\text{price} = f(\text{Supply})$$



$$L(D) \Rightarrow D = f(P)$$

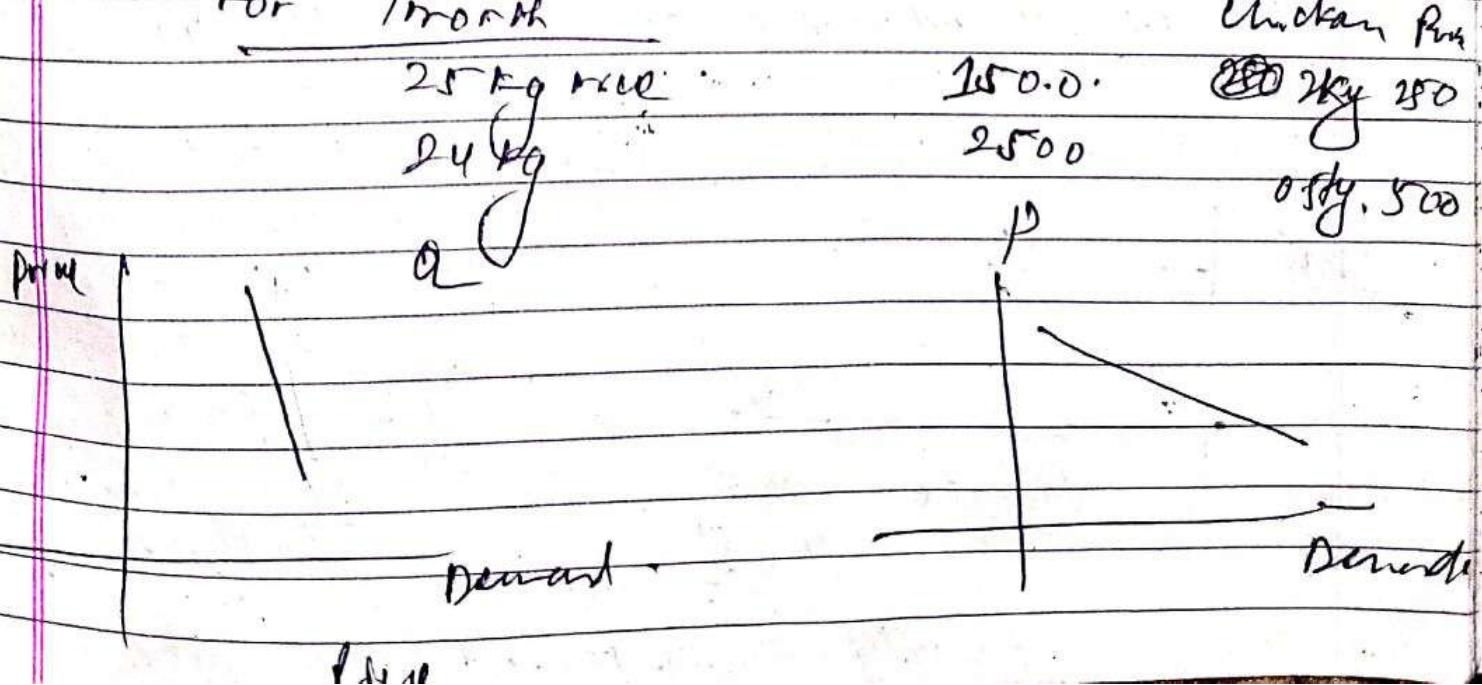
$$L(S) \Rightarrow S = F(P)$$



Price Elasticity of demand.

$$\text{If } \frac{\% \text{ change in demand}}{\% \text{ change in price}}$$

For 1 month



So rice is less elastic w.r.t. chicken.

If % increase in demand is less than

- i. decrease in price then sales
- i) increases      b) remains constant      c) decreases
- ii) all

$$P_1 = 10 \quad Q_1 = 100 \quad P_1 Q_1 = 1000$$

~~P<sub>2</sub>~~ Price decrease by 10%.

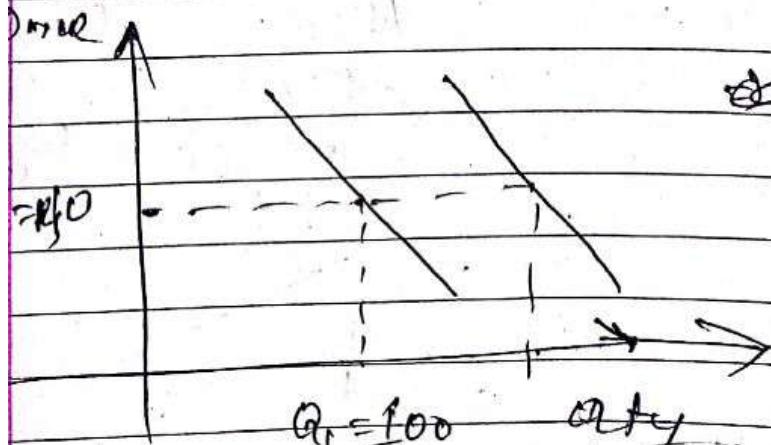
$$P_2 = 9$$

- i. increase in demand is less than
- ii. decrease in price. say 9%.

$$Q_2 = 109 \quad \text{Sales} = P_2 Q_2$$

$$= 9 \times 109 \\ = 981$$

Shift in demand curve or in supply curve.



• Other things  
constant come  
into play

many factors  
→ income  
→ lifestyle

mostly shift caused by many other

Market basket of 800 goods  
Food & Alcoholic Beverage, housing, apparel, transport,  
Medical care, entertainment, personal care and other

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## Inflation: (Price rise / Inflation)

- increase in price or decrease in purchasing power of currency.

Index =) consumer Price Index (CPI)  
(P.I based on market basket for goods and service  
causes) → 8 groups

Demand pull

cost push inflation

⇒ increase in price due to  
increase in demand.

⇒ increase in price due

① pop<sup>n</sup> increase  
income level increase.

to increase in cost

Eg: major in outbreak.

of production such as  
raw material cost /

fuel / tan, etc.

Eg:

Inflation due to increase in pop<sup>n</sup> is

a) Demand pull

b) Cost push

c) cost pull

d) Demand push

X

Inflation in contract management.

Each stat 12 month randa badhi  
taras. lagyo vano ~~clase~~ inflation (price  
adjustment) clause applicable.

Based on inflation contractor gets  
extra money.

PPI =) Producer Price Index

used for industrial price increase measure.

Actual Dollar : Dollar amounts may increase or decrease due to inflation or deflation rate.

Constant Dollar : Dollar amount will reflect purchasing power of a year.

\* Asset (Fixed) and Liability (Equity) :

a)  $\rightarrow$  car, building, furniture, etc.

non-monetary asset  $\Rightarrow$  fixed asset.  
(Building, Equipment)

b) Cash in Hand

$\rightarrow$  Bank Balance, gold, share, loan

, inventory (stock material)

$\rightarrow$  cash or equivalent usage can be converted into cash are current asset.

(within a year in a due business process)

c) Quick Asset :

$\Rightarrow$  cash or equivalent which can be converted into cash with a short period of time (quickly)

Quick asset = current Asset - inventory.

Total asset = Fixed asset + <sup>Quick asset</sup> current asset + inventory

\* Liability

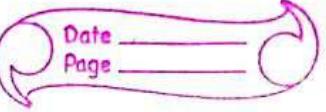
$\Rightarrow$  A/c eg: Bank loan.

Short term (current liability)  
less than 1 year

Long term liability  
more than 1 year

long-term debt financing  $\Rightarrow$  bank loan.

or working capital



current = Asset - Liability

current worth = 0

(flat or negative  
acc. credit & )

government officials may lose his  
job if worth < 0.

$\rightarrow$  current ratio =  $\frac{\text{current asset}}{\text{current liability}}$

$\rightarrow$  quick ratio =  $\frac{\text{quick asset}}{\text{current liability}}$   
(acid test ratio)

Project ~~and~~ <sup>19</sup> (Project financing)

↓  
Share <sup>aka</sup> capital  
 $\Rightarrow$  Equity capital

Loan  
 $\Rightarrow$  debt capital

Bond: investor gives money to company founders: 70-80% in a  
the document that records this arrangement.

long term debt  
financing.

Funding capital by issuing bonds.

Debt equity ratio  $\Rightarrow$   $\frac{\text{Debt}}{\text{Equity}}$

$\Rightarrow \frac{70}{30} \approx 2.33$

2.66

Debt ratio =  $\frac{\text{Debt}}{\text{Total Capital}} = \frac{70}{100} = 0.70$

equity capital  $\rightarrow$  preferred &  
common stock.

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- $\Rightarrow$  project start gaurus vanda patha.  
Bank ~~to~~ loan line/due  
sumitomo.  
 $\Rightarrow$  financial closure.

### Repayment

# In which of the following method of depreciation salvage value is never equal to zero (0).

- $\Rightarrow$  a) straight line      b) S.Y.D.  
 $\checkmark$  c) declining balance method  
d) uniting fund method.

# Economic life the one in which

a) Total cost is minimum

b) Avg. cost is minimum

c) Avg. annual cost is minimum

d) All.

# sinking fund:

~~future amount after year~~  
~~given time period~~ ~~higher side~~ this  
equal amount is called sinking fund.

# Hydro Power Engines

## Financial and Economic Analysis

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Budhi gandaki  $\Rightarrow$  storage type project.

(Private company)

Financial Analysis  $\Rightarrow$  company's expenditure and profit.

Economic Analysis  $\Rightarrow$  Benefits & disbenefits of public

society (from social, environmental viewpoint).

Public company

economic as well  
as financial  
analysis

FIRR  $\Rightarrow$  Financial Internal Rate of Return

EIRR  $\Rightarrow$  Economic Internal Rate of Return

EIRR  $>$  FIRR

Year	Cost	Total cost	Annual Avg cost
0	0/100	100	
1	25/10	110	$110/1 = 110$
2	25	125	$125/2 = 62.5$
3	25	150	$150/3 = 50$
4	35	185	$185/4 = 46.25$
5	50	235	$235/5 = 47$
6	70	305	
7			
8			
9			

Economic life  $\min^m$  annual cost  
of fusion.

Interest factor is

$$d) N_i \quad b) LAV; \quad c) (1+i)^N \quad d) (1+i)^N - 1$$

$$T \Rightarrow A$$

$$R = \frac{A}{1+i}$$

$$I = PTR$$

$$A = P + I = P + \frac{PTR}{100}$$

$$\therefore I = PN; \quad A = P(1+i)^N$$

~~def~~ compound interest

$$F = P(1+i)^N \quad F = P + I$$

$\overbrace{ }$   
compound  
factor.

$$I = F - P \\ = P[(1+i)^N - 1]$$

$$P = \frac{F}{(1+i)^N}$$

$$P = I = P \times IF$$

$$F =$$

$\therefore \frac{1}{(1+i)^N} =$  Present worth factor  
uniform series

$$P = A \left[ \frac{(1+i)^N - 1}{i(1+i)^N} \right] \rightarrow \text{present worth factor.}$$

capital recovery  
annuity

$$A = P \left[ \frac{i \cdot (1+i)^N}{(1+i)^N - 1} \right] \rightarrow \text{capital recovery factor.}$$

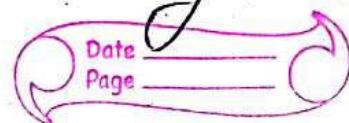
$$F = A \left[ \frac{(1+i)^N - 1}{i} \right] \rightarrow \text{uniform series compound factor}$$

$$A = F \left[ \frac{i}{(1+i)^N - 1} \right] \rightarrow \text{linking fund factor}$$

A future value divisor chart

After multiplying and  
converting tables.

commissioning :- Handover of project after testing.



Payback period is counted after

start of the project      b) completion of the project

commissioning of the project      d) start of project.  
(normally)

Kalinchowk cable car      yearly income.  
54 crore (investment)      18 crore

infed

Payback period  $\Rightarrow$  no. of years required for recovery  
of both principal as well as interest  
(discounted payback period).

Simple payback period  $\Rightarrow$  time required to  
recover principal only.

Project or not Payback period

~~Feasibility~~ or cutoff  
if  $\Rightarrow$  PBP < standard payback  
Kathmandu Gas project

Simple payback  $\Rightarrow$  18 years

Discounted payback  $\Rightarrow$  19 years

The investor's policy was PB 10 years, so cancel  
standard payback period company's policy

$$F = P (1+i)^N \rightarrow \text{single payment compound factor}$$

$$P = F \left( \frac{1}{1+i} \right)^N \Rightarrow \text{single payment PW factor or discounting factor}$$

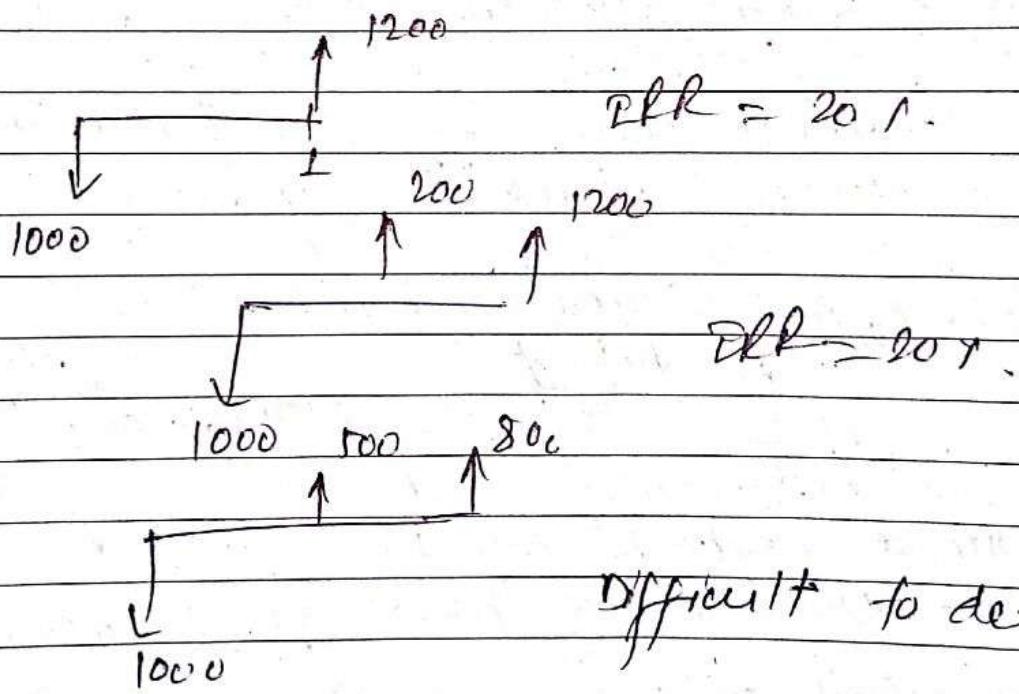
$\Rightarrow$  discount rate at 10% /

IRR (Internal Rate of Return) :

MARR  $\Rightarrow$  Minimum Attractive Rate of Return

\* The interest rate earned by investing in a project or anywhere (bank also) is IRR.  
OR

It is the break-even interest rate where net present value or net future value is zero.



So, Net PW = 0

Case I :

$$\frac{1200 - 1000}{1+i} = 0$$

$$i = 20\%$$

Case II:

$$PW = 0$$

$$\frac{200}{(1+i)_1} + \frac{1200}{(1+i)_2} - 1000 = 0$$

$$i = 20\%$$

Case III:

$$\frac{500}{(1+i)_1} + \frac{200}{(1+i)_2} - 600 = 0$$

Bank rate loan ~~and~~ Bank rate ~~and~~ ~~for~~  
~~outstanding~~ = MARR

outstanding loan ~~and~~ ~~if IRR > MARR~~  
~~outstanding~~ ~~IRR~~ ~~and~~ ~~outstanding~~  $\rightarrow$  IRR

so, minimum value of IRR for project  
is MARR

~~MARR~~  $\Rightarrow$  feasible if:  $IRR > MARR$

$IRR < MARR$   $\Rightarrow$  ~~reject~~

$IRR = MARR$  (critically  
 feasible)

$NPV > 0 \Rightarrow$  accept (feasible, economically  
 viable)

$NPV < 0 \Rightarrow$  reject / non-feasible.

$NPV = 0 \Rightarrow$  critical

min<sup>n</sup> value of  $NPV = 0$   
 for feasible project.

Similarly,  $NPV > 0 \Rightarrow$  accept

$NPV < 0 \Rightarrow$  reject

$NPV = 0 \Rightarrow$  critical

#. If  $NPV > 0$  then  $NPV$  is

- a) zero
- b) negative
- c) zero
- d) All

$$NPV = NPV(1+i)^N$$

always true.

#. If  $NPV$  is positive  $IRR$  is

a) equal to bank interest rate

b) greater than bank interest rate

c) all

(IRR)

#. PB period,  $\pi_{RR}$ ,  $R_{CR}$

For feasible project

a). min<sup>n</sup> value of  $B_{IC} = 1$

b) max<sup>n</sup> value of  $C_{IB} = 1$

Both a & B

c) None

$B_{IC} > 1$  or  $C_{IB} < 1 \Rightarrow$  feasible

$B_{IC} < 1$  or  $C_{IB} > 1 \Rightarrow$  non-feasible

Note : (i)

- Payback PBP; NPV, etc. is calculated before start of the project.
- (ii). Main concern of engineering economics is  
 a) IRR      b) BCR      c) NPV of Project.

E-Bidding system's main objective is  
 a) Time (b) Cost (c) Quality d) All.  
~~and factors vary for different~~

currently bidding price should be less than estimate. previously No. 1  
 cepto.

Depreciation: non-depreciable  $\Rightarrow$  Land and gold.

Straight line Method

$\rightarrow$  equal depreciation / year

$\rightarrow$  constant depreciation / year.

Eg: cost = 100, useful life = 5 years.  
 salvage value = 20

Initial cost { salvage value  $\Rightarrow$  may be zero  
 Net cost } scrap value  $\Rightarrow$  may be zero neglible.

Eg: car sold without engine along with at end of useful life  
 $\Rightarrow$  salvage.

$$\text{dep/year} = \frac{(I - s_v)}{N} = \frac{100 - 20}{5} = \frac{80}{5} = 16$$

Year	Dep	Book value
0	x	100
1	16	84
2	16	68
3	16	52
4	16	36
5	16	20

B.V = Initial cost - Depreciation

B.V at end of useful life = Salvage value.

B.V at  $n^{\text{th}}$  year

$$B.V = I - n \left( \frac{I - s_v}{N} \right)$$

(ii). Sum of Year Digit Method.

$$I = 100 \quad N = 5 \quad s_v = 20$$

Given B.V may or may not be equal to zero.

$$\begin{aligned} \text{SOYD} &= 1 + 2 + 3 + 4 + 5 = 15 \\ &= \frac{n(n+1)}{2} = 15 \end{aligned}$$

$$\text{Depreciation in year } 1 = \frac{5}{15} \times (100 - 20)$$

$$d_1 = \frac{N}{50 \text{ yrs}} (I - s_v)$$

$$d_2 = \frac{4}{15} (100 - 20)$$

$$d_3 = \frac{3}{15} (100 - 20)$$

$$d_n = \frac{(N-n+1)}{10 \text{ yrs}} (I - s_v)$$

Declining / Diminishing Balance:

→ constant percent depreciation

$$I=100, N=5 \text{ yrs}, s_v \rightarrow \text{not given}$$

rate of depreciation =  $\delta = \frac{1}{N} = \frac{1}{5} = 0.2$

= 20%.

Year	Dep.	Book value
0	$x$	100
1	$100 \times 0.2 = 20$	80
2	$80 \times 0.2 = 16$	64
3	$64 \times 0.2 = 12.8$	51.2
4	$51.2 \times 0.2 =$	

$$I - \delta I = I(1-\delta)$$

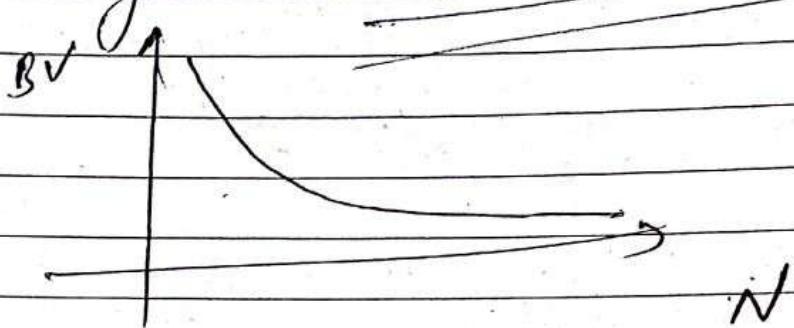
$$I(1-\delta) - \delta I(1-\delta) = I(1-\delta)^2$$

$$I(1-\delta)^2 - \delta I(1-\delta)^2 = I(1-\delta)^3$$

15

$$\text{Book value} = I(1-r)^n$$

So, salvage value never zero.



\* Sinking fund method

(only method that includes time value of money interest)

$\Rightarrow$  depreciation amount increase with time.

Given,

$$I = 100, \quad N = 5 \text{ years}, \quad S = 20$$

$$i = 10\%$$

$\Rightarrow$  may be zero as well

Depreciation amount in year 1

$$= (I - S) \cdot \text{sinking fund factor.}$$

$$= (100 - 20) \left( \frac{1}{1+i} + \frac{1}{(1+i)^2} + \dots + \frac{1}{(1+i)^N} \right)$$

$$= 80 \cdot \frac{0.1}{1.1^{10} - 1}$$

~~$$= 80 \times 0.1 = \text{Rs } 18.1$$~~

50-60% of full capacity occurs in Hydro Nepal.

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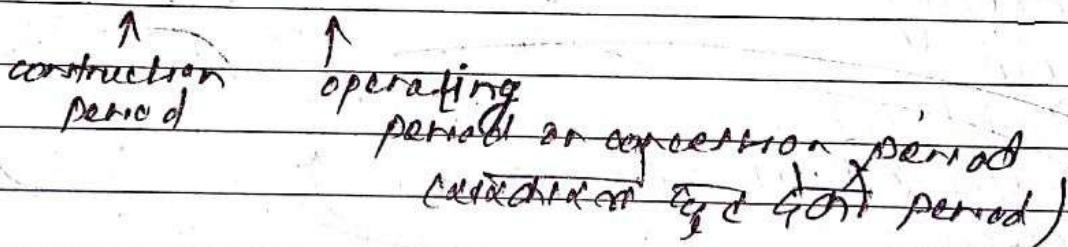
$$d_2 = d_1(1+i) = 13 \times 1.1 = 14.3$$

$$d_3 = d_2(1+i) = d_1(1+i)^2 = 13.1 \times 1.1^2 = 16.1$$

# Most advanced method of risk analysis

- a) Break even Analysis  $\rightarrow$  single parameter
- b) Scenario Analysis  $\rightarrow$  worst, best and most likely
- c) Sensitivity Analysis
- d) Monte Carlo Simulation

$$B_00T = 5 + 30$$



1MW Hydro power

Est. cost = 20 crore

$$\text{Annual Income} = 1000 \times 1 \text{ kwh} \times 24 \times 365 \\ \times 6 \times (0.5 - 0.6)$$

Chameliya Hydro power  $\Rightarrow$  4 yrs. const. period  
by 12 yrs still not complete.

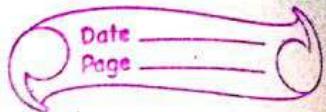
Annual cost = 2.1% of initial cost  
= 40 lakh.

N = 30 yrs

$$B_00T_{\text{interest}}(i) = 10\%$$
  
 $m = 0$

1st stage:- IRR, NPV, BCR & PBP

2nd stage: risk analysis.



\* concreting ~~Temp~~

[III] → Temperature ↑ productivity ↓

[IV] → [2] Floor Height

[I] [3] Material Distance  $\Rightarrow$  most sensitive parameter

[II] [4] Precipitation  $\Rightarrow$  2nd most sensitive

\* Monte Carlo in sensitivity.

multiple parameters varied independently

concreting

	20°C	25°C	22°C	20-50
Temp	1st	2nd	3rd	4th
Floor Height	1st	2nd	3rd	4th
Material distance	10	10	10	10

Precipitation

In sensitivity only one parameter varied  
so, not realistic not the most advanced

So, Monte Carlo method:

multiple parameters varied simultaneously

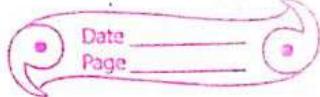
→ easily

## Economic Equilibrium

- cash flows with same economic effect st. can be traded with one another.
- requires common time basis for comparison.

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- 1) Resource smoothening means
- gradual increase in resource
  - adjustment of resource to have least variations
  - optimization and economic utilization of resources
  - all.

## 2) Inventory man

(1). In BIE ratio analysis benefits and costs have to be converted into,

- PCC
- PCD
- ACD
- All of above

(2) ~~Q~~

2 Social costs vary with

- earning capacity
- size of economy
- time at which may apply
- all

(3) Financial closure of project means

- signing of letter of intent to finance
- sighting of due diligence
- signing for approval of loan and commitment
- to fund the project
- none

(4) 'with' or 'without' project alternatives are compared in the economic analysis in terms of

- construction & maintenance cost
- direct & indirect cost
- both
- none

Note: cash and current analysis

$\Rightarrow$  Project ~~cost~~ benefit analysis  
~~cost~~ & ~~benefit~~ comparison

$\rightarrow$  So generally in terms of benefits and costs.

(5)

Which of the following is used in the financial ratio of the firm?

- a) Profitability ratio
- b) Liquidity ratio
- c) Turnover ratio
- d) All

Note: (i) Profitability ratio

$\Rightarrow$  represents company's ability to generate earnings relative to its revenue, S&M costs, equity, etc.

$\Rightarrow$  How well company are using existing assets to generate profit and value for shareholders.

$\Rightarrow$  most popular in financial analysis.

Eg: Profit margin, return on asset (ROA), return on equity (ROE).

(ii) Liquidity Ratio

$\Rightarrow$  determines a debtor's ability to pay-off current debt obligation without raising external capital.

Eg: Quick (Acid-Test) Ratio, current Ratio.

⇒ ~~cover~~ ability to cover short-term obligations and cash flows

In contrast solvency-ratio concerns with long-term ability to pay long-term debts. insolvent company often enter Bankruptcy.

### (ii) Turnover Ratio

→ Helps in determining working efficiency of business

→ it is the % of a material fund or other portfolio holding (such as stock, inventory) (investment) that have been replaced in a year.

A Ltd.	B Ltd
General (current) 10 lakh	25 lakh
Stock (current). 5 lakh	5 lakh

$$TR_A = \frac{210 - 180}{180} \times 100 \\ = \frac{200}{3} \\ = 66.66\%$$

$$TR_B = \frac{25 - 5}{5} \times 100 \\ = \frac{20}{5} \times 100 \\ = 400$$

B is efficient

But greater turnover doesn't always mean good and neither the opposite is always true.

Liquidity ratios are used:

To measure firm's ability to meet short-term obligation

To compare short term obligation to short term resources available to meet these obligations

To obtain such insight into present cash solvency of the firm and firms' ability to remain solvent in the event of adversity

→ solvency ratio.

simulation analysis.

Note in ~~for~~

Note: Sensitivity analysis aka what-if analysis  
How change in an independent variable affects a dependent variable.

cost Benefit Analysis (CBA)

→ measure benefits of a decision minus the cost of choosing it.

→ may include intangible aspects such as goodwill, employee morale, customer satisfaction.

Sensitivity Analysis vs Sub-group Analysis

doesn't estimate intervention in group removed from the analysis.

informal comparison

→ measure per each sub-group

→ Statistical comparisons

(7) Bankable Projects mean

- a) returns are very high
- b) risk factors are manageable
- c) simple and doable projects
- d) all

(8) Public Projects must be good in

- a) financial Analysis
- b). Economic Analysis
- c) Cost Benefit Ratio
- d) all

(9) <sup>Ques.</sup> Sensitivity analysis are sometimes confused with

- a). Cost Benefit analysis
- b). subgroup analysis
- c) group analysis
- d). Enset analysis

(10) Scrap value of RCC structures are generally

- a). 0
- b) -ve
- c) +ve
- d) not predictable

(11) The wages of supervisors and material handlers are charged as

- a) overhead cost
- b). Direct labor cost
- c). Direct labor cost
- d) rate

(12) Annual periodic payment for repayment of capital amount invested over a definite period is

- a). interest certain
- b). Annuity certain
- c). due interest
- d). due annuity

Note :

Annuity Due =) payment made at the beginning of each period. Eg: ~~Interest on~~

Annuity certain =) perIOD. guaranteed return on ~~interest on~~ <sup>interest on</sup> ~~income~~

Fined overhead

- ~~Office rent~~ office rent
- salaries of manager, supervisor.
- depreciation expense of fixed asset.
- taxes and insurance.

variable overhead

- electricity bills

- sales commission

Fined Direct cost

~~Direct cost~~

Direct cost

variable Direct cost

→ Direct labor, material

→ manufacturing supplies

→ wages feed to production,

(13)

Answers involve:

- a) All payments of equal am

(13)

A cost that differs between alternatives is,

- to a) common cost b) variable cost

- c) Differential cost d) Opportunity cost

(14)

The state where economic forces are balanced  
is called

- a) Economic Equilibrium

(15)

Most commonly used risk analysis technique  
in engineering economics is

- a) Sensitivity Analysis b) Break-even Analysis

- c) Scenario Analysis d) Monte-Carlo Simulation

for continuous compounding  $FV = PVe^{rt}$

- (16). Public projects must be of good quality because
- a) it is paid at higher rate
  - b) projects are of high priority
  - c) users are public and maintenance is not timely, difficult and costly
  - d) all of above ✓

(17). Sensitivity Analysis is

- a) to change one or many estimates to see the result
- b) ratio of Benefit to cost
- c) condition under which alternatives are equivalent
- d) examination of range of values for some parameters to determine their effect on a particular decision. ✓

(18). Sensitivity analysis can be used to determine project viability after following factors changes.

- a) capital investment b) annual expense
- c) interest rate d) all ✓

(19). Consider a project with a cost Rs 14,762 with an indefinite life. If the cashflow in odd year (1, 3, 5, ...) is Rs 1000 and in even years (2, 4, 6, ...) is 2,000. The rate of return (%)

- a) 8% b) 10% c) 12% d) 15% ✓

(20). Sensitivity analysis provides a second look at

- a) hazard evaluation b) economic evaluation
- c) productivity evaluation d) workmanship evaluation ✓

(21)

Material cost can be classified as

- a). Direct cost
- b). Indirect cost
- c) both a&b
- d) none.

Direct material cost: for direct material that becomes as part of the product. Eg: Brassit  
⇒ sugar, milk, oil, etc.

Indirect material cost: indirectly forms a part of the finished product. Eg: glasses, nails, miffr,

(22)

The objective of cyclic replacement study is to determine the pattern replacement that will minimize cost

- a) maximum annual cost
- b) min annual cost
- c) interest rate
- d) average annual cost

(23)

A technique that measures the profitability of a project caused by changes in the factors that affect the cash inflows or is called

- ~~a) Capital Analysis~~
- b) Sensitivity Analysis
- c) Risk Analysis

- ~~b) Cost-Benefit Analysis~~
- d) Risk Analysis

- # Present worth Annuity (PWA) is generally known as
- Premium Annuities
  - Interest " "
  - Future Annuities
  - All " "

## Interest calculated on the basis of 365 days is  
 ⇔ Exact simple interest.

- ## The annuity which refers to the debt payment for recovering the initial amount or capital in equal periodic payments is known as
- Present worth Annuity
  - Linking Fund Annuity
  - Compound annuity
  - Capital Recovery Factor

# Product of CAF and PWF (SP) is  
 → 1