CIMA P2 – Main Formulae (provided by CSSC Tuition)

Section A COST PLANNING – formulae

Throughput costing

- **Throughput per unit ($) = Sales price *less* direct material cost per unit**

- **1) Return per factory hour**= Throughput per unit
  Production time **per unit** in bottleneck resource **(in hrs)**

- **2) Cost per factory hour** = Total Factory Cost (inc. overheads and labour)
  Bottle neck resource time available (all)

- **Throughput Accounting Ratio** = Return per Factory Hour **(1)**
  Cost per factory hour **(2)**

Learning Curve (formula given exam)

$$Y = ax^{b}$$

Y is cumulative average time per unit
a is time to produce first unit
x is the total no of units

b is index of learning which is $\frac{\log r}{\log 2}$

r is the learning rate as decimal

Section B CONTROL & PERFORMANCE MGMT – formulae

DIVISIONAL PERFORMANCE

- **ROI** % = Controllable Profit* x100
  Capital Employed**

*It is acceptable to use Earnings /Net Profit/ PAT as numerator (Depreciation should be deducted)

**'Net assets' or Total assets may be used to represent capital investment.
May be opening book values or depreciated or Capital Employed (Debt +Equity or [Total assets less current liabilities])

NB) Question should specify which version of formula to use – alternatively it will only give you enough information to calculate it one way).

Residual Income ($) = Earnings *less* Notional interest on capital

Notional Interest on Capital = Cost of capital % x Capital Employed

For same division - Earnings will be the same as numerator used for ROI / Capital Employed also same as ROI denominator.

Financial Performance Measures

- **Profitability**

ROCE = Net Profit $ x 100 < this will be a %
Capital Employed $

- Asset Turnover = Turnover ($)
  Capital Employed ($)

  Asset turnover expressed as 'X times' – eg 3 times.

- **Dupont relationship**:

Net profit margin x Asset Turnover = ROCE.

Liquidity Ratios

- Current Ratio = Current Assets
  Current Liabilities

- Quick Ratio = Current Assets less Inventory
  Current Liabilities

NB) Also other working capital formula (debtor days etc) as measure of liquidity.

Section C -LONG TERM DECISION MAKING

Fisher Equation:

$(1 + M) = (1 + r)(I + h)$

Where M is 'money rate or nominal rate (includes inflation)
r is Real rate (excludes inflation)
h is inflation rate
NB) all rates as decimals

Sensitivity % for NPV calcs = $\frac{\text{NPV}}{\text{PV of variable}} \times 100$

Exceptions

Sensitivity of Sales volume = is 'sensitivity to PV of contribution.
Sensitivity to Cost of capital % needs to be found through IRR calc.

Payback (needs cumulative cash table)

ARR % is usually $\frac{\text{Average ANNUAL Profits}}{\text{Average Investment}} \times 100$

Average Investment = $\frac{\text{Initial + Scrap}}{2}$

IRR

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H}(H - L)$$

L = lower discount rate chosen
H = higher discount rate chosen
NPV_L = NPV at lower rate L
NPV_H = NPV at higher rate H

MIRR

$$MIRR = \left[\frac{PV_R}{PV_I}\right]^{\frac{1}{n}}(1 + r_e) - 1$$

PV_R=PV of Return Phase Cash Flows
PV_I=PV of Investment Cash flows
r_e=Cost of Capital
n= Year of the final cash flow

PI Index = $\frac{\text{NPV}}{\text{Capital Investment required}}$

PI Index – use this to rank divisible projects during time of capital rationing

PRICING

Demand Equation

P = a – bQ

(NB) Occasionally this is written with a positive – but strictly correct to be negative – ie normal demand relationship when price goes up qty falls – so negative sign)

b = change in price
change in quantity

a = $Current price + (Current qty at current price x $z)
(Change in qty when price is change by $z

For Monopoly - Profit maximising output 'Q' is where:

MC = MR

MC is marginal cost (Variable cost)

MR = a – 2bQ

Ie) MR is Demand equation – same intercept 'a' but with 'b' doubled

NB) Once profit maximising output is obtained – insert this quantity into original Demand equation to find profit maximising selling price.

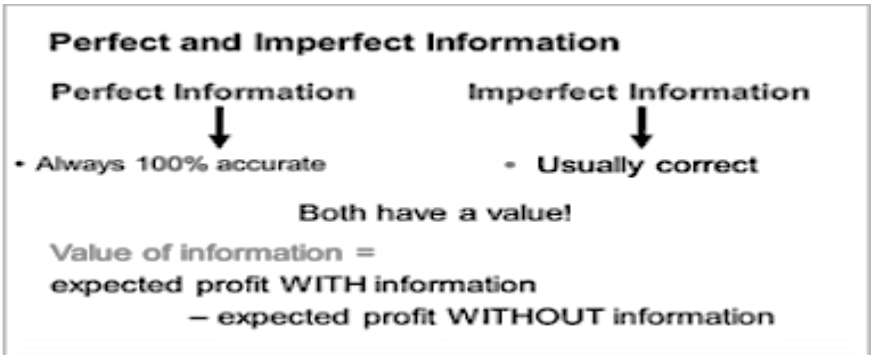
Price Elasticity

PED = change in qty as % of demand
Change in price as % of price.

Section D – Risk & Uncertainty

Expected Value

$\sum px$



- **Standard Deviation**

$$\sqrt{\frac{\sum(x_i - \bar{x})^2}{n}}$$

Mean is $\overline{X}$

NB) Often $\overline{X}$ will be represented by Expected Value (in which case no need to divide by 'n').

- **Note: Standard Deviation = Variance^2**

- **Coefficient of variation** = $\frac{\text{Standard Deviation}}{\text{MEAN}}$

- **Payoff table – Each cell** = Profit from each combination (Sales less costs)
- **Regret Table – Compare each cell to best option in circumstances and state regret value.**
  - **One cell in every row WILL be the best in the circumstances so regret will be zero.**
  - **There are no negative values in Regret tables. The bigger the value – the worse regret.**

Maximax – optimist – seeks best outcome regardless of likelihood
Maximin – pessimist –chooses the option with the least worst outcome from all available.

Minimax Regret –sore loser -based on table of Regrets (create this first) – this decision maker will wish to choose the option with the smallest possible regret (ie will select the column that results in least possible regret).

Expected Value can be used to make decisions for payoff tables. This gives a long run average result for each decision. The decision maker is described as risk neutral.