



University of Technology

Building and Construction Eng. Dept.

final Exam
Subject : engineering economy
Date :1/6/2015

2014-2015
Class: 4th stage
Time : 3 hrs.



Note: answer four questions

Q1 / A-What are the elements of costs, explain in details

B- How could you improve the productivity, explain factors?

(25)

Q2 a contractor has two choices to buy two machines, if the interest rate was 12% which one he will choose? use the net present value(NPV) analysis

	Machine 1	Machine 2
Initial cost	20000	25000
Maintenance cost	2000\$/ year	1500\$/year
Useful life	5	10
Salvage value	12000\$	14000\$
Revenue	4500\$/year	3500\$/year

(25)

Q3 / A company have the following details:

Fixed cost = \$ 4,000,000

Variable cost per unit = \$ 150

Selling price per unit = \$ 250,

Find

(a) The break-even sales quantity,

(b) The break-even sales

If the actual production quantity is 60,000, find

(i) Contribution; and

(ii) Margin of safety by all methods.

(25)

Q4/ A machine has the information shown in the table, calculate the internal rate of return (IRR), it is expected to be between 10 % and 6%

Useful life	20 years
Purchase price	16 million \$
Salvage value	3 million \$
Maintenance cost	0.4 million\$ / year
Revenue	2.2 million\$ / year
Tires cost	2 million \$ replaced every 8 years

(25)

Q5 /a- what are the stages of product life cycle explain?

b- When preparing feasibility study a market study should be done, explain?

(25)

Best wishes ...

اجوبه امتحان الاقتصاد الهندسي - الرابع بناء

الاجوبه س ١ B

١- تحسّن الطرق : وتدعى أيضاً " هندسة المناهج " وتشمل هذا التقنية اختباراً منسقاً يقوم به المديرون واختصاصيو العمل كما لو أنه سيؤدي الآن ، مع نظرة إلى تحسين الإجراءات وإضافة أدوات ميكانيكية للمساعدة ، أو تسريع العمل في المستقبل .

٢- وفورات الحركة : وهذا يشمل جهد ملموس لتعديل حركات الجسم البشري، في أثناء تأديته للعمل، بحيث تتم الحركات بأكثر الطرق فاعلية، وأكثرها سهولة، وأقلها إرهاقاً. وتركز وفورات الحركة على الإرشادات التالية:

- يجب أن تكون الحركات منتجة: أي أن كل حركة يجب أن تجعل العمل أقرب للانجاز.
- يجب أن تكون الحركات بسيطة، فكلما كان استخدام أجزاء الجسم أقل، كلما كان ذلك أفضل.
- يجب أن تكون الحركات متناغمة.
- توفير الراحة للعاملين.
- تقليل الأنشطة غير الملائمة.

٣- تبسيط العمل: ويكون ذلك عن طريق:

- إزالة العناصر غير الضرورية، وغير المنتجة لمهمة ما، وإذا أمكن، إزالة المهمة نفسها.
- جمع المهام مع بعضها، فالقائمان بعملين أو أكثر في وقت واحد، يوفر الوقت.
- قم بتغيير التسلسل بحيث تنجز عناصر المهمة بأبسط طريقة، وليس بالضرورة بالترتيب الأفضل من الناحية المنطقية.
- ببساطة الإجراءات، بعد التركيز على المبادئ الثلاثة السابقة، فهذه الخطوات النهائية تحت المراقبة أو العامل على البحث عن تقنيات طرق التحسين والتوفير في الحركة.

٤- الممكنة والأتمتة: ففي حين أن تحسين الطرق وتبسيط العمل يميل إلى التركيز على إجراء تحسينات صغيرة على المدخلات البشرية، فإن المناهج التكنولوجية العالية التي تركز على إجراء تحسينات واسعة النطاق غالباً ما تتضمن استبدال الجهد البشري بأجهزة الحاسوب والمكننة

٥- تحليل الأنظمة: تقوم على هذا المنهج حالياً أساليب تحسين الأداء لكافة الأعمال، ويسعى تحليل الأنظمة إلى إجراء تحسينات، حيث يأخذ في الاعتبار جميع أوضاع ومكونات المهمة أو العملية، على أساس أنها مترابطة، ذلك أن تغييراً ما في أحد العوامل سيؤثر دوماً على الوضع أو على عامل آخر، ويدعم هذا التحليل بشكل كبير التقنيات التحليلية المتطورة مثل تلك التي تقدمها المناهج الكمية، وبحوث العمليات، والمحاكاة بمساعدة الحاسوب، ويمكن القول أنه لم يكن ممكناً من دونها.

Q1 A

Cost can be broadly classified into *variable cost* and *overhead cost* Variable cost varies with the volume of production while overhead cost is fixed, irrespective of the production volume.

Variable cost can be further classified into direct material cost, direct labor cost, and direct expenses.

Cost	
<i>variable cost</i>	<i>overhead cost</i>

The overhead cost can be classified into factory overhead, administration overhead, selling overhead, and distribution overhead.

Direct material costs are those costs of materials that are used to produce the product.

Direct labour cost is the amount of wages paid to the direct labour involved in the production activities.

Direct expenses are those expenses that vary in relation to the production volume, other than the direct material costs and direct labour costs.

Overhead cost is the aggregate of indirect material costs, indirect labour costs and indirect expenses.

Administration overhead includes all the costs that are incurred in administering the business.

Selling overhead is the total expense that is incurred in the promotional activities and the expenses relating to sales force.

Distribution overhead is the total cost of shipping the items from the factory site to the customer sites.

The selling price of a product is derived as shown below:

- Prime cost = Direct material costs + Direct labour costs + Direct expenses
- Factory cost = Prime cost + Factory overhead
- Costs of production = Factory cost + Office and administrative overhead
- Cost of sales = Cost of goods sold + Selling and distribution overhead
- Cost of sales + Profit = Sales
- Selling price per unit = Sales/Quantity sold

Q5 B

ثالثاً: دراسة السوق:

يقوم معد الدراسة بتقديم تحليل خصائص سوق المنتج وتقديرات التسويق وحجم الإنتاج الملائم وعلاقة الطاقة التصميمية للمشروع بالفجوة التسويقية والعوامل المحددة للطلب على منتجات المشروع وحجم الاستهلاك المتوقع والفئات المستهدفة ونسبة تغطية المشروع لطلب السوق من السلع أو الخدمات التي ينتجها المشروع ، والأسعار المفترضة لمنتجات المشروع ومقارنتها مع الأسعار السائدة

Q 3

Solu.

fixed cost = 4000 000 \$

variable cost per unit = 150 \$

selling price per unit = 250 \$

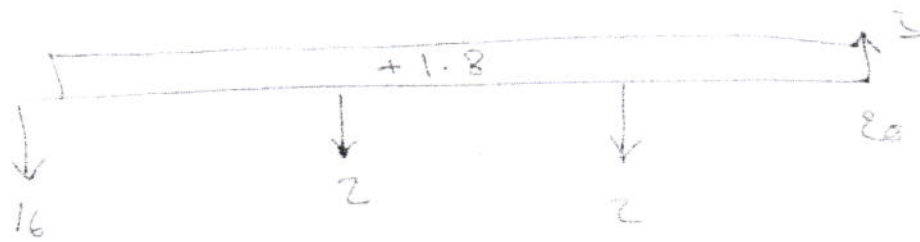
$$\begin{aligned} \text{a) The break even quantity} &= \frac{F_c}{S - V} \\ &= \frac{4000\ 000}{250 - 150} = 40\ 000 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{b) break even sales} &= \frac{F_c}{S - V} \times S \\ &= 40\ 000 \times 250 \\ &= 10\ 000\ 000 \end{aligned}$$

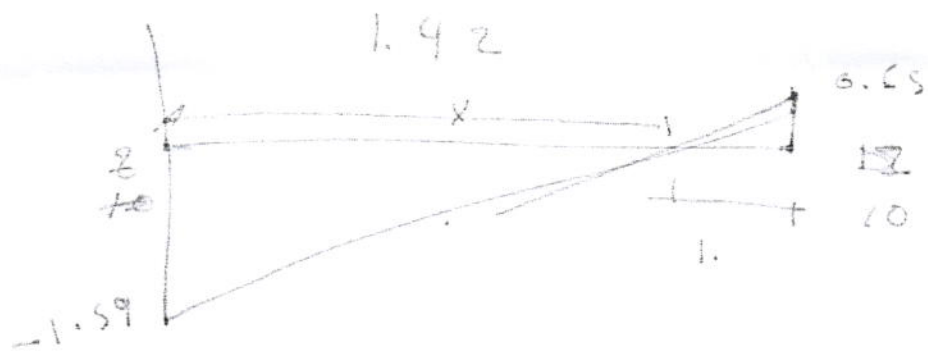
$$\begin{aligned} \text{✓ contribution} &= \text{sales} - \text{variable cost} \\ &= S \times Q - V \times Q \\ &= 40\ 000 (250 - 150) = 6\ 000\ 000 \end{aligned}$$

margin of safety

M.S = sales - break even sales



% 10		8 %
P_1	$= -16$	-16
P_2	$= +0.4458 \checkmark$	$+0.6435$
P_3	$= -0.4352 \checkmark$	-0.5838
P_4	$= -0.933 \checkmark$	-1.0806
P_5	$= +15.3244 \checkmark$	$+17.6725$
	$-1.5984 \checkmark$	$+0.6516$
	11.42	



$$\frac{+1.59}{x} = \frac{0.65}{2-x}$$

$$x = \frac{3.196}{0.}$$

$$0.43x = 3.196 - 1.598$$

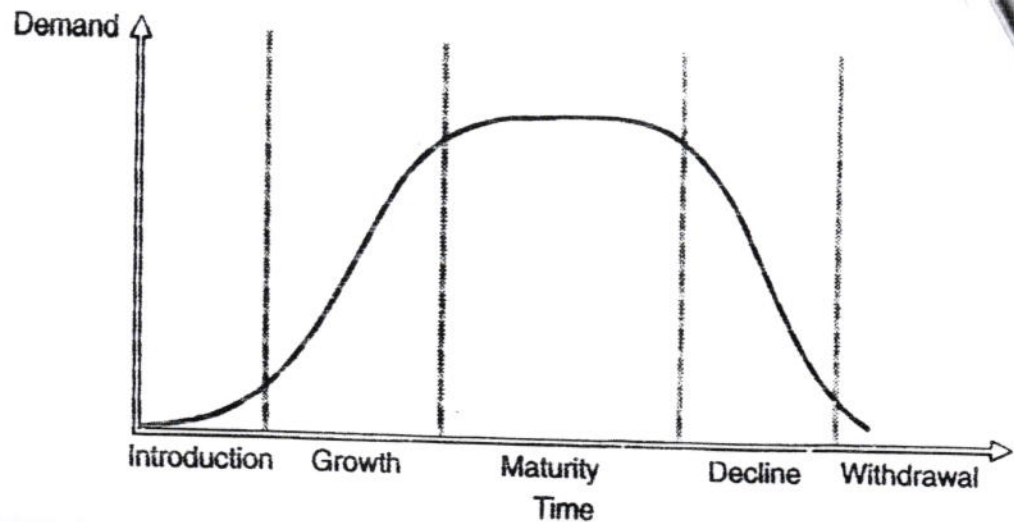


Figure 4.7 Life-cycle of a product.

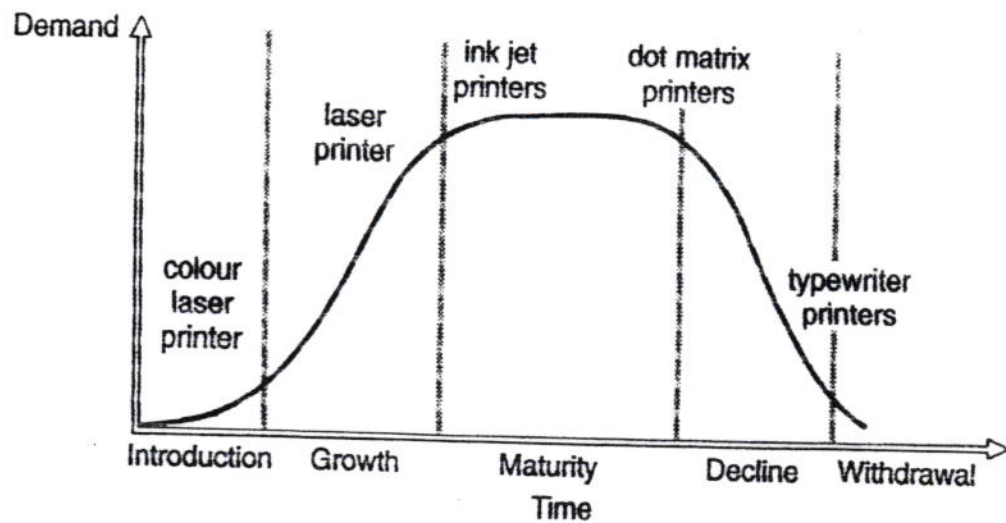


Figure 4.8 Life-cycle of a product.

life-cycles of months or even weeks; consumer durables like washing machines have life-cycles of five or 10 years; some basic commodities like soap and coffee remain in the mature stage for decades. Unfortunately, there are no real guidelines about the length of a life-cycle. Some products have an unexpected short life, while others stay at the mature stage for a very long time. Some products, like full cream milk and beer have been at the mature stage for a long time, and are now in a decline.

Organizations can take several years to develop a new product, they must start planning well before the new product is actually needed. In practice, most organizations keep a range of products at different stages in their life-cycles. This gives long-term stability, with new products being phased-in while older ones are declining and being withdrawn. As a result, overall production is smoothed rather than having wide fluctuations, as shown in Figure 4.9.

- 4.13 Three alternative products, A, B and C, have internal rates of return of 10%, 15% and 20% respectively. Which of these gives the best financial returns?

Product life-cycle

Stages in the life-cycle

Earlier in the chapter we described how new products are introduced. But we know that customer demands change over time, so demand for any particular product will eventually fall, and the organization should stop making it. You can see this when cars are replaced by new models, computer software is upgraded, books go out of print, and so on. As a result, almost all products have a limited life-span. Experience shows that demand for most products follows a standard life-cycle. This has five stages, as shown in Figure 4.7.

- (1) **Introduction** A new product appears on the market and demand is low while people learn about it, try it and see if they like it (for example, colour photocopiers, grass skis and telephone banking).
- (2) **Growth** New customers buy the product and demand rises quickly (for example, FAX machines, mobile telephones, multi-media computer systems).
- (3) **Maturity** Most potential customers know about the product and are buying it in steady numbers: demand stabilizes at a constant level (for example, cars, colour television sets, postal service).
- (4) **Decline** Sales fall as customers start buying new, alternative products that become available (for example, beef, suntan lotion, marathon runs).
- (5) **Withdrawal** Demand declines to the point where it is no longer worth making the product (for example, black and white television sets, telegrams, three wheel cars).

We can illustrate this life-cycle by looking at related products that are at different stages (see Figure 4.8). There are, for example, several different kinds of printer for personal computers. Some of these are fairly new, such as colour laser printers which are at the introductory stage; ordinary laser printers have become established and as their price falls they are moving through a growth stage; ink jet printers are moving into the maturity stage; dot-matrix printers are at the mature stage and starting to decline; printers based on typewriters are no longer selling and are well into the decline stage.

The exact shape of the life-cycle changes from product to product, but the most important variable is its length. Each edition of a newspaper has a life-cycle of a few hours; clothing fashions and fad computer games have