

ECONOMIC DECISION MAKING

Chapter at a Glance

Decision Making is the selection of one course of action from two or more alternatives courses of action. It is a choice making activity. ROE (i) It is a selective process.

(ii) It is a continuous process which goes on throughout the life of an organisation. (iii) Decisions are normally taken on the basis of past experiences and present circumstances for a future course of action.

Multiple Choice Type Questions

- 1 Which of the following statements is correct? [WBUT 2014)
- a) engineering economics provides a set of methods by which economic worth of alternatives can be compared
 - b) engineering economics never takes into account non-commercial considerations
 - c) engineering economics does not take into consideration tax liabilities of the firm
 - d) engineering economics is not applicable in the case of public sector undertakings

Answer:(a)

2. In decision making risk is measured

BUT 2014]

by

- a) expectation
- b) mean
- c) variance
- d) median

Answer: (c)

3. The firm's decision to invest its funds in fixed and long term assets is known as

- a) Assets Planning
- b) Capital Budgeting
- c) Long Term Budgeting
- d) Short Term Budgeting

Answer: (b)

4. Which of the following is not applicable to bottom-up approach to cost estimation?

[WBUT 2016]

- a) The project under consideration is considered at the highest aggregate level
- b) The project under consideration is split into smaller parts and their respective components are identified
- c) Cost estimates are made for each component of each small part and added up
- d) Cost estimates are made for each component of each part of the project and are added up to arrive at the total

Answer: (a)

ECO-2

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5. Defined as the creative problem solving process of planning, organizing, leading, and controlling an organization's resources to achieve its mission and **objectives**.

- a) Management b) Planning c) Organizing [MODEL QUESTION]

Answer: (a) d) Supervision

6. Refers to the activity combining "technical" knowledge with the ability to organize and coordinate worker power, materials, machinery, and money.

"

- a) Engineering Management [MODEL QUESTION]
c) Engineering Organization b) Engineering Materials

Answer: (c) d) Engineering Club

7. The following are considered as functions of an engineer except

- a) Testing b) Construction c) Sales [MODEL QUESTION]
d) Physical Education

Short Answer Type Questions

1. Discuss the economic problems faced by an engineer with suitable examples.

Answer: WBUT 20181 Some examples of engineering economic problems range from value analysis to economic studies. Each of these is relevant in different situations, and most often used by engineers or project managers. They are:

- Value Analysis: Proper value analysis finds its roots in the need for industrial engineers and managers to not only simplify and improve processes and systems, but also the logical simplification of the designs of those products and systems.
- Linear Programming is the use of mathematical methods to find optimized solutions, whether they be minimized or maximized in nature.
- Interest and Money: Time Relationships Considering the relevance of capital to be lent for a certain period of time, with the understanding that it will be returned to the investor, money-time relationships analyze the costs associated with these types of actions. Capital itself must be divided into two different categories, equity capital and debt capital.
- Depreciation and Valuation: The fact that assets and material in the real world eventually wear down, is defined and hence by the term, decreasing is a situation of value that any must given be accounted for. Depreciation itself some exceptions do exist. Valuation can be considered the basis for depreciation in a basic sense, as any decrease in value would be based on an original value

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- Capital Budgeting in relation to engineering economics, IS the proper usage and utilization of capital to achieve project objectives. It can be fully defined by the statement; as the series of decisions by individuals and firms concerning how much and where resources will be obtained and expended to meet future objectives.

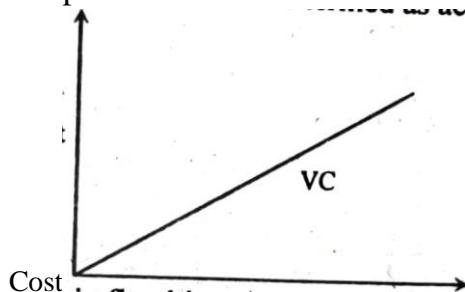
ECO-3

ECONOMICS FOR ENGINEERS

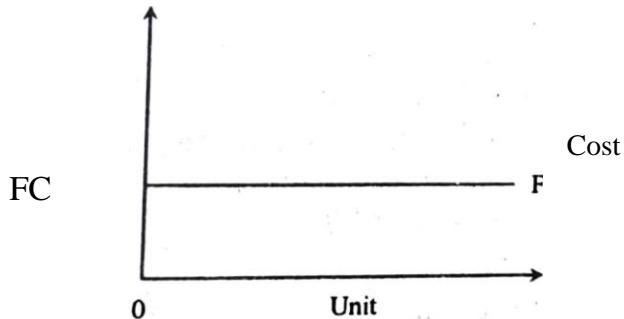
ENGINEERING COSTS & ESTIMATION

Chapter at a Glance

- **Variable cost:** The cost which tends to follow the level of activities is the variable cost. That is they are proportional with the level of output which may be expressed in terms of units, labour hours, machine hours. Example of variable cost might be direct material, direct labour and variable expenses (overhead). Here the word direct means variability and directly proportion to the production. These costs are also termed as activity cost.



- Fixed cost: It is the cost which is fixed in nature irrespective of volume of production within the manufacturing capacity and is fixed for a certain period. It accrues in relation to the passage of time and which within certain output and turnover limits, tends to be unaffected by variation in the levels of output or turnover. It is also termed as Period Cost.



- Marginal cost: It is the cost for producing one additional unit. This addition unit cost will be the variable cost because variable cost is incurred with every variation of output and fixed cost remains same. So the increase is only due to the variable cost. Marginal cost is useful for

ECO-7

buys decision • Average cost: Average cost per cost unit is of the production. average cost As per in unit the above of production. example If the is average ascertained cost as would total be

For 1000 units produced = Rs. 6000 / 1000 units = Rs. 6 per unit

For 1001 units produced Rs. 6005 / 1001 units = Rs. 5.99 per unit

- Sunk cost: It is the cost which is already being incurred in past and is not relevant to any decision making process. e.g., Any survey or market research cost to decide whether any job

- Other Opportunity cost: Opportunity cost is the benefit It is also that termed could as **opportunity cost**. be foregone derived cost from or choosing opportunity any

loss.

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- Recurring and non-recurring costs: Recurring expenses are almost predetermined which are incurred in regular intervals. These expenses part the operating expenses running the business process. e.g., salary expenses, repairs and maintenance.
- Incremental cost: For any managerial decision making process of selecting between two more alternatives it is required to have cost benefit analysis of different alternatives.
- Life-cycle cost: In economic engineering analysis the assets are compared with the life of human beings, like growing through various phases, reaching maturity and ultimately declining termed as the life cycle. At every stages cost are associated for
- Similarly every product and services produced also moves through phases in life cycle and each phase incurs various costs. It includes cost associated with acquiring, using, caring, feasibility study, design and development, production, maintenance, replacement and disposal, support, training and operation.
- Types of Cost Estimate — Models
 - I. Per-unit Model
 - 2. Segmenting Model
 - 3. Cost Indexes Model

Multiple Choice Type Questions

1. Costs reflected in accounting system only are called
a) Cash cost b) Overhead cost c) Book cost d) Direct cost

Answer: (c)

2. The opportunity cost of a good is [WBUT 2012, 2014, 2017, 2019]
a) the time last in finding it

- b) the quantity of other goods sacrificed to the another unit of that good
- c) the expenditure on the good
- d) the loss of interest in using saving?

Answer: (b).

3. To compute the construction cost per square foot of a building

- a) Per unit model will be used [PNBUT 2012, 2017]
- b) Segmenting model will be used
- c) Learning curve estimation process will be used
- d) None of these

Answer: (a)

4. Which one is fixed cost?

[WBUT 2012, 2017]

- a) Depreciation of fixed assets
- b) Excise duty
- c) Cost of advertising
- d) Sales tax

Answer: (c)

5. What is the relationship between Marginal cost (MC) and Average cost (AC)

curves?

[WBUT 2013]

- a) AC cuts the MC from below
- b) MC cuts the AC from below
- c) AC and MC do not cut each other
- d) there is no fixed relationship

Answer: (b)

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ENGINEERS 6 To compute the updated cost Of a boiler of the same capacity in a power plant, we use

- a) per unit model [WBUT 2013]
- b) segmenting model
- c) cost index model
- d) none of these

Answer: (c)

7. The value of the power-Sizing Exponent (E) indicates Diseconomies of Scale when

- a) $0 < E < 1$ [WBUT 2014]

Answer: (b)

8. Learning Curve is applicable to the industries with

- a) low labour mechanization
- b) high labour turn over
- c) huge
- d) high variable cost

Answer: (b)

9. If in a power sizing model the power sizing index is greater than 1, then
a) Per unit price increases with increase in quantity

Per unit price decreases with increase in quantity

CWBUT 20161

b)

c) Per unit price remains constant with increase in quantity

d) Per unit price remains constant with decrease in quantity

Answer: (a)

10. A portion of the learning curve is PUBUT 20161

a) Parallel to y axis b) Parallel to x axis

c) Cuts the x axis

d) Cuts the y axis

Answer: (c)

11. What is the relation between the slopes of Total Cost (TC) and Total Revenue (TR) curves? WBUT 20161

c) Slope of Slope of TC

d) No fixed relation

a)
Slope of
Slope

Answer: (d)

12. Sunk cost is

WBUT 20161 of TC
b)

Slope of Slope of TC

- a) Original investment + depreciation — repairing expenses
b) Original investment — depreciation + repairing expenses
c) Original investment + depreciation + repairing expenses
d) Original investment — depreciation — repairing expenses

Answer: (c)

13. Which of the following is not applicable to bottom-up approach to cost estimation?

a) The project under consideration is considered at the highest aggregate

b) The project under consideration is split into smaller parts and their respective components are identified

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- c) Cost estimates are made for each component of each small part and added
- d) Cost estimates are made for each component of each part of the project and are added up to arrive at the total

AnsWer: (a)

T

14. Cost reflected in accounting system only is b) called Overhead cost 20171 a)

- Cash Book costcost
- d) Direct cost

c)

Answer: (c)

15. The following value(s) of the Power-Sizing Exponent (E) indicates Economies of scale CWBUT 2018)

a) $0 < E < 1$

Answer: (a)

16. Marginal cost curve cuts the Average Variable cost from 20191

- a) Above at its minimum point
- b) Below at its falling part
- c) Below at its minimum point
- d) None of these

Answer: (a)

17. To compute the updated cost of a boiler with same capacity in a power plant, we use CWBUT 20191

- a) Per Unit Cost Model
- b) Cost Index Model
- c) Power Sizing Model
- d) Segmenting Model

Answer: (b)

Short Answer Type	uestions
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1. Labour cost index value was at Rs. 124, ten years ago and is Rs. 188 today. Annual labour costs for similar facility were Rs. 5,75,500 ten years ago. Develop the cost estimates of annual labour cost for today. [WBUT 20131 Answer: According to cost index model,

Cost at current time Index value at current time

Cost at past time	Index value at past time
Annual labour cost today	Labour cost index today
Annual labour cost ten years ago	labour cost index ten years ago
<u>Annual labour cost today</u> 188	
$\Rightarrow \frac{188}{5,75,500} = \frac{188}{124}$	
\Rightarrow Annual labour cost today = 8,72,532 Rs.	

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~~CASH FLOW INTEREST AND EQUIVALENCE~~

~~• Chapter at a Glance~~

- Time value of money: It is known to all that Rs. 100 on hand now is more valuable than Rs 100 receivable after one year. Differently speaking, we will not part with Rs. 100 now in return for a firm assurance that the same sum will be repaid after a year. But we might part with Rs. 100 now if we are assured that something more than Rs. 100 will be paid at the end of the first year. This extra compensation required for parting with Rs. 100 now is called 'interest' or the time value of money.
Money has time value for the following reasons:
 - (a) Money can be employed productively in order to generate real returns. e.g., if Rs. 100 is invested in material and labour produces finished goods worth Rs. 105, we can say that the investment of Rs. 100 has earned a return of Rs. 5 per cent.
 - (b) During inflation, value of a rupee today is more (higher purchasing power) than a rupee in future.
 - (c) As because future is uncertain, people like current consumption more than future consumption.
- Effective vs. Nominal Rate of Interest: The general relationship between the effective and nominal rates of interest is as follows: .
$$1 + \frac{r}{m} - 1 = m \text{ where, } r = \text{Effective rate of interest}$$
$$k = \text{Nominal rate of interest}$$
$$m = \text{Frequency of compounding per year.}$$

Multiple Choice Type Questions

1. A person if deposits Rs. 50,000 in a bank at an interest of 10% compounded annually, then the future value at the end of 5 years will be 20161 a) 80,525 b) 70,525 c) 85,525 d) 90,525

Answer: (a)

2. A deposit of Re. 1,10,000 was made for 31 days. The net interest after deducting 20% withholding tax is Rs. 890.36. Find the rate of return annually. WBUT 20161

Answer: (d)

c) 11.75

d) 11.95

3. The present value of 1 to be received after 3 years compounded annually at
a) 0.909 b) 0.826 c). 0.751 d) None of these [WBUT 2018]

Answer: (c)

c). 0.751

d) None of these

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4. A uniform series of payment occurring at equal interval of time is called
(WBUT 20181

- a) Annuity b) Amortization c) Depreciation d) Bond

Answer: (a)

Short Answer Questions

1. A company wants to set up a reserve which will help it to have an annual amount equivalent to Rs. for every year for the next 20 years towards its employees welfare measure. Find the single payment that has to be made now. [Given $i = 150/01$. WBUT 2012] Answer:

The company sets up a reserve which will result in a annuity of Rs. per year for 20 years. The single payment to be made at present should be equal to the present worth of Rs. per annum for 20 years which can be calculated as follows: .

Amount of single payment

$$= 1,00,000 \times 6.259$$

$$= 6,25,900
Rs.$$

2. A person has invested Rs. 10,000 in a bank at an interest of 10% p.a. How much amount will receive after 2 years if the compounding is done: NVBIJT 20131

a) Annually

b) Semi Annually

c) Quarterly

d) Monthly

e) Daily. Answer:

mn

$$FV_n = PV(1 +$$

m where, $FV_n =$

Future value after n years

$$= 10,000 \times (1.05)^4 = 10,000 \times 1.216 =$$

n = number of years m —number of times compounding is done in a year.

$$(a) FV = PV \left(1 + \frac{0.1}{m}\right)^{m \cdot n}$$

$$= 10,000 \left(1 + 0.10\right)^2 = 10,000 \times (1.10)^2 =$$

$$(b) FV = 10,000 \left(1 + \frac{0.10}{2}\right)^{2 \times 2} = 10,000 \left(1 + 0.05\right)^4 = 12,100 \text{ Rs.}$$

$$FV = 12,100 \text{ Rs.}$$

12,160
Rs.

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CASH FLOW & RATE OF RETURN ANALYSIS

RETURN ANALYSIS

Chapter at a Glance

Net Present Value (NPV) Method:

In this method all cash flows attributable to a capital investment projects are discounted by a chosen percentage e.g. the firms weighted average cost of capital to obtain the present value of the future cash flows. If the present value of the future cash flows is higher than the present value of the investments the proposal is accepted else rejected. In order to arrive at the net present value the present value of the future cash flows is deducted from the initial investment.

$$NPV = \frac{C_1}{(1+K)} + \frac{C_2}{(1+K)^2} + \frac{C_3}{(1+K)^3} + \dots + \frac{C_n}{(1+K)^n} - C_0$$

$$\text{i.e., } NPV = E$$

$$\sum_{t=1}^n \frac{C_t}{(1+K)^t}$$

where C_0 = initial investment (cash out flows)

C_t = cash inflows occurring at time t

K = Discount rate.

- Profitability Index Method (PI) / Benefit Cost Ratio (BCR):

Another time adjusted method of evaluating the investment proposals is the Benefit Cost (B/C) ratio or Profitability Index (PI). Profitability Index is the ratio of the present value of

cash inflows at the required rate of return, to the initial cash outflow of the investment. The formula for calculating benefit cost ratio or profitability index is as follows:

$$PI = PV \text{ of cash flows} / \text{Initial cash outlay} = PV(C) / O$$

Internal rate of return method:

Internal rate of return is a percentage discount rate used in capital investment appraisals which makes the present value of the cost of the projects equal to the future cash flows of the project. It is the rate of return which equates the present value of anticipated net cash flows with the initial outlay. The IRR is also defined as the rate at which the net present value is zero. The test of profitability of a project is the relationship between the internal rate of return (0/0) Of the project and the minimum acceptable rate of return. The IRR can be determined by solving the following equation for r which is discount rate.

$$C_0 = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \dots + \frac{C_n}{(1+r)^n}$$

$$\text{i.e., } C_0 = \sum_{t=1}^n \frac{C_t}{(1+r)^t}, \text{ i.e., } \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0 = 0$$

The IRR equation is the same as the one used for the NPV method.

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- Sensitivity Analysis:
Costs include variable costs which depend on the sales volume. The NPV or IRR of the project is again determined by analysing the after-tax cash flows. We can understand that it is difficult to arrive at an unbiased and accurate forecast of each variable. If forecasts go wrong, the reliability of NPV or IRR is lost. Each item of forecast is changed, one at a time to at least three values pessimistic, exact and optimistic. NPV is re-calculated for all the three assumptions. This method of calculating NPV or IRR for each forecast is called sensitivity analysis.
- Break-Even analysis:
In sensitivity analysis we ask what will happen to the project if sales decline or costs increase or something else happens. As a financial manager, you will also be interested in knowing how much should be produced and sold at a minimum to ensure that the project does not 'lose money'. Such an exercise is called break-even analysis and the minimum quantity at which loss is avoided is called the break-even point. The break-even point may be defined in accounting terms or financial terms.

Multiple Choice Type Questions

1. At the break-even point [WBUT 2013]
a) revenue > cost
b) revenue < cost
c) revenue = cost
d) no relation between revenue and cost
Answer: (c)
2. For a project to be financially viable the value of Benefit-Cost Ratio should be
a) greater than 1 b) less than 1 [WBUT 2013]
c) in between 0 and 1 d) negative
Answer: (a)
3. The period required for the project's profit or other benefits to equal the project's cost is called [WBUT 2013]
a) investment period b) equalization period
c) pay back period d) none of these
Answer: (c)
4. Internal rate of return is an indicator of
a) loss of an investment b) profit of an investment [WBUT 2013]
c) efficiency of an investment d) depreciation of an asset
Answer: (c)

5. Annualized capital recovery cost is defined as

a) $c(A/p, i, n) + S(A/F, i, n)$

n)

b) $-C(A/P, i, n) + S(A/F, i, n)$ [WBUT 2015]

c) $-C(A/P, i, n) - S(A/F, i, n)$

d) $c(A/p, i, n) - S(A/F, i, n)$

Answer: (d)

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ECONOMIC MICS FOR ENGINEERS

6. IRR stands for the rate of return for which

Answer: a) $NPV=0$ (a) b) $NPV=I$ c) $Npv = 1$ d) NPV is maximum.

7. At Break-even point

a) Total revenue = Total Variable Cost
revenue = Total Fixed Cost,

Cost b) Total ²⁰¹⁹
^{cost}

c) Total (a) revenue = d) All of these Answer:

Short Answer Type Questions

I. Discuss in detail the concept of Sensitivity Analysis.

[WBUT 2012]

OR,

What is sensitivity Analysis? Discuss the merits and demerits of sensitivity analysis.

[WBUT 2014] OR, State the concept of Sensitivity Analysis.

[WBUT 2017]

Answer:

Sensitivity analysis: Refer to Chapter at a Glance.

Advantages:

1. It is a very popular method of assessing risk because it shows how robust or vulnerable a project is to changes in values of underlying variables.
2. It indicates whether further work is necessary because if NPV is highly sensitive to changes in some factor, it may be worthwhile to explore how the variability of critical factor may be reduced.
3. It is intuitively very appealing because it articulates the concerns the project evaluators normally have.

Disadvantages:

only

1.

It does not provide any idea of the probability of the change in the variable shows what happens to NPV if there is a change in that variable.

2' In the real world many variables change together whereas in sensitivity analysis only one variable is changed at a time.

3• The results of sensitivity analysis may be interpreted by different decision-makers differently one may accept the project -- another may reject.

2.

Assuming that the cost structure and selling price remain same in 2014 and 2015, find out

i) ratio;

II) Break Even point of sales;

i.ii) Profit when sales are of Rs. 3,00,000; wVBUT 20151 tv) Sales required to earn a profit of Rs. 60,000 and

v) Margin of safety in 2015

ECO-31

ECONOMICS FOR ENGINEERS

INFLATION AND PRICE CHANG

Chapter at a Glance

Inflation may be defined as a general rise in the prices in a persistent manner. It causes a loss in the purchasing power of a currency. It happens when many prices increase simultaneously. Inflation causes money to lose purchasing power. What a rupee hundred can buy today will be less tomorrow. Thus the rupee hundred loses the purchasing power due to the price rise, that is inflation. In engineering economic analysis it requires cost benefit analysis of any investment that requires comparison to be made on an equivalent basis. On the contrary, when the purchasing power increases the situation is deflation. But this situation does not exist.

- Control of inflation: There is no single remedy to combat the inflation rather monetary and non-monetary fronts have to be considered to have control over it. The aim is to reduce aggregate monetary expenditure. Anti-inflationary measures can be classified as:
 - a. Monetary measures: The best remedy for fighting inflation is to reduce the aggregate spending. Monetary policy can help in reducing the pressure on demand by increasing interest rates or borrowing from banks thus reducing the demands for funds.
 - b. Fiscal measures: It includes spending both in private and government level. Government reduces expenditures and private expenditure is reduced by increasing tax.
 - c. Physical and non-monetary measures: Measures like increasing output / imports, decrease exports so as to increase the available supply of goods in short supply, so as to bring the demand and supply at parity and thus the prices tend to be controlled.

ECO-45

- Price changes with indexes: The term "inflation" refers to a rise in a broad price index representing the overall price level for goods and services in the economy. Inflation is measured by price index As we know, a price index measures the general level of prices in reference to some base period, The Consumer Price Index (CPI), the Personal Consumption Expenditures Price Index (PCEPI) and the GDP deflator are some examples of broad price indicfs. "inflation" may also be used to describe a rising price level within a narrower set of assets, goods or services within the economy, such as commodities (including food, fuel, metals), tangible assets (such as real estate), financial assets (such as stocks, bonds), services (such as entertainment and health care), or labour. The Reuters-CRB Index (CCI), the Producer Price Index, and Employment Cost Index (ECI) are examples of narrow price indices used to measure price inflation in particular sectors of the economy.

Multiple Choice Questions

1. Inflation makes

- a) Future rupees less valuable than present rupees [WBUT 2012, 2017]
- b) Future rupees more valuable than present rupees
- c) Future rupees equal to present rupees
- d) None of these

Answer: (a)

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2. Which one of the following is helpful for measuring inflation? CWBUT 2012,

- a) Lening curve
- b) Segmentation model
- c) Consumer price index
- d) (Minimum attractive rate of return)

Answer: (c)

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3. If the inflation rate is 6% per year and the market interest rate is known to be

15% per year. What is the implied real interest rate in this inflationary economy? [WBUT 2012, 2016, 2017]

1 to be
ny?
, 2017]

- i) 11.45%
- b) 9.00%
- c) 8.49%

Answer: (c)

What is inflation?

- a) it is the term used to describe a decline in purchasing power evidenced in an economic environment of rising prices
- b) it is the term used to describe a decline in purchasing power in an economic environment of rising prices
- c) it is the term used to describe an increase in purchasing power evidenced in an economic environment of rising prices
- d) it is the term used to describe a reversal in purchasing power evidenced in an economic environment of rising prices

Answer: (a)

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5. The index which measures prices of a selection of goods and services purchased by a given consumer class is [WBUT 2014]

- a) Consumer Price Index
- b) Commodity Price Indices
- c) Composite Price Indices
- d) Producer Price Indices

Answer: (a)

6. If Index Number for a certain period is equal to 100, then [WBUT 2016]

- a) Prices are increasing
- b) Prices are decreasing

- c) Prices remain constant
- d) Change in prices cannot be predicted

Answer: (c)

7. Demand-pull inflation may be caused by

- a) An increase in costs
- b) A reduction in government spending
- c) A reduction in interest rates
- d) An outward shift in aggregate supply

Answer: (c)

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8. If the inflation rate is 7% per year, market interest rate is 15%, then the real interest rate will be

20191

Answer: (a)

ECONOMICFOR ENGINEERS

9 which one of the following is involved to measure inflation

CWBUT 20191

- a) Nominal Interest Rate
- b) MARR
- c) Consumer Price Index
- d) None of these

Answer: (c)

Short Answer Questions

1. Give the causes of inflation and its controlling measures.

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Answer:

1st Part:

The main causes of inflation are as follows:

- Inflation occurs when the aggregate demand for products exceeds the aggregate supply of products. Prices usually increase when aggregate demand is higher than aggregate supply. Put in other words, factors such as increase in money supply, the government budget deficit, increase in export earnings, etc. create new demand, and if supply does not match this increased demand, demand-pull inflation arises. In this type of inflation, the unemployment level is at a minimal level. Such inflation is called Demand-pull inflation.
- Inflation may also occur due to increase in the cost of factors of production. The increase in the cost of factors of production results in a decrease in the supply of products by producers in the economy, or it makes producers push up the prices of their products to cover their higher costs of production. In cost-push inflation, the unemployment level may be high if high costs reduce production and thus, employment of factors of production including labor. Such inflation is called Costpush inflation.

2nd Part:

Measures to Control Inflation: The measures to control inflation can be classified into monetary, fiscal and other measures.

Monetary measures: **Monetary** policy is framed by the central bank of a country. The central bank is required to regulate the money supply in the economy in order to control the rate of inflation. Quantitative and qualitative measures are used to control the money supply. Quantitative credit control measures are in the form of bank rate policy, open market operations and variable reserve ratio, which influences the cost and availability of credit in an economy. The cash reserve ratio is the most significant monetary control measure and a high cash reserve ratio requirement reduces the capacity of the banks to lend. Qualitative or selective control measures include the regulation of consumer credit, directives, moral persuasion, publicity, etc. to control monetary expansion in the economy.

Fiscal measures: Some of the fiscal measures to control inflation are public expenditure, taxation and public borrowing.

Public expenditure: A decrease in the public expenditure by the government can control the inflation rate. The public expenditure should not be reduced in productive areas, but should be cut in the non-productive areas.

PRESENT WORTH ANALYSIS

«Chapter at a Glance

End of the year convention

In the above the basic assumption taken as the receipt or disbursement is generally taken to be in the end of any year. Like if and project yields and revenue it is assumed to be in the end of next year. This is known as End of the Year Convention. This convention is used for considering the time value of money for preparation of the present worth (value) able or for compound interest factors e.g.,

As the compound interest formulae as derived is, $A = P \times [1 + i]^n$

where A is the Future value of money invested at the end of the year (1, 2, 3, ..., n)

P = Principal amount invested or value of money at t = 0 i = Rate of return

/ Rate of return/ Cost of Capital for financing any project. Here $[1 + i]^n$ is the interest rate factor

- Major Areas of Analysis — Economic view point
- Borrowed money view point: Any investment requires a lot of funds to be invested at the beginning of even at in between the project life. This investment is to be financed from various sources. The financing does incur cost and is a vital factor for capital budgeting analysis. Thus we get an interest rate for financing which is to determine the time value of money for the Present worth analysis. From the above compound interest formulae we can get .

$$P = A \times \frac{1}{[1 + i]^n}$$

Here, P = Present worth [Present value] of money. [Cash inflow from the investment made at present time]

A = Returns / cash inflow in the n year i = is the interest rate or cost of borrowing for the financing.

Here, $\frac{1}{[1 + i]^n}$ is the Present worth / Discounting rate factor.

- Inflation and deflation: Using of proper present worth rate / discount rate depends on whether the benefits and costs are measured in real or nominal terms. To be consistent

and free from inflation bias, the cash flows should match with discount rate. ms equivalence value means that an asset what cost today a certain sum of money can be expected to cost the same amount several years hence for the purpose analysis.

- Taxes: Tax is incorporated in the present worth analysis as the future return or cash inflow is after adjustment of tax. But it is assumed in a present worth analysis, done at present ($t=0$), tax rate to be kept constant for the purpose of analysis only.
- Depreciation: Depreciation is the loss due to wear and tear of the purchased asset in use. It is used to calculate as to determine the cash flow after charging depreciation and tax. As per tax rules tax is applicable on profit after charging depreciation.

ECO-55

POPULAR PUPULATIONS

Multiple Choice Type Questions

CWBUT 201 S, 20191

1. Contribution margin is the

- a) excess of sale price over variable costs
- b) excess of sale price over fixed costs
- c) excess of sale price over both variable and fixed costs
- d) none of these

Answer: (a)

What is the full form of PVIF?

20151

b) Present Value Interest Factor

a) Present Value Income Factor

None of these

Profit Value Income factor

c)

Answer: (b)

3. If actual sales are Rs. 40,000 and BEP sales are Rs. 30,000, the Margin of Safety is

a) 70,000

b) 10,000

c) 1,40,000

d) 15,000

Answer: (b)

4. $FVIF_{5\%,3} =$

W BUT 20151
1.216

Rs. **UT** 20151

- a) 1.050 b) 1.103 c) 1.158 d)

Answer: (c)

5. In NPV method, cash flow is generally calculated on the basis of tMODEL
QUESTIONI a) present value b) future value c) annuity d) none of these

Answer: (a)

6. What could be the value of present sum for Rs. 10,000 at 8% interest for one year?

[MODEL QUESTIONI]

- a) Rs. 9,263 b) Rs. 9,261 c) Rs. 9,264 d) none of these

Answer: (d)

Short Choice e uestions

1. a) Define Break — even point. Represent the elements diagrammat(cally, and derive the BEP and BEP sales algebraically.

b) The following data relates to ABC Co. for 2011 :

Fixed Factory Overhead = Rs. 30,000

Fixed Selling Overheads = Re. 6,000

Variable Manufacturing Cost per unit = Re. 6.00

Variable Selling C08t per unit = Re. 1.50

Selling Price Per unit R'. 12.00 Calculate

- i) Break-even point in terms of units and BE sales in terms of rupees.
ii) Number of units that need to be sold to make a profit of Rs. 45,000. pdBUT 2012)

ECO-56

Chapter at a Glance

- Measurement of risk: Risk refers to variability. It is a complex and multi-faceted phenomenon. A few measures have been used to capture different facets of more important ones are range, standard deviation, coefficient of variation and Standard Deviation: The standard deviation Of a distribution is

Where c = standard deviation; p_i = probability associated with the i value ,
 A_i = i th value; X = expected value

- Simulation Analysis: The steps involved in simulation analysis are as follows:
 - Model of project, the model of the project shows how the net present value is related to the parameters and the exogenous variables (Parameters are input variables specified by the decision maker and held constant over all simulation runs. Exogenous variables are input variables which are stochastic in nature and outside the control of the decision maker.
 - Specify the values of a parameters and the probability distributions of the exogenous variables.
 - Select a value at random from the probability distributions of each of the exogenous variables.
 - Determine the net present value corresponding to the randomly generated values of exogenous variables and pre-specified parameter values.
 - Repeat Steps (3) and (4) a number of time to get large number of simulated net present values.
 - Plot the frequency distribution of the net present value.
- Decision tree Approach: Many project decisions are complex investment decisions. such complex investment decisions involve a sequence of decisions over time. Decisions tree can handle the sequential decisions of complex investment proposals. The decision of taking UP an investment project is broken into different stages. At each stage the proposal is examined to decide whether to go ahead or not. The multi-stages approach can be handled effectively with the help of decision trees. A decision tree presents graphically the relationship between a present decision and future events, future decisions and the consequences of such decisions
- Risk and Return: The returns from an investment cannot be thought of in isolation Ofthe risk factor. Return and risk go together in investment. As the future is uncertain' there is

always a probability that the returns will be either better or worse than predicted. The larger the variation in returns, the greater the presence of the risk factor. Everything an investor does is linked directly or indirectly to return and risk.

- Risk vs. Return:

Risk: Risk can be defined as the chance that the actual outcome from an investment will differ from the expected outcome. So more the variability of possible outcomes that can occur, will result in greater risk involvement.

ECONOMICS FOR ENGINEERS

Return: Return is the motivating factor that motivates the investor in the form of rewards, for undertaking the investment. Investors are taking all the efforts of investment to maximise their expected return from investment.

Multiple Choice Questions

1. The present worth of an alternative is 0. What do we know about the value of the future worth? **b) FW = 0** [WBUT 2012, 2017]
d) Cannot be determined without cash flows

Answer: (b)

2. If A and B are two independent events then P (A and B) **c) FW > 0** [WBUT 2012, 2017]

- a) $P(A) \times P(B)$
b) $P(A) + P(B)$
c) $P(A) / P(B)$
d) $P(A) - P(B)$

Answer: (a)

3. In a decision tree arrows coming out of which node have probabilities
[WBUT 2012, 2014, 2017]

- a) decision node
c) both (a) and (b)
b) random node
d) none of these

Answer: (d)

4. If E_o = optimistic estimate
 E_m = most likely estimate, and
[WBUT 2013]

E = pessimistic estimate then the average or mean value of a parameter for economic analysis is given by

- a) $(E_o + E_m - E_p)$ b) $(EO + Em - Ep)/3$

Answer: (d)

BU T2014]

5. Margin of safety is equal to

- a) actual sales minus BEP sales
minus Actual cost
c) $(E_o + 2E_m + E_p)/4$

b) BEP sales minus Actual sales

these

d) none of

- d) $(EO + 4Em - Ep)/6$

G) actual sales

Answer: (a)

6. If A and B are two mutually non-

a) $P(A) \times P(B)$

c) $P(A) + P(B) - P(A)P(B)$

events,

P(AorB)

20141

b) $P(A) + P(B)$

[W

exclusive

d) $P(A)P(B) - P(A) - P(B)$

is

[WBUT

Answer: (b)

POPULAR PUBLICATIONS

7. A numerical description of the outcome of an experiment is called a

a) Descriptive statistic

c) Variance

b) Probability

d) Random Variable

Ansv cr: (b)

8. If A and B are two independent events then it can be expressed as

a) $P(A \cup B)$

b) $p(A \times B)$

Ansv er^c. (c)

d) none (WBUT of

these20161

WBUT 20191

9. In decision tree the node with which probability is attached is called

a) Decision node

b) Random or Chance node

Both (a) and (b)

d) None of these

c)

Ansver: (b)

10. If A and B are two independent events then $P(A \cap B) =$

[WBUT 2019]

a) $P(A/B) \times P(B)$ b) $P(A) \times P(B)$
c) $P(A \cup B)$

d) $P(A) + P(B)$

Ansver: (b)

Short Answer Type Questions

1. An aqueduct is needed to bring water into the city. It can be built at a reduced size IOW for Rs. 3 lakhs and enlarged 25 years later at Rs. 3.5 lakhs. The other option is to construct the full size aqueduct for Rs. 4 lakhs. Use Present Worth to find the better choice. [Given $i = 6\%$] [WBUT 2012, 2016, 2018] Ansver:

Option 1: Build at reduced size now and

$$PW_1 = 3,00,000 \times PVIF_{(6\%, 0 \text{ yr})} + 3,50,000 \times PVIF_{(6\%, 25 \text{ yr})}$$

$$\begin{aligned} &= (3,00,000 \times 1) + (3,50,000 \times 0.233) \\ &= 3,00,000 + 81,550 = 3,81,550 \end{aligned}$$

Option 2: Construct full size adequate now –

$$PW_2 = 4,00,000 \times PVIF_{(6\%, 0 \text{ yr})} = 4,00,000 \times 1 =$$

$$= 4,00,000 \text{ Rs.}$$

Since present worth of 1st option results in lower amount/cost, therefore the option to built It reduced size now and thereafter enlarge after 25 years should be Collosved.

2. Find the Equal Annual Worth (EAW)

[WBUT 2012]

Initial cost = Rs. 40,000

Salvage value Rs. 5,000

Revenues/year Rs. 10,000

Life : 10 years

~~DEPRECIATION~~


Chapter at a Glance

DEPRECIATION

- Depreciation concepts and Terminology:

Depreciation is the decrease in value of physical properties with the passage of time and use. More specifically Depreciation is an accounting concept that establishes an annual deduction against before - tax income such that the effect of time and use on an asset's value can be reflected in a firm's financial statements.

Depreciation is noncash cost that is intended to 'match' the yearly fraction of value used by an asset in the production of income over the asset's life. The actual amount of depreciation can never be established until the asset is retired from service. Because depreciation is a noncash cost that affects income taxes, we must consider it properly when making after-tax engineering economy studies.

- Meaning of Depreciation:

On the basis of Fundamental Accounting Assumption of Going Concern, assets are classified as Fixed Assets and Current Assets. Fixed assets are used in the business to drive benefits for more than one accounting period. Periodic profit is measured by charging cost against periodic revenue. Since fixed assets are used to generate periodic revenue, an appropriate proportion of the cost of fixed assets, which is believed to be used or expired for generation of periodic revenue, needs to be charged as cost. Such an appropriate proportion of the cost of fixed assets is termed as Depreciation.

Generally, the term 'depreciation' is used to denote decrease in value but in accounting, this term is used to denote decrease in the book value of a fixed asset. Depreciation is the permanent and continuous decrease in the book value of a fixed asset due to use, efflux of time, obsolescence, expiration of legal rights or any other cause.

- Straight line method of depreciation: 1: Amount of Depreciation = Original cost less Residual value

Step

Expected useful life of the asset

Step 2: Rate of _____

$$\text{Depreciation} = \frac{\text{Amount of Depreciation}}{\text{Original Cost}} \times 100$$

Written Down value Method (WDV)

In this method rate of depreciation falls on WDV of the assets and the rate of depreciation is calculated by the following formula:

POPULAR

$$r = 1 - \sqrt[n]{\frac{S}{C}}$$

where r = W.D. V rate of Depreciation S = Salvage value

C = Original cost of the asset.

- Recovery Rate: A percentage (expressed) in decimal form for each year of the MACRS recovery period that is utilized to compute an annual depreciation deduction.
- salvage value (SV): The estimated value of a property at the end of its useful life. It is expected selling Price of a property when the asset can no longer be used productively its

2y

ECO-82

owner. The term net salvage value is used when the owner will incur expenses in disposing of the property and these cash outflows must be deducted from the cash inflows to obtain a final net SV. Under MACRS the SV of a depreciable property is defined to be zero.

Multiple Choice Type Questions

1. If tax life is N years then for double depreciation, depreciation rate then would be given by

- a) $2xN$ b) $200^0/N$ c) $100\%/N$ Answer: (b)

2. Depreciation charged on plant and machinery is CWBUT 20191

- a) Discretionary Cost b) Committed Cost
c) Conversion Cost d) Future Cost

Answer: (b)

2. Which of the following is correct? [MODEL QUESTION]

- a) Depreciation is the permanent and continuous decrease in the market value of a fixed asset due to use, defluxion of time, obsolescence, expiration of legal rights or any other cause.
b) Depletion refers to the economic deterioration by the exhaustion of natural (e.g. ore deposits in mines) resources.
c) Obsolescence refers to the physical deterioration by (i) invention of improved technique or equipment (ii) market decline due to change in taste and fashion etc. (iii) inadequacy of existing plant to meet the increased business.
d) Amortization refers to the physical deterioration by the expiration of intangible assets (e.g. Goodwill, Patents)

Answer: (a)

3. Type of depreciation that arises out of economic factors like suppression, obsolescence and inadequacy is called
 a) c) physical accidental depreciation
 b) d) functional non-functional depreciation

Answer: (b)

[MODEL QUESTION]

4. Which of the following assets does not depreciate? a)
 Machinery and Equipment b) Patents Furniture
 d)
 c) Land

Answer: (c)

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 QUESTION)

5. Depletion refers to
 a) Wastage of output in process industries
 b) Gradual exhaustion of wasting assets
 c) Loss of value of an asset due to new technology
 d) None of these

Answer: (b)

ECO-83

PUBLICATIONS

6. The main cause of depreciation includes b) Passage of time
 a) Physical wear & tear d) Expiration of legal Rights
 c) Changes in economic development
 e) All of these

Answer: (e)

QUESTION)
 [MODEL

Short Answer Type Questions

1. From the following information calculate the annual depreciation based on historical and replacement cost respectively and show the amount of additional depreciation that should be provided in each year. Cost of machinery Rs. 20,000
 Estimated life 4 years
 Residual Value NIL

Inflation factor 10% p.a

Use straight-line method for computing depreciation.

20121

Answer:

POPULAR

Nominal depreciation per annum

Original cost — Residual value 20,000 — Nil

= 5, 000 Rs.per annum

Estimated life in years 4

Current value of asset after inflation = $20,000 \times 1.10 = 22,000$ Rs. Additional depreciation to be charged per annum

22,000 - Nil

$-5,000 = ,400 - 5,000 = 400$ Rs.

4

2. Distinguish between Depreciation and Obsolescence.

Solve:

A company purchased a machine on 1st April 2012 for Rs. 2,60,000; Shipping and forwarding charges: Rs. 10,000; Import duty: Rs. 12,000; Installation charges: Rs. 10,000; Depreciation is to be charged under diminishing balance method at 1st year — 10% p.a.; 2nd year — 20% p.a., 3rd year — 30% p.a.

Calculate the amount of depreciation each year. Answer:

1st part:

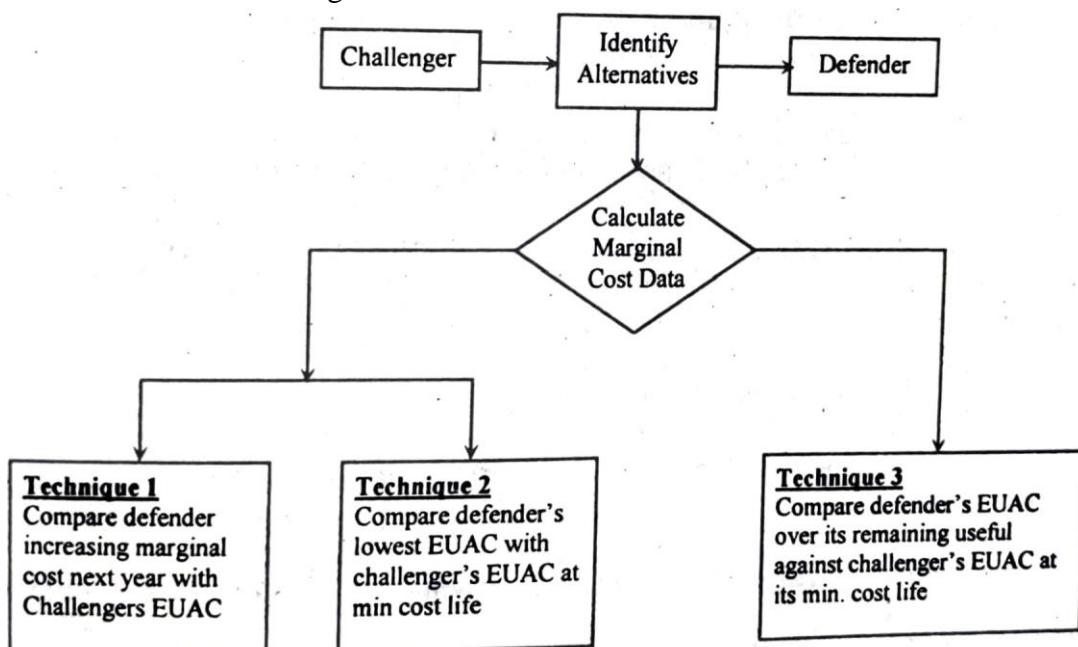
Depreciation is the decrease of worth of fixed assets with the passage of time and use. It is derived from the Latin word depretium, which means declining worth. Depreciation may be found in form of physical depreciation, economic depreciation and accounting depreciation etc.

Depreciation is a permanent continuing and gradual shrinkage in the book value of asset. It is charged on the fixed assets only. The institute of Chartered Accountants India defines depreciation as a measure of the wearing out consumption or other loss of value of a depreciable asset arising from use, efflux of time or obsolescence, technology and market changes.

REPLACEMENT ANALYSIS

Replacement Analysis: Replacement analysis is the systematic and economically evaluating decisions of either retaining the existing asset/equipment or acquiring new equipment by replacing the existing equipment. The existing facility is termed as defender and that of replacing the existing facility by choosing the best course of action among the alternative available is the challenger. Replacement Analysis deals with evaluation of defender and challenger. Various replacement analysis techniques are applied depending different circumstances for existing installed asset / defender against the best current available asset / challenger.

- Decision mapping: A replacement analysis decision map can be expressed in flow chart diagram for ease in decision making.



- Minimum cost life Analysis: The minimum cost life of any new asset is the years at which the EUAC is minimized. This cost life should be lesser than the actual / physical life of an asset, due to the increase of operating & maintenance cost in the later years of asset.
 - Generally cost of operation & maintenance of a machine increases due to passage of time.
 - The replacing machine [defender] time should be fixed.
 - Replacement policy for gradual deterioration
 - Salvage value to be determined prior to the decision making.

Time value of replacing asset. ... at which the EUAC is minimum. This

As discussed the replacement decision would be at which the EUAC is minimum. calculation can be made in two as ects.

POPULAR

EUAC = Price Ofe
ment-value of machine after life (i.e., salvage value] + Maintenance cost for the years.

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$$TC = (C - SV) + \sum_{t=1}^n M(t)$$

The process: and

$$\text{Average } TC[\text{EUAC}] = \frac{1}{n} [C + M(n/n)]$$

Here, C = Cost of the machine, S.V. Salvage value and

E M (t) = cumulative maintenance cost.

Multi le Choice **e uestions**

1. A machine worth Rs. 1,00,000 is purchase by paying Rs. 20,000 down payment and 12 monthly installments of Rs. 8,000 each. The book cost at time of purchase is [WBUT 2012, 20171

0,000 b) Rs. 8,000 c) Rs. 80,000 d) Rs. 12,000

Answer: (a)

2. A replacement decision is a choice between the present asset, sometimes called the and currently available replacement alternatives, sometimes called

.....

CWBUT 20131

- a) defender, challenger b) challenger, defender
c) defender, protector d) protector, defender

Answer: (a)

3. The example of Replacement problem is [WBUT 2015]

- a) Obsolescence b) Depletion
c) Deterioration due to aging d) All of these

Answer: (d)

4. in Replacement Analysis, the existing asset which is considered for replacement

..... asset.

[WBUT
20151

- a) challenger b) striker c) winger d) defender

Answer: (d)

5. Which are the determinants of economic life of an asset?

[WBUT
20161

- a) Capital recovery cost
b) Average operating and maintenance cost
c) Sum of capital recovery cost
d) all of these

Answer: (d)

6. In replacement analysis old machines are known as

puBUT 2018]

a) Defender

- c) Both (a) and (b) b) Challenger

Answer: (a)

d) None of these

ECO-90

ACCOUNTING

eChapter at a Glance

- Accounting is means of communicating the results of the business operation to various parties interested in or connected with the business, like owner, creditors, investors, government, financial institution and other parties. This is done by systematic recording of the events and transactions as per accounting process guidelines, principles and format. The American Accounting Association defines accounting as the "Process of identifying, measuring and communicating economic information top permit informed judgments and divisions by the user of the information."
- Balance Sheets: It is a statement of financial position consisting of assets and liabilities of any business enterprise in a particular date. Balance sheet summarises and reveals the financial position on an enterprise. Balance sheet is prepared following few concepts like Money Measurement – Concept, Entity Concept Cost Concept and dual aspect concept. The basic equation followed is Assets = Liabilities + Owner's Equity

Balance Sheet	Asset Side	All fixed and current assets, investments and fictitious assets
	Liability Side	Liabilities including capital, Loans, currents liabilities & provisions.

- Ratio Analysis: Ratio analysis is one of the techniques of financial analysis to evaluate the financial condition and performance of a business concern. Ratios are calculated from current year numbers and are then compared to

POPULAR

previous years, other business, the industry, or even the economy to judge the performance of the business.

- Formula in Practice:

Liquidity Ratios (Denoted As $\frac{A55}{X: Y}$)

i) Current Ratio $\frac{CVRREaV7}{CURRENTASSET-STOCK-FREPÆD}$

ii) Quick / Liquid Ratio or $\frac{CURRENT LIABILITIES-BASK}{QUICKASSET}$

Acid Test Ratio

$$\frac{DEBENTURES-LOANS-CURRE.VT L!ASU.^ry}{EQ} \quad ASSET$$

Solvency Ratios $\frac{DEBENTURES-LOANS}{SHARE-PREF SHARE. R & s-F, c assrs}$

i) Debt-Equity Ratio $\frac{EQ}{EQ SHARE *PREF SHARE. R S}$

or ii) Debt Equity Ratio $\frac{TOTAL ASSESTS(EXCLVDISG}{TOTAL ASSET (EXCLUDI.VG} \quad asssr$

iii) Proprietary Ratio

$CURRENT LIABILITIES$

vi) Total Asset to Debt Ratio $\frac{LONG.*DEBENTURESTEæ,f}{PREF SHARE}$

$= \frac{EQSH CAPITAL}{EQSH CAPITAL + R&S-F;c Asset}$

DESTS vii) Capital Gearing Ratio

POPULAR

PUBLICATIONS

PROFIT BEFORE INTEREST AND TAX (EBIT)

viii) Interest Coverage Ratio = PROFIT AFTER PAYMENT TAX (PAT) PER + INTEREST-DE YEAR. V INTEREST+INSTALLMENT PAYMENT ix) Debt Service Coverage Ratio

Profitability Ratios (Expressed SALES IN CRORE % OF GOOD SOLD x 100)

i) Gross Profit Ratio = $\frac{\text{NET SALES}}{\text{PROFIT AFTER TAX (PAT)}}$

x) ii) Net Profit Ratio = $\frac{\text{NET SALES}}{\text{NET PROFIT BEFORE TAX} \times 100}$

BEFORE INTEREST & TAX x 100 iv)

Return on Capital Employed = $\frac{\text{SR CAP} + \text{R&S-FIC. ASSETS} + \text{DEBT, VLTURE}}{\text{PAT-DIVIDEND FOR PREFSHARE}} \times 100$

Y) Return on Equity = $\frac{\text{EQVITSH-R, QS-FICTASSET}}{\text{PAT} - \text{Dividend on Pref Share}}$

vi) Earnings per Share (EPS) = $\frac{\text{SHARES OUTSTANDING}}{\text{DIVIDEND PER SHARE}}$

EQVITY SHARE HOLDER [Rs. Per Share] vii) Dividend

Price Earnings Ratio = $\frac{\text{MARKET EARNINGS}}{\text{PRICE PER SHARE}}$ SHAREEQSHARE [In Times] viii)

(P/E Ratio)

Multiple Choice Questions

1. Which one is the right Accounting Equation? CWBUT 2012, 2013, 2017]

- a) Assets — Liabilities = Capital b) Assets + Liabilities = Capital
- c) Assets + Capital = Liabilities d) none of these

Answer: (a)

2. Return of shareholders' fund is determined by which of the following formula?

- a) net profit after tax / shareholders' fund [WBUT 2014]
- b) net profit after tax / shareholders' equity
- c) net profit before / shareholders' fund
- d) net profit before tax / shareholders' equity

Answer: (a)

3. Patent is an example of [WBUT 2014]

- a) current asset b) fixed asset c) fictitious assets d) intangible assets

Answer: (d)

POPULAR

4. Current Ratio is the ratio of 2014]
- a) Current Asset by Current Liabilities
 - b) Current Liabilities by Current Asset
 - c) Current Capital by Current Asset
 - d) Current Capital by Current Liabilities

Answer: (a)

5. In Double Entry System of Book Keeping every business transaction affects
a) two accounts]
b) two sides of same account 2015
c) the same account on two different dates
d) all of these Answer: (a)
6. Which of the following balance appears on the debit side of the Trial Balance?
a) A loss b) An expenditure c) An Asset d) [WBUT All of these 2015]
Answer: (d)
7. Accounting Equation is
a) Capital = Assets — Liabilities b) Liabilities = Capital — Aso
c) Assets = Capital — Liabilities d) none of these
Answer: (a)
8. If Current Ratio is 2.2 and Current Liability is Rs. 80,000 then the current asset will be.
a) Rs. 1,76,000 b) Rs. 1,34,000 c) Rs. 1,60,000 d) Rs. 1,72,000

Answer: (a)

9. Goodwill is a

- a) Fixed asset
- c) Fictitious asset

- [WBUT 2018]
b) Current asset
d) Wasting asset

Answer: (a)

10. Gross Profit is the difference between

BUT 20191

- a) Net Sales and Cost of goods sold
- b) Net Sales and Cost of production
- c) Net Sales and Net purchase
- d) Tax and dividend

Answer: (a)

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11. Debt to Equity Ratio comes under Ratio

- a) Leverage Ratio
- b) Liquidity
- c) Profitability
- d) Dividend Ratio

Answer: (a)

10. Current Ratio: 2.5, Current Liabilities: Rs.50000, Acid test Ratio: [MODEL 1.5QUESTION]

The value of current Assets is —

- a) Rs. 100000
- b) Rs. 125000

Answer: (b)

11. Overhead is the other name of

- a) all direct cost
- c) opportunity cost

Answer: (d)

c) Rs.150000 d) Rs. 175000

[MODEL QUESTIONI

- b) sunk cost
- d) indirect cost

QUESTION_2015

Group—A
(Multiple Choice Type)

Questions) 1. Answer any ten questions.

i) Contribution margin is the

- a) excess of sale price over variable costs
- b) excess of sale price over fixed costs
- c) excess of sale price over both variable and fixed costs
- d) none of these

ii) The firm's decision to invest its funds in fixed and long term assets is known as

- a) Assets Planning b) Capital Budgeting
- c) Long Term Budgeting d) Short Term Budgeting

iii) Which of the following balance appears on the debit side of the Trial Balance?

- a) A loss b) An expenditure c) An Asset d) All of these
- iv) In Double Entry System of Book Keeping every business transaction affects "a) two accounts b) two sides of same account
- c) the same account on two different dates d) all of these

v) In this method we start with the higher rate of depreciation in the first year of the life of the assets and reduce this rate in succeeding periods till its year of salvage.

- a) Straight line method b) Reducing balance method c) Sum of the years digit method d) Sinking fund method
- vi) Annualized capital recovery cost is defined as
 - a) $C(A/P, i, n) + S(A/F, i, n)$
 - b) $-C(A/P, i, n) + S(A/F, i, n)$
- c) $-C(A/P, i, n) - S(A/F, i, n) Y^t d$

POPULAR PUBLICATIONS

- x) If actual sales are Rs. 40,000 and BEP sales are Rs. 30,000, the Margin of Safety is
 a) 7,000 b) 10,000 c) 15,000 d) 30,000

xii) FVIF_{E5%.3}
 a) 1.050 b) 70,000

- xii) In R = vc) 1.158

a) cl d) 1216

b) 1.103

xiii) In Replacement Analysis, the existing asset which is considered for replacement is called asset.

i) P/V rat
ii) Break a) challenger b) striker c) winger
Vd) defender

Group — B

(Short Answer Type Questions)

2. Assuming that the cost structure and selling price remain same in 2014 and 2015, find out
i) PN ratio; ii) Break Even point of sales; iii)
Profit when sales are of
Rs. 3,00,0

- iv) Sales required to earn a profit of Rs. 60,000 and
 v) Margin of safety
 in 2015

Period	Sales (Rs.)	Profit (Rs.)
2014	3,60,000	27,000
2015		39,000

see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Short Answer Type Question No. 2.

3. Distinguish between Depreciation and Obsolescence.

Solve:

A company purchased a machine on 1st April 2012 for Rs. 2,60,000; Shipping and forwarding charges: Rs. 10,000; Import duty: Rs. 12,000; Installation charges: Rs. 10,000; Depreciation is to be charged under diminishing balance method at

1st year— 10% p.a.; 2nd year — 20% p.a., 3rd year — 30% p.a.

Calculate the amount of depreciation each year.

see Topic:
 Short Answer Type

ear	Cash flow
1	30000
2	20000
3	10000

ATE OF RETURN NALYSIS, Short

DEPRECIATION,
 Question No. 2.

3.

4. a) Define IRR (Internal Rate of Return).

b) What is the present value of the following cash flow, assuming a discount rate of 8%?

see Topic: CASII FLOW & Answer Type Question NO• see Topic: PRESENT WOR ril ANALYSIS, Short Answer Type Question No. 6.

5 Write a short note oh recurring and nonrecurring cost.

see Topic: ENGINEERING COSTS & ESTIMATION, Short Answer

3•

ECO-112

Type Question No.

11. Write short notes on any three of the following.

- a) Relevance of Capital budgeting
- b) Sunk cost and variable cost
- c) Causes and effects of inflation
- d) Significance of cost accounting
- e) Sensitivity analysis

- a) see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Long Answer Type Question No.
- b) see Topic: ENGINEERING COSTS & ESTIMATION, Long Answer Type Question No. 8(c).
- c) See Topic: INFLATION AND PRICE CHANGE, Long Answer Type Question No. 3(d).
- d) See Topic: ACCOUNTING, Long Answer Type Question No. 7(c).
- e) see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Long Answer Type Question No. QUESTION 2016

Group — A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any ten of the following:

- i) Accounting Equation is
 - a) $\text{Capital} = \text{Assets} - \text{Liabilities}$
 - b) $\text{Liabilities} = \text{Capital} - \text{Assets}$
 - c) $\text{Assets} = \text{Capital} - \text{Liabilities}$
 - d) none of these
- ii) A person if deposits Rs. 50,000 in a bank at an interest of 10% compounded annually then future value at the end of 5 years will be
 - a) 80,525
 - b) 70,525
 - c) 85,525
 - d) If A and B are independent events then it
- iii) If in a power sizing model the power sizing index is greater than 1,
 - a) Per unit price increases with increase in quantity
 - b) Per unit price decreases with increase in quantity
 - c) Per unit price remains constant with increase in quantity
 - d) Per unit price remains constant with decrease in quantity

can be expressed as

- a) $P(A \cup B)$ b) $P(A \times B)$ $P(A) \times P(B)$

ECO-114

d) 90,525

d) none of these

- v) Which are the determinants of economic life of an asset?
a) Capital recovery cost
b) Average operating and maintenance cost
c) Sum of capital recovery cost
- a) Slope of Slope of TC b) vi) What is the relation between the slopes of Total Cost / No fixed relation
c) Slope of Slope of TC d) (TC) Slope and of Total Slope Revenue of TC(T)
Vii) A portion of the learning curve is
a) Parallel to y axis b) Parallel to x axis R) curves?
b) Cuts the x axis d) Cuts the y axis
- viii) If the inflation rate is 6% per year and the market interest rate is known to be 15% per year, what is the implied real interest rate in this inflationary economy?
a) 11.45% b) 9.00% c) 8.49%
- ix) Sunk cost is
a) Original investment + depreciation — repairing expenses
b) Original investment — depreciation + repairing expenses c) Original investment + depreciation + repairing expenses
d) Original investment — depreciation — repairing expenses
- x) Which of the following is not applicable to bottom-up approach to cost estimation?
a) The project under consideration is considered at the highest aggregate level
b) The project under consideration is split into smaller parts and their respective components are identified
c) Cost estimates are made for each component of each small part and added up
d) Cost estimates are made for each component of each part of the project and are added up to arrive at the total
- xi) A deposit of Rs. 1, 10,000 was made for 31 days. The net interest after deducting 20%

Type Question No.

Withholding tax is Rs. 890.36 Find the rate of return annually.

- a) 12.25 b) 12.75 c) 1 1.75 M/d) 11 95

xii) If Index Number for a certain period is equal to 100 then

- a) Price are increasing b) Prices are decreasing
Vc) Prices remain constant d) Change in prices cannot be predicted

Group B

(Short Answer Type Questions)

2 An aqueduct is needed to bring water into the city. It can be built at a reduced size now for Rs. 3 lakh and enlarged 25 years later at Rs. 3.5 lakh. The other option is to construct the full size aqueduct now for Rs. 4 lakh. Use present worth to find the better choice (Given, $i = 6\%$ and $(P/F, 6\%, 25) = 0.2330$). ^{see Topic: UNCERTAINTY IN FUTURE EVENTS, Short 1.}

ECO-IIS

Type Question No.

POPULAR PUBLICATIONS

i) Should the company make or buy? Present the case, when the firm cannot utilize the capacity elsewhere, profitably and when the capacity can be utilized, profitably ii) What would be your decision. the supplier has offered the component at Rs 4 50 each

See Topic: **ENGINEERING COSTS & ESTIMATION** (OSTS ESTIM 1 Long Answer type Question No. 5(a) &

11. Write short notes on any three of the following

- a) Cost push vs Demand pull inflation.
- b) NPV IRR
- c) Current asset and fixed asset
- d) Conditional probability
- e) Segmenting Model

a) see Topic: INFLATION PRICE CHANGE, Long Answer Type Question No. 3(c).

h) see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Long Answer Type Question No.

c) See Topic: ACCOUNTING, Long Answer Type Question No. 7(d).

d) see Topic: CERTAIN IN Future EVENTS, Long Answer Type Question No. 10(c).

e) see Topic: ENGINEERING COSTS & ESTIMATION, Long Answer Type Question No. 8(d).

QUESTION 2017

Group—A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any ten of the following:

i) Cost reflected in accounting system only is called
a) Cash cost b) Overhead cost c) Book cost d) Direct cost

ii) The opportunity cost of a good is

- a) the time lost in finding it
- b) the quantity of other goods sacrificed to the another unit of that good
- c) the expenditure on the good
- d) the loss of interest in using saving iii) Which one is the right

Accounting Equation?

c) ^va) Assets Assets + Capital — Liabilities = Liabilities= Capital b) Assets None of + theseLiabilities = Capital

iv) Inflation makes

- Va) future rupees less valuable than present rupees
- b) future rupees more valuable than present rupees
- c) future rupees equal to present rupees
- d) none of these

v) If A and B are two independent events then P (A and B) is

- a) $P(A) \times P(B)$
- b) $P(A) + P(B)$
- c) $P(A)/P(B)$
- d) $P(A) - P(B)$

To compute the construction cost per square foot of a building

xi) If the inflation rate is 6% per year and the market interest rate is known to be 15% per year, what is the implied real interest rate in this inflationary economy?

- a) 11.45% b) 9.00% * c) 8.49%

xii) A machine worth Rs. 1,00,000 is purchased by paying Rs. 20,000 down payment and 12 monthly installments of Rs. 8,000 each. The book cost at the time of purchase is

- "a) Rs. 5,000 b) Rs. 8,000 c) Rs. 80,000 d) Rs. 12,000

Group— B

(Short Answer Type

Questions) 2. What are the different methods of calculating depreciation? see Topic:

DEPRECIATION, Short Answer Type Question No.

Type Question No.

^{3.} If Rs. 100 is invested at a compound interest @ 10% p.a. for 3 years, what will be the respective future value for consecutive 3 years?

see Topic: CASH FLOW, INTEREST AND EQUIVALENCE, Short Answer Type Question No. 6.

⁴ What is 'Simulation Model'? How is the same practically applicable in decision making process? see Topic: UNCERTAINTY IN FUTURE EVENTS, Short Answer Type Question No. 5.

⁵ Define Learning Curve. What are the limitations of Learning Curve?

see Topic: ENGINEERING COSTS & ESTIMATION, Short Answer Type Question No. 5.

6. State the concept of Sensitivity Analysis.

see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Short Answer 1.

Type Question No.

- c) see Topic: ENGINEERING COSTS & ESTIMATION, Long Answer Type Question No. 8(b).
d) see Topic: ENGINEERING COSTS & ESTIMATION, Long Answer Type Question No. 86).
e) see Topic: CASII FLOW, INTEREST & EQUIVALENCE, Long Answer Type Question No. 16).
- QUESTION 2018

Group — A
(Multiple Choice Type Questions)

1 Choose the correct alternatives for any ten of the following:

- i) What is true about the relationship between AC and MC?
a) AC cuts MC from below b) MC cuts AC from below
c) MC and AC do not cut each other d) AC equals MC when AC is at its maximum
- ii) If Current Ratio is 2.2 and Current Liability is Rs. 80,000 then the amount of current asset will be
✓ a) Rs. 1,76,000 b) Rs. 1,34,000 c) Rs. 1,60,000 d) Rs. 1,72,000
- iii) In replacement analysis old machines are known as
a) Defender b) Challenger c) Both (a) and (b) d) None of these
- iv) At Break-even point
• a) Total revenue = Total Cost
c) Total revenue = Total Variable Cost
b) Total revenue = Total Fixed Cost
d) All of the above
- v) Demand-pull inflation may be caused by
a) An increase in costs
✓ c) A reduction in interest rates
b) A reduction in government spending
d) An outward shift in aggregate supply
- vi) Goodwill is a
Va) Fixed asset b) Current asset
c) Fictitious asset d) Wasting asset
- vii) A large angle of incidence indicates
a) A low rate of profit
c) No profit, no loss
"b) A high rate of profit
d) None of the above

a) 2/13 b) 1/13 c) 5/13 d) 8/13

viii) IRR stands for the rate of return for which

- a) NPV= 0 b) NPV= 1
c) NPV= -1 d) NPV is maximum

viii) A card is drawn from a deck of 52 cards. Find the probability that it is either a red king or a black queen.

x) The present value of 1 to be received after 3 years compounded annually at 10%

a) 0.909

b) 0.826

c) 0.751

d) None of these

POPULAR PUBL!CAT'QNS

- xii) A uniform series of payment occurring at equal interval c) Depreciation of time is called d)
Bond v/a) Annuity b) Amortization
- xiii) The following value(s) of the Power-Sizing Exponent (E) indicates Economies of scale
 a) $0 < E < 1$

Group—B

(Short Answer Type Questions)

2. An asset purchased at Rs. 17,000 has a life time of 5 years and salvage value of Rs. 2,000 If depreciation is computed using straight line method, calculate the book value of the asset at the end of 3 years.

see Topic: DEPRECIATION, Short Answer Type Question No. 4.

3. An is needed to bring water into the city. It can be built at a reduced size now for Rs. 3 lakhs and enlarged 25 years later at Rs. 3.5 lakhs. The other option is to the full size aqueduct for Rs. 4 lakhs. Use Present Worth to find the better choice. [Given $i = 60/01$. see Topic: UNCERTAINTY IN FUTURE EVENTS, Short Answer Type Question No. 1.

4. A box contains 6 white and 4 black balls. Two balls are drawn at random one after another without replacement. Prepare tie joint probability distribution table.

see Topic: UNCERTAINTY IN FUTURE EVENTS, Short Answer Type Question No. 6.

5 Discuss the economic problems faced by an engineer with suitable examples. see Topic: ECONOMIC DECISION MAKING, Short Answer Type Question No. 1.

6. What is ratio analysis? Discuss any three ratios and point out their limitations, if any, for analyzing the financial health of a company.

See Topic: ACCOUNTING, Short Answer Type Question No. 4.

Group—C

(Long Answer Type Questions)

7. a) What do you understand by replacement analysis? Explain 'Economic life' of an asset.
see Topic: REPLACEMENT ANALYSIS, Long Answer Type Question No. 2(a).

b) A firm has purchased an equipment at Rs. 20,000. When should the asset be replaced, if the following is given.

End of year	Operation cost in (Rs.)	Maintenance cost in (Rs.)	Resale value in (Rs.)
1	2,000	200	10,000
2	3,000	300	9,000
3	4,000		8,000
4	5,000	500	7,000

5	6,000	<u>600</u>	6,000
6	7,000		
7		700	5,000
	8,000	800	
8	9,000	<u>900</u>	4,000
			3,000

QUESTION 2019

G roup — A (Multiple Choice Type Questions)

1 Choose the correct alternatives for any ten of the following:

- i) The opportunity cost of a good is
 - a) The time lost in finding it
 - b) the expenditure on it
 - c) the quantity of the next best alternative sacrificed to produce one unit of that good
 - d) the amount of savings lost

- ii) If the inflation rate is 7% per year, market interest rate is 15%, then the real interest rate will be
 - d) 12%

- iii) Gross Profit is the difference between
 - a) Net Sales and Cost of goods sold
 - b) Net Sales and Net purchase
 - c) Net Sales and Cost of production
 - d) Tax and dividend

- iv) In a decision tree the node with which probability is attached is called
 - a) Decision node
 - b) Random or Chance node
 - c) Both (a) and (b)
 - d) None of these

- v) Depreciation charged on plant and machinery is
 - a) Discretionary Cost
 - b) Committed Cost
 - c) Conversion Cost
 - d) Future Cost

- vi) At Break-Even point
 - a) Total Sales = Total Cost
 - b) Total Revenue = Total Cost
 - c) Total Revenue = Total Fixed Cost
 - d) None of these

- vii) Marginal cost curve cuts the Average Variable cost from
 - a) Above at its minimum point
 - b) Below at its falling part
 - c) Below at its minimum point
 - d) None of these

- viii) Debt to Equity Ratio comes under
 - a) Leverage Ratio
 - b) Liquidity Ratio
 - c) Profitability Ratio
 - d) Dividend Ratio

- ix) Which one of the following is involved to measure inflation
 - a) Nominal Interest Rate
 - b) MARR

Vc) Consumer Price Index

d) None of these

POPULAR PUBLICATIONS

x) If A and B are two Independent events then $P(A \cap B)$

a) $P(A/B) \times P(B)$

c) $P(A \cup B)$

✓b) $P(A) \times P(B)$

d) $P(A) + P(B)$

xo To compute the updated cost of a boiler with same capacity in a power plant, we use

a) Per Unit Cost Model

Vb) Cost Index Model

c) Power Sizing Model

d) Segmenting Model

xii) Contribution margin is the

Va) excess of sale price over variable cost

b) excess of sale price over fixed cost

c) excess of sale price over both variable cost and fixed cost

d) none of these

Group — B

(Short Answer Type Questions) 2.

Write a brief note on Per Unit Cost method of estimation.

see Topic: ENGINEERING COSTS & ESTIMATION, Short Answer Type Question No. 6.

3. Distinguish between Consumer Price Index (CPI) and Wholesale Price Index (WPI). see
Topic: INFLATION AND PRICE CHANGE, Short Answer Type Question No. 3.

4. A machine needed for 3 years can be purchased for Rs. 77,662 and Sold at the end of period for about Rs. 25,000. A comparable machine can be leased for Rs. 30,000 per year. If a firm expects return of 20% on investments, should it buy or lease the machine? Capital recovery factor (20%, 3 years) = 0.4747. Sinking fund factor (20%, 3 years) = 0.2747).

see Topic: CASH FLOW & RATE OF RETURN ANALYSIS, Short Answer Type Question No. 7.

5 Define inflation. What are the causes of inflation?

see Topic: INFLATION AND PRICE CHANGE, Short Answer Type Question No. 4.

6. A student has taken a loan of Rs. for 3 years at 9% per annum. Calculate how much needs to be repaid at the end of 3 years under compound interest rate see Topic: CASH FLOW, INTEREST AND EQUIVALENCE, Short Answer Type Question No. 7.

Group — C

7. A firm whose cost of capital is (Long 10%, Answer considering Type two Questions) mutually exclusive projects X and Y, the details are as follows:

Year	Project A (70,000)	Project B <u>(7.00.000)</u>
1	10,000	50,000
2	20,000	40,000
3	<u>30,000</u>	2mooo

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QUESTION BANK

**DEPARTMENT OF CSE/IT
ECONOMICS FOR ENGINEERS—HSMC-301**

PART-A (Each question carry one mark)

Choose the one correct answer for each of the following questions:

1. Resources are best defined as:
 - a. Elements such as water, soil and minerals.
 - b. Anything that helps to produce products and services wanted by people.**
 - c. Manpower.
 - d. None of the above.

2. Examples of consumer products and services are:
 - a. Cake baked by the local bakery.
 - b. A radio news bulletin.
 - c. A car produced for private use by a family.
 - d. All the above.**

3. An example of production products or services are:
 - a. A machine made for use in a factory.
 - b. Food for factory workers.
 - c. Television shows.
 - d. All the above**

4. Which of the following economic systems rely primarily on the forces of demand and supply?
 - a. Centrally planned economies.
 - b. Capitalist (market) economies.**
 - c. Traditional economies.
 - d. All the above.

5. “The market” can best be defined as places where:
 - a. Consumers and producers are brought together.
 - b. Prices are determined.
 - c. Exchanges of products and services take place.
 - d. All the above.**

6. The following are types of efficiency of resource utilisation:
 - a. Engineering efficiency.
 - b. Economic efficiency
 - c. Marginal efficiency.
 - d. Both (a) and (b)**

7. An example of direct cost for producing wheat is:
 - a. The cost of food for the farmer.
 - b. The cost of seed to plant.**
 - c. Both (a) and (b).
 - d. None of the above.

8. Opportunity cost is only applicable when:
 - a. Students study.
 - b. An alternative really exists.**
 - c. When one activity interferes with another income producing activity.
 - d. Both (b) and (c).

9. Inflation rate is:

- a. The rate at which the average value of money deteriorates over time.
- b. Is commonly calculated for individual products or services.
- c. Is calculated by using the prices obtained in food stores.
- d. Is not relevant for engineering managers.

10. Real rate of return is:

- a. The return on an investment after taking the effect of inflation into account.
- b. Lower than the nominal rate of return.
- c. Calculated from $(1 + \text{Real return}) = (1 + \text{Nominal return}) / (1 + \text{Inflation})$.
- d. All the above.

11. There is a difference between accounting numbers and cash flows, because:

- a. Accountants tend to be too optimistic.
- b. Accounting numbers reflect transactions whether payment has taken place or not.
- c. Cash flows indicate the actual inflow and outflow of cash.
- d. Both (b) and (c).

12. Normally some products produced go into inventory, because:

- a. Over optimistic sales forecasts are always made.
- b. Too many products are always produced.
- c. The sales department can never sell all the products produced.
- d. This practice provides for unforeseen production problems in later periods

13. Direct labour cost can be calculated from:

- a. Number of units required x Hours available x Labour cost per hour.
- b. Number of units required x Hours per unit x Labour cost per hour.
- c. Number of units required x Number of labourers.
- d. None of the above.

14. Depreciation of fixed assets is:

- a. A decrease in the asset's value because of poor maintenance.
- b. Difference between the asset's purchase price and the price of a similar new asset.
- c. The amount by which its value is assumed to decrease because of the asset being used.
- d. Only a theoretical concept

15. Salaries for managers and support staff are normally:

- a. A variable cost (i.e. proportional to production levels).
- b. A fixed cost.
- c. An unnecessary cost.
- d. An opportunity cost.

16. The following are examples of techniques for investment analysis:

- a. Net present value, Nominal values, Budgeting, Internal rate of return, and Planning.
- b. Net present value, Depreciation, Cost-benefit ratio, and Return on investment.
- c. Net present value, Internal rate of return, Cost-benefit ratio, and Inflation.
- d. Net present value, Internal rate of return, Cost-benefit ratio, and Payback period

17. Disadvantages of the payback method include:

- a. It ignores all cash flows beyond the minimum acceptable payback period.
- b. It discounts cash flows to present value.
- c. It considers the effects of inflation.
- d. All the above

18. In case of capital rationing, the best strategy is:

- a. To make as many small investments as possible.
- b. To invest in only one place.
- c. To evaluate NPV of different options, and then choose the combination with the highest NPV.
- d. All the above

19. Investments can be risky, since:

- a. There are many dishonest investors.
- b. It is totally impossible to assess any of the risk involved in an investment, in advance.

- c. Investment outcomes are always uncertain to some extent.
d. None of the above

20. Investment diversification is a technique used to:

- a. Reduce investment risk.
b. To create work.
c. To cover non-profit organisations against the effects of inflation.
d. All the above.

21. Costs reflected in accounting system only are called

- a. Cash Cost b. Overhead Cost c. Book Cost d. Direct Cost

22. The opportunity cost of a good is

- a. the time lost in finding it. b. the quantity of other goods sacrificed to another unit of that good.
c. the expenditure on the good. d. the loss of interest in using saving.

23. Which one is the right accounting equation?

- a. Assets - Liabilities = Capital b. Assets + Liabilities = Capital. c. Assets + capital = Liabilities
d. none of these.

24. Inflation makes

- a. future rupees less valuable than present rupees. b. future rupees more valuable than present rupees.
c. future rupees equal to present rupees. d. none of these.

25. If A and B are two independent events then P(A and B)

- a. $P(A) \times P(B)$ b. $P(A) + P(B)$ c. $P(A)/P(B)$ d. $P(A) - P(B)$

26. To compute the construction cost per square foot of a building

- a. per unit model will be used. b. segmenting model will be used. c. learning curve estimation must be used.
d. none of these.

27. Which one is the fixed cost?

- a. Depreciation of the fixed assets. b. Excise duty. c. Cost of advertising. d. Sales tax.

28. Which one is helpful in measuring Inflation?

- a. Learning Curve. b. Segmenting Model. c. Consumer Price Index. d. MARR(Minimum attractive rate of Return)

29. In a decision tree arrows coming out of which node have probabilities

- a. Decision node. b. Random node c. Both a and b. d. none of these.

30. The present worth of an alternative is 0. What do we know about the value of the future worth?

- a. $FW < 0$ b. $FW = 0$ c. $FW > 0$ d. Cannot be determined without the cash flows.

31. If the inflation rate is 6% per year and the market interest is known to be 15 % per year. What is the implied real interest in the inflationary economy?

- a. 11.45% b. 9.00 % c. 8.49% d. 8%

32. A machine worth Rs. 1,00,000 is purchased by paying Rs. 20,000 down payment and 12 monthly installments of Rs. 80000 each. The book cost at the time of purchase

- a. Rs. 1,00,000 b. Rs. 8,000 c. Rs. 80,000 d. Rs. 12,000

33. At the break - even point

- a. Revenue > Cost b. Revenue < Cost c. Revenue=Cost d. No relation between revenue and cost.

34. What is the relationship between marginal cost(MC) curve and average cost curve(AC)?

- a. AC cuts the MC from below. b. MC cuts the AC from below.
c. AC and MC do not cut each other. d. There is no fixed relationship.

35. For a project to be financially viable the value of benefit-cost ratio should be

- a. greater than 1 b. less than 1 c. in between 0 and 1 d. negative

36. In NPV method, cash flow is generally calculated on the basis of
a. present value. b. future value. c. annuity. d. none of these.

37. Internal rate of return is an indicator of
a. loss of investment b. profit of an investment c. efficiency of investment. d.
depreciation of an asset.

38. What is inflation?
a. It is the term used to describe a decline in purchasing power evidence in an economic environment of rising prices.
b. It is the term used to describe a incline in purchasing power evidence in an economic environment of rising prices.
c. It is the term used to describe an increase in purchasing power evidence in an economic environment of rising prices.
d. It is the term used to describe a reversal in purchasing power evidence in an economic environment of rising prices.

39. To compute the updated cost of a boiler of the same capacity in a power plant, we use
a. per unit model. b. segmenting model c. cost index model. d. none of these.

40. A replacement decision is a choice between the present asset, sometimes called the , and currently available replacement alternatives, sometimes called.....
a. Defender, Challenger b. Challenger, Defender c. Defender, Protector d. Protector Defender.

41. If E_o =optimistic estimate, E_m = most likely estimate, E_p = pessimistic estimate
then the average or mean value of a parameter for economic analysis is given by
a. $(E_o+E_m+E_p)$ b. $(E_o + E_m - E_p)/3$ c. $(E_o + 2E_m + E_p)/4$ d. $(E_o + 4E_m - E_p)/6$

42. The largest tax collected at the federal government level is the:
a. income tax b. sales tax c. property tax d. social security tax

43. A person had an income of \$20,000 last year and paid \$10,000 in tax. This year, the person had an income of \$100,000 and paid \$30,000 in tax. The person's marginal tax rate is:
a. 25% b. 30% c. 50% d. 100%

44. The tax in question 29 is:
a. progressive b. regressive c. proportional

45. Assume that Equilibrium GDP is \$4,000 billion. Potential GDP is \$5,000 billion. The marginal propensity to consume is 4/5 (0.8). By how much and in what direction should government purchases be changed?

- a. increase by \$1,000 billion c. increase by \$100 billion
b. decrease by \$1,000 billion d. increase by \$200 billion

46. Using the numbers in question 31, by how much should taxes be changed?
a. increased by \$1,000 billion c. decreased by \$200 billion
b. decreased by \$1,000 billion d. decreased by \$250 billion

47. Assume that Equilibrium Real GDP is \$20,000 while Potential Real GDP is \$15,000. The marginal propensity to consume is 9/10. Assume that government decides to lower taxes by \$1,000. To pay for this, it lowers government purchases by \$1,000. As a result of these two changes, what is the new Equilibrium Real GDP?
a. \$19,000 b. \$20,000 c. \$21,000 d. \$14,000 e. \$1,000

48. Several adjustments have been suggested to the official budget deficit to be able to measure the effects of the budget deficit on the economy. For which of the following would the adjusted deficit be larger than the official budget deficit?

- a. state and local budget surpluses need to be added to the official budget deficit
b. the effects of unemployment need to be taken out of the official budget deficit
c. the effects of inflation need to be taken out of the official budget deficit
d. off-budget spending needs to be added to the official budget deficit

49. The demand for money will fall if:
a. Real GDP rises c. the GDP Deflator rises
b. real interest rates rise d. people expect deflation soon

50. An increase in the money supply causes:
a. interest rates to fall, investment spending to rise, and aggregate demand to rise
b. interest rates to rise, investment spending to rise, and aggregate demand to rise
c. interest rates to rise, investment spending to fall, and aggregate demand to fall
d. interest rates to fall, investment spending to fall, and aggregate demand to fall

51. If individuals forecast future prices by examining the rates of inflation of the present and recent past, they are using:
a. adaptive expectations c. inflationary expectations
b. rational expectations d. structural expectations

52. If the actual unemployment rate is below the natural rate of unemployment, it would be expected that:

- a. the rate of inflation would increase
- b. wages would fall
- c. the Phillips curve would shift to the left
- d. the natural rate of unemployment would fall

53. According to the monetarist acceleration theory, in the long-run,

- a. the actual unemployment rate will be below the natural rate of unemployment
- b. the actual unemployment rate will be equal to the natural rate of unemployment
- c. the actual inflation rate will be equal to the natural inflation rate
- d. the budget deficit will be equal to zero
- e. the money supply will be growing at a constant rate per year

54. If the money supply is: The interest rate is:

\$100 billion 10%

120 billion	8%
140 billion	6%
160 billion	4%
120 billion	2%

If the interest rate is: Investment spending is:

10% \$10 billion

8%	20 billion
6%	30 billion
4%	40 billion
2%	50 billion

Assume that equilibrium GDP is \$400 billion, potential GDP is \$500 billion, the marginal propensity to consume is 9/10, the interest rate is 8%, investment spending is \$20 billion, the money supply is \$120 billion, and the reserve requirement is 1/10. By how much and in what direction should the Fed change the monetary base?

- a. increase it by \$20 billion
- b. decrease it by \$100 billion
- c. increase it by \$90 billion
- d. increase it by \$2 billion
- e. decrease it by \$10 billion

55. Suppose an individual spends all his income on only two goods, good X and good Y. Moreover, suppose that you were asked to derive his price consumption curve for good Y. Which of the following would be allowed to vary?

- a. Money income.
- b. The tastes of the consumer.
- c. The price of good X.
- d. The price of good Y.

56. The "compensated" demand curve is the demand curve that

- a. shows only the income effect.
- b. shows only the substitution effect.
- c. shows both the income and substitution effects.
- d. shows the Giffen good demand curve.
- e. none of the above.

57. The substitution effect refers to

- a. the change in quantity demanded when the price of a substitute changes.
- b. the change in quantity demanded resulting from a change in total satisfaction, holding relative prices constant.
- c. the change in quantity demanded resulting from a change in relative prices, holding the level of satisfaction constant.
- d. the percentage change in quantity demanded resulting from a one percent change in all prices.
- e. a movement from one indifference curve to another.

58. The income effect of a price change

- a. is always positive.
- b. is always negative.
- c. may be positive or negative.
- d. is associated with a change in nominal income.
- e. is caused by changes in consumer tastes.

59. If a good is normal, then the demand curve for that good must be

- a. downward sloping.
- b. upward sloping.
- c. perfectly elastic.
- d. completely inelastic.
- e. either (a) or (b); whether it is one or the other depends on the relative magnitudes of the income and substitution effects.

60. If the demand curve for a good is downward sloping, then the good must be
- normal.
 - inferior.
 - Giffen.
 - either (a) or (b).**
 - either (b) or (c).
61. If the demand curve for a good is upward sloping, then which of the following statements must be true?
- The good is inferior.
 - The substitution effect is in the opposite direction to the income effect.
 - The substitution effect overwhelms the income effect.
 - 1 only.
 - 2 only.
 - 1 and 2 only.**
 - 2 and 3 only.
 - 1, 2, and 3.
62. When a good is an inferior good, the “non-compensated” demand curve will be
- relatively more elastic than the compensated demand curve.
 - relatively more inelastic than the compensated demand curve.**
 - equally elastic but with a different intercept than the compensated demand curve.
 - parallel to the compensated demand curve and to the right.
 - either more elastic or more inelastic depending upon the size of the income effect.

Part – B **(Marks are given in between brackets.)**

- What is Break Even Analysis? Explain its nature. (3+2)
- How will you determine the breakeven point? Can there be two break even points? Show with the help of graph. (3+2+5)
- From the following information, you are required to find out a) Contribution b) P/V Ratio c) Break Even Point Sales in terms of value and units. d) Profit e) Required sales to earn profit Rs. 20,000. Total Fixed cost Rs. 10,000. Total Variable cost Rs. 50,000, Total Sales Rs. 75,000, and Unit sold 10,000.
- What do mean by cash flow diagram? State the uses and significance of cash flow diagram. (7)
- Define depreciation. State the causes of depreciation also state the different methods of charging depreciation. (3+7)
- Define depreciation allowances in details as per Income Tax Act 1961. (8)
- Discuss briefly the different estimation method. (8)
- What is cost indexes? How should you measure it? (3+4)
- What is learning curve and learning curve ratio? Discuss its features and advantages. (4+3)
- Define accounting ratio. State the advantages and limitations of accounting ratio. (7+8)
- Discuss about the following ratios: - Current ratio, quick ratio, absolute liquid ratio, Debt Equity ratio, Capital gearing ratio, Proprietary ratio, Gross profit ratio, Net profit ratio, Operating ratio, Debtors turnover ratio, creditor turnover ratio, Stock turnover ratio. (5 marks each)
- Write short notes on:- Sunk cost, opportunity cost, Marginal cost, Semi-fixed and Semi-variable cost, Working capital, Capital expenditure and revenue expenditure, Time value of money, Net present value, Cost allocation and cost apportionment, Learning curve method. (5 marks each)
- Define Inflation State the causes of Inflation. State the effects of inflation. (3+6+6)
- What is sensitivity analysis? Discuss its advantages and limitations. (3+4)
- What is estimate? Discuss its use in economic analysis. (3+4)
- What is decision tree? Discuss the steps to be taken for making decision tree analysis. (3+4)
- Give a format of Cash Flow Statement as per AS-3. (5)
- Define Cash flow statement. Discuss the objectives of preparing cash flow statement. (3+4)
- Distinguish between Marginal Costing and Absorption costing.(5)
- Distinguish between Net Present Value and Internal rate of return.(5)
- Define macroeconomics and microeconomics. (6).
- What is scarcity?(3)
- Define resources.(3)
- What is demand?(3)
- What is supply?(3)
- What is Utility?(3)
- What is elasticity of demand?(3)
- What is indifference curve?(3)
- Define equilibrium price.(3)
- What is demand forecasting?(3)

31. Distinguish between industry demand and firm demand.(3)
32. What is marginal revenue?(3)
33. Define demand function.(3)
34. What is returns to scale?(3)
35. Define law of diminishing return.(3)
36. Define economic to scale.(3)
37. Distinguish between breakeven point and shutdown point.(3)
38. Define perfect competition and imperfect competition.(3)
40. Define Income tax.(3)
41. Define direct tax and indirect tax.(50)
42. Define GDP.(3)
43. Define balance of trade and balance of payment.(6)
44. Define price discrimination.(4)
45. Define price skimming.(3)
46. What is penetration pricing?(4)
47. What is prestige pricing?(3)
48. What is capital?(4)
49. What is working capital?(5)
50. What is investment?(6)
51. How does investments differ from saving?(5)
52. What is capital budgeting?(4)
53. What is capital rationing?(4)
54. Define benefit cost ratio.(4)
55. “Bank creates deposit”- Is it true?(5)
56. Define open market operation.(4)

Subject :- Economics For Engineers

Choose the one correct answer for each of the following questions:

1. Resources are best defined as:

- a. Elements such as water, soil and minerals.
- b. Anything that helps to produce products and services wanted by people.**
- c. Manpower.
- d. None of the above.

2. Examples of consumer products and services are:

- a. Cake baked by the local bakery.
- b. A radio news bulletin.
- c. A car produced for private use by a family.**
- d. All the above.**

3. An example of production products or services are:

- a. A machine made for use in a factory.**
- b. Food for factory workers.
- c. Television shows.
- d. All the above

4. Which of the following economic systems rely primarily on the forces of demand and supply?

- a. Centrally planned economies.
- b. Capitalist (market) economies.
- c. Traditional economies.
- d. All the above.**

5. “The market” can best be defined as places where:

- a. Consumers and producers are brought together.
- b. Prices are determined.
- c. Exchanges of products and services take place.
- d. All the above.**

6. The following are types of efficiency of resource utilisation:

- a. Engineering efficiency.
- b. Economic efficiency
- c. Marginal efficiency.
- d. Both (a) and (b)**

7. An example of direct cost for producing wheat is:

- a. The cost of food for the farmer.
- b. The cost of seed to plant.
- c. Both (a) and (b).**
- d. None of the above.

8. Opportunity cost is only applicable when:

- a. Students study.
- b. An alternative really exists.
- c. When one activity interferes with another income producing activity.
- d. Both (b) and (c).**

9. Inflation rateis:

- a. The rate at which the average value of money deteriorates over time.
- b. Is commonly calculated for individual products or services.
- c. Is calculated by using the prices obtained in food stores.
- d. Is not relevant for engineering managers.

10. Real rate of return:

- a. The return on an investment after taking the effect of inflation into account.
- b. Lower than the nominal rate of return.
- c. Calculated from $(1 + \text{Real return}) = (1 + \text{Nominal return}) / (1 + \text{Inflation})$.
- d. All the above.

11. There is a difference between accounting numbers and cash flows, because:

- a. Accountants tend to be too optimistic.
- b. Accounting numbers reflect transactions whether payment has taken place or not.
- c. Cash flows indicate the actual inflow and outflow of cash.
- d. Both (b) and (c).

12. Normally some products produced go into inventory, because:

- a. Over optimistic sales forecasts are always made.
- b. Too many products are always produced.
- c. The sales department can never sell all the products produced.
- d. This practice provides for unforeseen production problems in later periods

13. Direct labour cost can be calculated from:

- a. Number of units required x Hours available x Labour cost per hour.
- b. Number of units required x Hours per unit x Labour cost per hour.
- c. Number of units required x Number of labourers.
- d. None of the above.

14. Depreciation of fixed assets is:

- a. A decrease in the asset's value because of poor maintenance.
- b. Difference between the asset's purchase price and the price of a similar new asset.
- c. The amount by which its value is assumed to decrease because of the asset being used.
- d. Only a theoretical concept

15. Salaries for managers and support staff are normally:

- a. A variable cost (i.e. proportional to production levels).
- b. A fixed cost.
- c. An unnecessary cost.
- d. An opportunity cost.

16. Disadvantages of the payback method include:

- a. It ignores all cash flows beyond the minimum acceptable payback period.
- b. It discounts cash flows to present value.
- c. It considers the effects of inflation.
- d. All the above

17. Investments can be risky, since:

- a. There are many dishonest investors.
- b. It is totally impossible to assess any of the risk involved in an investment, in advance.
- c. Investment outcomes are always uncertain to some extent.
- d. None of the above

18. Costs reflected in accounting system only are called

- a. Cash Cost b. Overhead Cost c. Book Cost d. Direct Cost

19. The opportunity cost of a good is

- a. the time last in finding it. b. the quantity of other goods sacrificed to another unit of that good.
c. the expenditure on the good. d. the loss of interest in using saving.

20. Which one is the right accounting equation?

- a. Assets - Liabilities = Capital b. Assets + Liabilities = Capital. c. Assets + capital = Liabilities
d. none of these.

21. Inflation makes

- a. future rupees less valuable than present rupees. b. future rupees more valuable than present rupees.
c. future rupees equal to present rupees. d. none of these.

22. If A and B are two independent events then $P(A \text{ and } B)$

- a. $P(A) \times P(B)$ b. $P(A) + P(B)$ c. $P(A)/P(B)$ d. $P(A) - P(B)$

23. To compute the construction cost per square foot of a building

- a. per unit model will be used. b. segmenting model will be used. c. learning curve estimation must be used.
d. none of these.

24. Which one is the fixed cost?

- a. Depreciation of the fixed assets. b. Excise duty. c. Cost of advertising. d. Sales tax.

25. Which one is helpful in measuring Inflation?

- a. Learning Curve. b. Segmenting Model. c. Consumer Price Index. d.
MARR(Minimum attractive rate of Return)

26. In a decision tree arrows coming out of which node have probabilities

- a. Decision node. b. Random node c. Both a and b. d. none of these.

27. The present worth of an alternative is 0. What do we know about the value of the future worth?

- a. $FW < 0$ b. $FW = 0$ c. $FW > 0$ d. Cannot be determined without the cash flows.

28. If the inflation rate is 6% per year and the market interest is known to be 15 % per year. What is the implied real interest in the inflationary economy?

- a. 11.45% b. 9.00 % c. 8.49% d. 8%

29. A machine worth Rs. 1,00,000 is purchased by paying Rs. 20,000 down payment and 12 monthly installments of Rs. 80000 each. The book cost at the time of purchase

- a. Rs. 1,00,000 b. Rs. 8,000 c. Rs. 80,000 d. Rs. 12,000

30. At the break - even point

- a. Revenue > Cost b. Revenue < Cost c. Revenue=Cost d. No relation between revenue and cost.

31. What is the relationship between marginal cost(MC) curve and average cost curve(AC)?

- a. AC cuts the MC from below. b. MC cuts the AC from below.
c. AC and MC do not cut each other. d. There is no fixed relationship.
32. For a project to be financially viable the value of benefit-cost ratio should be
a. greater than 1 b. less than 1 c. in between 0 and 1 d. negative
33. In NPV method, cash flow is generally calculated on the basis of
a. present value. b. future value. c. annuity. d. none of these.
34. Internal rate of return is an indicator of
a. loss of investment b. profit of an investment c. efficiency of investment.
d. depreciation of an asset.
35. What is inflation?
a. It is the term used to describe a decline in purchasing power evidence in an economic environment of rising prices.
b. It is the term used to describe a incline in purchasing power evidence in an economic environment of rising prices.
c. It is the term used to describe an increase in purchasing power evidence in an economic environment of rising prices.
d. It is the term used to describe a reversal in purchasing power evidence in an economic environment of rising prices.
36. To compute the updated cost of a boiler of the same capacity in a power plant, we use
a. per unit model. b. segmenting model c. cost index model. d. none of these.
37. A replacement decision is a choice between the present asset, sometimes called the , and currently available replacement alternatives, sometimes called.....
a. Defender, Challenger b. Challenger, Defender c. Defender, Protector d. Protector Defender.
38. If E_o =optimistic estimate, E_m = most likely estimate, E_p = pessimistic estimate then the average or mean value of a parameter for economic analysis is given by
a. $(E_o+E_m-E_p)$ b. $(E_o + E_m - E_p)/3$ c. $(E_o + 2E_m + E_p)/4$ d. $(E_o + 4E_m - E_p)/6$
39. A person had an income of \$20,000 last year and paid \$10,000 in tax. This year, the person had an income of \$100,000 and paid \$30,000 in tax. The person's marginal tax rate is:
a. 25% b. 30% c. 50% d. 100%
40. An increase in the money supply causes:
a. interest rates to fall, investment spending to rise, and aggregate demand to rise
b. interest rates to rise, investment spending to rise, and aggregate demand to rise
c. interest rates to rise, investment spending to fall, and aggregate demand to fall
d. interest rates to fall, investment spending to fall, and aggregate demand to fall
41. If individuals forecast future prices by examining the rates of inflation of the present and recent past, they are using:
a. adaptive expectations c. inflationary expectations
b. rational expectations d. structural expectations
42. If a good is normal, then the demand curve for that good must be
a. downward sloping.
b. upward sloping.

- c. perfectly elastic.
- d. completely inelastic.
- e. either (a) or (b); whether it is one or the other depends on the relative magnitudes of the income and substitution effects.

43. If the demand curve for a good is downward sloping, then the good must be

- a. normal.
- b. inferior.
- c. Giffen.
- d. either (a) or (b).
- e. either (b) or (c).

44. If the demand curve for a good is upward sloping, then which of the following statements must be true?

- 1. The good is inferior.
 - 2. The substitution effect is in the opposite direction to the income effect.
 - 3. The substitution effect overwhelms the income effect.
- a. 1 only.
 - b. 2 only.
 - c. 1 and 2 only.
 - d. 2 and 3 only.
 - e. 1, 2, and 3.

45. Capital is a) Personal account, b) Real account c) Nominal account d) Not an account.

46. Goodwill is a a) Fixed assets b) Current assets c) Fictitious assets d) Wasting assets.

47. Excess of current assets over current liabilities is termed a) Total capital b) Floating capital c) Working capital d) Debt capital.

48. A trial balance can detect only a) Errors of principle b) Errors of omission c) Compensating error d) Arithmetic accuracy.

49. The sunk costs include:

- a. A past expenditure
- b. An unrecovered balance
- c. An invested capital that cannot be retrieved
- d. All of these

50. The opportunity cost of a good is

- a. The time lost in finding it
- b. the expenditure on it
- c. the quantity of the next best alternative sacrificed to produce one unit of that good.
- d. the amount of savings lost.

Short Answer

Discuss the economic studies.

Answer:
Some examples of
economic studies. E

Each

engineers or
project value

Analysis

ysis:

engineers and
also the logical

Linear Programming
solutions, whether the

engineering of
interest these is

Money: ent for
certain managers. They
investor, money nagers to not
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g is the
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and debt capital.

Time period
of tinn

Depreciation relationships itself
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eventually wear

Valuation:
Depreciation itself down, and thence
is somdefined by do ex'
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sense, as any n g in relation

Capital Budgetin

Answer Type Questions

faced by an engineer with suitable examples. ✓
[WBUT 2018]

economic problems range from value analysis to relevant in different situations, and most often used by

faced by an engineer with suitable examples.

are:

analysis finds its roots in the need for industrial

only simplify and improve processes and systems, - but the designs of those products and systems. use of Inathenvatical methods to find or maximized in nature.

Relationships Considering the prevalence of capital to be with the understanding that it will be returned to the analyze the costs associated with these types of divided into two different categories, equity capital

The fact that assets and material in the real world break, is a situation that must be accounted for.

the decreasing of value of any given asset, though can be considered the basis for depreciation in a value would be based on an original value to engineering econonlcs, is the proper usage and of capital to achieve project objectives. It can be

fully defined by the of decisions by individuals and firms concerning how will be obtained and expended to meet fUTURE objectives.

ECO-3

e Minimu _____ DLCosLEoxmulas being one of the most important and integral operations in the engineering econolnic field is the minimization of cost in systepps and processes Time, resources, labor, -and capital must all be minimized when placed into any systel)), so that revenue, product, and profitban be maximized.

Economic dies, both Private tind public in Nature Economic studies, which are tnuch jnore common outside of. engineering economics, are still used from time to time to determine feasibility and utility of certain projects. They do not, however truly reflect. the "common notion" of econonic studies, which is fixated upon macroeconomics, something engineers have little interaction with.

. The management team of a small furniture manufacturing company is under pressure to increase profitability in order to get a much - needed loan from the bank to purchase a more modern pattern - cutting machine. One proposed solution is to sell waste wood chips and shavings to a local charcoal manufacturer and factory areas.

- a. Define the company's problem. Next reformulate the problem in a variety of creative ways.
- b. Develop at least one potential alternative for your reformulated problems in part (a). (Don't concern yourself with feasibility at this point).

[MODEL QUESTION]

Answer:

- a. The company's appears to be that revenues are not sufficiently covering costs. Several reformulations can be posed.
 1. The problem is to increase revenues while reducing costs.
 2. The problem is to maintain revenues while reducing costs.
 3. The problem is an accounting system that provides distorted cost information.
 4. The problem is that the new machine is really not needed (and hence there is no need for a bank loan).
 - b. Based only on reformulation 1 , an alternative is to sell wood chips and shavings as long as increased revenue exceeds extra expenses that may be required to heat the buildings. Another alternative is to discontinue the manufacture of specialty items and concentrate on standardized, high volume products. Yet another alternative is to pool purchasing, accounting engineering and other white-collar support services with other small firms in the area by contracting with a local company involved in providing these services.
 3. X, a moneymaker prides himself on how much money he can save by being frugal. Today, Stand needs 15 gallons of gasoline to top off his automobile's gas tank. If he drives eight miles (round trip) to a gas station on the outskirts of town, it costs Rs.3.00 per litre and his car gets 25 Km per litre for in - town driving. Should he make the trip to get less - expensive gasoline? Each mile that he drives creates one pound of carbon dioxide. Each pound of CO₂ has a cost impact of Rs.0.02 on the environment. What other factors (cost and otherwise) should he in his decision making?
- [MODEL QUESTION]

Eco-4

ECONOMICS FOR ENGINEER

Answer:

Because each (8 pound Km x of Rs.0.02) co has a = penalty Rs. I .34. of If Rs.0.02, he can drive the saving's his car for from less his than trip = (15 I .34/8 litres=

per Km, he should make the trip. The cost of gasoline only for the trip is (Skm/25 per' Km litre) per litre).Rs.().96, but other costs of driving, such as insurance. Maintenance

and depreciation may also influence his decision. What is the cost of an accident; should Stan have one during his trip to purchase less – expensive gasoline? If he makes the trip weekly for a year, should this influence his decision? .9

Long Answer Questions

Discuss the principles of Engineering Economy. [MODEL QUESTION]
Answer:

Principle - 1: Develop the alternatives:

The choice (decision among alternatives, the alternatives need to be identified and then defined for subsequent analysis).

Principle -2: Focus on Differences

Only differences in expected future outcomes among the alternatives are relevant to their comparison and should be considered in the decision. Principle -3: Use a consistent Viewpoint

The prospective outcomes of the alternatives, economic and other should be consistently developed from a defined view point (perspective).

Principle - 4: Use a common unit of measure

Using a common unit of measurement to enumerate as many of the prospective outcomes as possible will simplify the analysis of the alternatives.

Principle 5: Consider All Relevant Criteria

Selection of a preferred alternative (decision making) requires the use of a criterion or several criteria). The decision process should consider both the outcomes enumerated in the

monetary unit and those expressed in some other unit of measurement or made explicit. in a descriptive manner.

Principle -6: Make risk and Uncertainty Explicit

Risk and uncertainty are inherent in estimating the future outcomes of the alternatives and should be recognized in their analysis and comparison.

Principle - 7: Revisit Your Decisions

Improved decision making results from an adaptive process, to the extent practicable, the initial Projected outcomes of the selected alternatives should be subsequently compared with actual results achieved.

A firm must decide between two system designs s1 and s2, whose estimated cash flows are shown in the following table. The effective income tax rate is 40% and MACRS (GDS) depreciation is used. Both designs have a GDS recovery period of five Years. if the after - tax desired return on investment is 10% per year, which design should be chosen? [MODEL QUESTION]

ECO-5

Capital investment	100,000
Useful life (year)	
W/ at end of useful life	30,000 40,000

An sner:

Note that de-sign alternative has different principles of engineering economy '4M;fy to bcfkzc taz at)d VIZ v/c analysis the system designs a priority (if /e; 'wc in using the annu%} it 9,implifi\$3 .arzsiss

(Lprcciated a fives (J recovery period. No to ICE

GDS are required the u-;cfuj tifg of each aftcrrijativc is than or t," of the calculation of the ATCFs the We can't the PW of" the after fax cash of in of the We can directly cc;npzz. ATCfrs by the AWs}

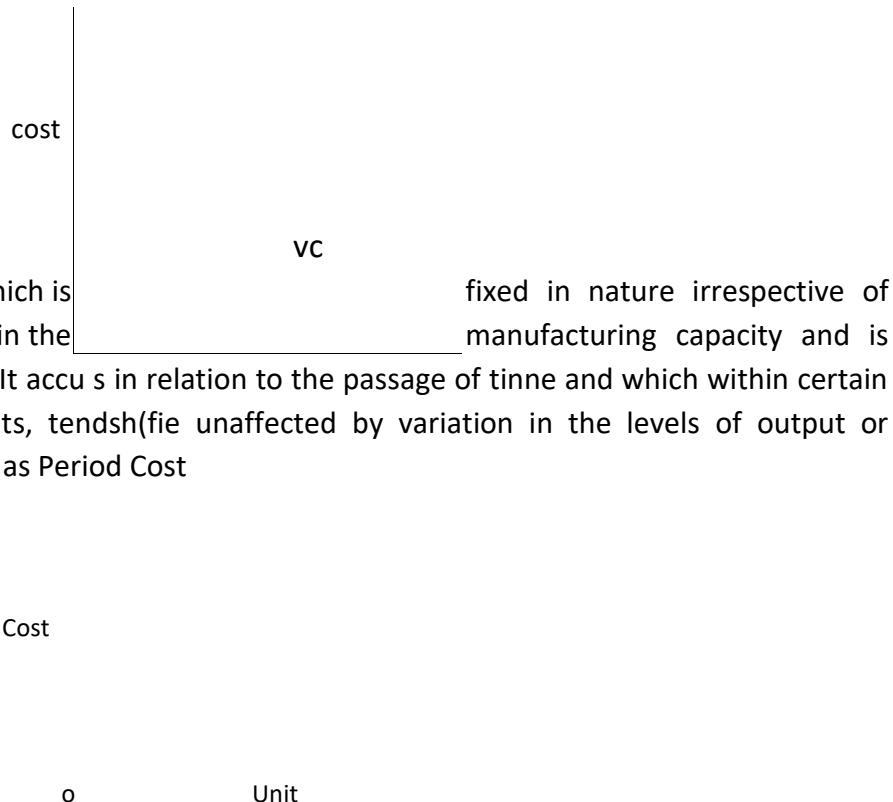
$$AW\%2 = \frac{pw,,2}{7m.6} = 22.96 \text{ (approx)}$$

% since it has the dicti's if a gyztcrn it, not req!Jired5

ENGINEERING COSTS & ESTIMATION

'Chapter at a Glance'

variable cost: (The cost which tends to follow the level of activities is the variable cost. That is they are proportional with the level of output which may be expressed in terms of units, labour hours, machine hours) Example of variable cost might be direct material, direct labour and variable expenses (overhead). Here the word direct means variability and directly proportion to the production. These costs are also termed as activity costs.



Marginal cost: It is the cost for producing one additional unit) This additional unit cost will be the variable cost because variable cost is incurred with every variation of output and fixed cost remains same. So the increase is only due to the variable cost. Marginal cost is useful for make or buy decision process.

Average cost: Average cost is the average cost per unit of production. It is ascertained as total cost of production for per unit of production. As in the above example the average cost would be

For 1000 units produced — Rs. 6000 / 1000 units = Rs. 6 per unit

For 1001 units produced = Rs. 6005 / 1001 units = Rs. 5.99 per unit

Sunk cost: (It is the cost which is already being incurred in past and is not relevant to any decision making process. e.g., Any survey or market research cost to decide whether any job to be undertaken or not is a sunk cost)

OPportunity cost • Opportunity cost is the benefit that could be derived from choosing any Other alternative by utilizing the resources. It is also termed as foregone cost or opportunity loss.)

ECO-7

Answer: (a)

14. Cost reflected in accounting system only is called [WBUT 2017]

- a) Cash cost
- b) Overhead cost
- c) Book cost
- d) Direct cost

Answer: (c)

15. The following value(s) of the Power-Sizing Exponent (E) indicates Economies of scale [WBUT 2018]

Answer: (a)

Short Answer Type Questions

1. Labour cost index value was at Rs. 124, ten years ago and is Rs. 188 today. Annual labour costs for similar facility were Rs. 5,75,500 ten years ago. Develop the cost estimates of annual labour cost for today. [WBUT 2013]

Answer:

According to cost index model,

Cost at current time Index value at current time

Cost at past time Index value at past time

Annual labour cost today Labour cost index today

Annual labour cost ten years ago labour cost index ten years ago

Annual labour cost today 188

¹²⁴

Annual labour cost today = 8, 72, 532

Rs.

2. Distinguish between fixed cost and variable cost with diagrams. [WBUT 2014]

Answer:

Fixed Cost	Variable Cost
1. They are not a function of output.	1. They are function of output in the production period.

2. They do not vary with output upto a certain level or activit .	2. They vary directly and sometime proportionately with the output.
3. They are incurred in hiring the fixed factors of production whose amount cannot be ad'usted in short time.	3, They are incurred in employment of the variable factors of production whose amount can be altered in the short run,

ECO-IO

Fixed Cost

They cannot be avoided until the operations of the firm are closed completely down, in the event of shut-down

5. They are also called contractual cost.

Cost

Unit

Cost

VC

4. They can be avoided but, if a firm shuts down in the then it will not incur variable costs.

5. They are also Called prime Cost or direct costs.

3. Write a short note on recurring nonrecurring cost.

and

[WBUT 2015]

Answer:

Recurring costs are almost predetermined expenses which are incurred in regular intervals. These expenses form part the operating expenses for running the business process. e.g., salary expenses, repairs and maintenance. The benefits derived out of these types of expanses are generally short term and the expenses are to be incurred in regular intervals to maintain the benefit out of it.

On the other hand the non-recurring costs occur at irregular intervals and generally not predetermined and thus may not be always a part of regular budgeting process. e.g., Repair expenses incurred due to breakdown of machines, plan to purchase machineries due to a subsequent huge order received.

Non-recurring costs might be planned also in some cases like overhauling of plant and mtcTii1öéFYTS"7Öne in planned manner but still not very regular thus non recurring expenses whereas breakdown maintenance cost is an unplanned expenses,

In engineering the recurring cost are considered of having an interval of almost 1 to 4-5 years gap which are easily anticipated beforehand. Non recurring expenses are made in huge interval gap and various models are made to figure out or anticipate the expenses although it is not easy to do.

4. a) What is Estimation?

b) An Electricity company wants to replace its Machinery which was erected in the Year 1982 at a cost Of Rs: with a capacity of 300 MW. This consists of material, labour and overhead in the ratio of 5 i 3 : 2. The present cost index of material, labour and overheads are 250, 300 and 240 respectively. The company Wants to increase double

PUBLICATIONS

of its present capacity. You are required to determine the Present cost of Machinery to be replaced with double capacity by using cost Indexes and power-sizing model. The power sizing factor is 0.90. [WBUT 2016]

ECO-II

POPULAR

Answer:

a) Estimation (or estimating) is -the process of finding an estimate, or approximation; which is a value that is usable for some purpose even if input data may incomplete, uncertain, or unstable. The value is nonetheless usable because it is from the best, information available. Typically, estimation involves "using the value:

a statistic derived from a sample to estimate the value of a corresponding population parameter". The sample provides information that can be projected, through various formal or informal processes, to determine a range most likely to describe the missing information. An estimate that turns out to be incorrect will be an overestimate if the estimate exceeded the actual result, and an underestimate if the estimate fell short of the, actual result.

b) Cost of machine of original capacity

5	
Material: 15,00,000 x	
5+3+2	
3	
Labour: 15,00,000 x	
10	
2	
Overhead: 15,00,000 x	
10	
Total Cost	

Cost of present machine of double capacity

0.90	
250	
2	
Material: 7,50,000 x	
— IOO	
300	
2	
Labour: 4,50,000 x	
— x —	
IOO	
0.90	
Overhead: 3,004,000 x	
2	
4! x 2	
IOO	
Total cost	

. Define Learning Curve. What are the limitations of Learning Curve? [WBUT 20171
Answer:

part: Refer to Question No. I(a) of Long Answer Type Questions.

Limitations of Learning Curve are cost of Entry: Every activity in which a human can engage has a cost of entry. For example, if a person chooses to play a new video game, the cost of entry is purchasing the game plus whatever time it takes to master the controls. Activities with steep learning curves have a high cost of entry since participants must spend more of their time learning the basics before they can truly enjoy themselves. A high cost of entry turns off

ECO-12

customers or participants who decide that your product's steep learning

Any time you learn something new, there is a chance of frustration. New tasks are unfamiliar and require careful attention, and in with steep learning curves, mistakes can be quite costly. If you were trying to teach a person to marble, for example, every mistake could cost that person hundreds of dollars in supplies. When the amount of frustration experienced by a person learning a task outweighs his potential enjoyment of that task, he is more likely to quit than continue. A steep learning curve may force new customers to walk away from a product or service.

Exclusion: One of the benefits of offering an activity with a steep learning curve is the participants that hang around are truly dedicated to the task. By weeding out people with casual interests or low frustration barriers, you ensure that your customers are all a certain mindset and caliber. A steep learning curve is an easy way to keep people who may not stick with a given activity or product from wasting too much of your time, as it pushes them out much earlier than they would naturally lose interest.

Satisfaction: When a service or product has a steep learning curve, the people who do master it feel an immense sense of accomplishment they would not get if the product were simple to use. Following the example of video games again, in games with high difficulty levels and brutal learning curves, the gamer who sticks it out to the end is going to feel a greater sense of satisfaction from completing the game than she would if the game were easy from start to finish. Steep learning curves may keep some people away, but they can also keep some people coming back for more.

Long Answer Type Questions

1. a) What do you mean by Learning Curve method in cost estimation?

b) A certain index for the cost of purchasing an installing utility boilers is keyed to 1988, where its baseline value was arbitrarily set at 100. Company XYZ installed a 50,000 lb/hour boiler for \$525,000 in 2000 when the index had a value of 468. This same company must install another boiler of the same size in 2007. The index is 2007 is 542. What is the approximate cost of the new boiler? Answer:

PUBLICATIONS

- a) The learning curve has to do with the ways people improve their performance of certain tasks. For every job, the operator has to be trained although for simple jobs ordinary instructions sheet is sufficient for training the operator but for complex job further training is required so that the operator can perform all the tasks with sufficient skills. While determining the extent of training required, the ability of the operator to learn and adapt to new methods is also a factor to be considered. While learning a new method, the operator gathers speed quickly at first with practice, the rate will be there but the rate of improvement will be slow. The cycle of practice are plotted on the

ECO-13

p _____ ARP

X axis and time per cycle on the Y axis in the learning curves. The learning curve therefore is a graph which represents the relationship between the practice time and the speed of work and the formula is as follows:

where $L = \text{Labour input}$, $Q = \text{Current output} = \text{accumulated past work}$, N a constant and $i = \text{a constant which is less than } 1$.

The learning curve model is usually applied to direct labour, rejects, defective products and also overheads because overheads are also affected by learning as they are related to direct labour.

- b) The cost of new boiler of same size as installed in 2000 index value at current year (2007)
= cost of old boiler installed in index value at past year (2000) G.
(approx.)

. Discuss the meaning of estimation. What are the advantages in engineering economic analysis? Discuss its limitations. (WBUT 20131 Answer:
In statistics, estimation refers to a process in which one makes inferences about a population. An estimation of population parameters may be estimated in two ways: (i) if the estimate consists of single value or point then it is called point estimate (2) if the estimate gives a range of values then it is called interval estimate.

The advantages of engineering economic analysis are:

- i) Promotion of well-being and survival of the organization. ii)'
Embody creative and innovative technology and ideas.

- iii) Translate profitability to the bottom-line through a valid and acceptable treasure of rent.
- iv) Taking appropriate decisions to apply such methods directed minimizing costs / maximizing benefits.

The main limitation of engineering economic analysis is that there is a major need to consider aspects of ethical and value based considerations as well as to incorporate concepts of corporate social responsibility in engineering.

ECO-14

FOR

- ECONOMIC ENGINEERING
- a) Distinguish between Marginal Cost and Average Cost. Draw both the graphs on a single graph paper.
 - b) if $C(x) = +5x^2 + 500$, find
 - i) Fixed Cost ii)
 - Variable cost iii)
 - Average Cost
 - iv) Marginal Cost
 - v) Average Variable Cost. [WBUT 2015] Answer:

- a) The average cost is obtained by dividing total cost of production by the number of units of the commodity produced so that cost = Total cost

Average

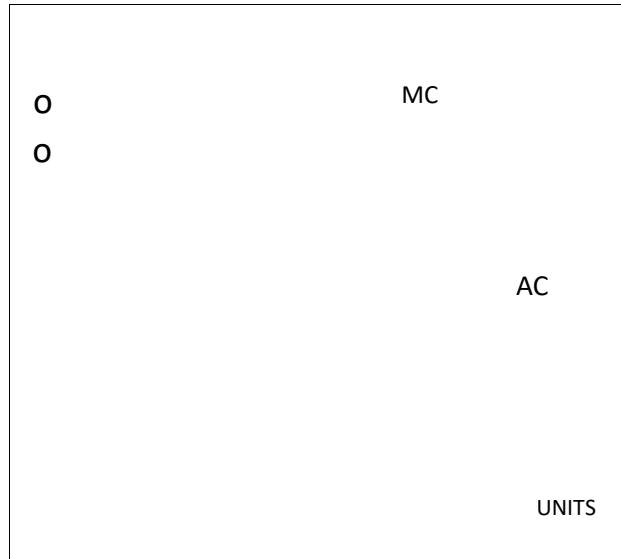
Output

Marginal cost is the cost of production of final or the marginal unit of the commodity. Alternately it may be expressed as the total cost of n unit of the output minus the total cost of (n-1) unit. Both averages as well as the marginal cost curves are normally UShaped curves.

The relationship between marginal cost and average cost is as follows:

1. If average cost is falling, then, MC is below average cost
2. If AC is constant, then MC = AC.
3. If AC is rising, then MC > AC i.e., MC is above AC.

PUBLICATIONS



b) Given, $C(x) = x^3 + 5x^2 + 3x + 500$

-i) Fixed cost = 500 ii) Variable cost = Total cost — Fixed cost = $C(x)$

$$-500 = x^3 + 5x^2 \quad \underline{500+3x}$$

iii)- Average cost — x

W) Given, total cost = $C(x) = x^3 + 5x^2 + 3x + 500$

ECO-15

$$-3x^2 + 10x + 3$$

Marginal cost $\frac{dx}{dx}$

$$\text{Variable cost } x^3 + 5x^2 + 3x$$

v) Average variable cost = Output x

you Explain mean by the Cost types Index? of estimate. What are the difficulties in estimation? [WBUT What 2015] do

Answer:

part:

Types of Cost Estimate — Models are described below: Per-unit Model

Here in this model a cost estimate is made for a single unit, then the total cost estimate results from multiplying the estimated cost per unit times the number of units. This model is applicable for those types of products where various cost components like raw materials, labour and other overheads cost are identifiable and determined for a single unit of production.

Segmenting Model

Here partitions the total estimation task into segments. Each segment is estimated, and then the segment estimates are combined for the total cost estimate. Like if cost for any student fest to be calculated first it is segmented into the category of decoration, artiste cost, entertainment and food, travelling, advertisement etc. cost of each segment is calculated and then added to derive the total cost,

Power-Sizing Model

This is practically an effect of economy of scale. Any cost of producing / manufacturing any product will not be increased in same proportion as the units are increased. For example, the cost of producing 10 units will typically be less than ten times of the comparable production cost of a single product. Cost of economic comparable production cost depends on an exponential factor termed as Power Sizing. Exponent

To estimate the cost of B based on the cost of similar item A, use the equation

$$\text{Cost of B} = \text{Cost of A} \times (\text{Size of B} / \text{Size of A})^x$$

Here X is the appropriate power-sizing exponent, available from a variety of sources of past performance of production.

Learning Curve Model

Here cost estimating is the assumption that as a particular task is repeated and the operator systematically becomes quicker at performing the task. In particular, the model is based on the assumption that the time required to complete the task for production unit 2x is a fixed

POPULAR PUBLICATIONS

percentage and will be less than the double of the required for production 'unit x' for all positive, integer x. e.g., if 5 hrs is required for producing a single unit and the learning rate is 80 % then to producing

ECO-16

= 8 hrs. and producing double the units i.e., 4 units will be 8 Hrs. FOR 2 80 0/0 =

Difficulties in cost estimation

Estimating is difficult because the future is unknown. With few exceptions (such as with legal contracts) it is difficult to anticipate future economic consequences exactly. In this section we discuss several aspects of estimating that make it a difficult task. Engineering economic analysis includes present and future economic factors; thus, it is critical to obtain reliable estimates of future costs, benefits and other economic parameters. Difficulties in developing cost estimates arise from such conditions as one-of-a-kind resource availability, and estimator expertise. Generally •the quality of a cost estimate increases as the resources allocated to developing the estimate increase. •The benefits expected from improving a cost estimate should outweigh the cost of devoting additional resources to the estimate improvement.

3rd part:

A cost index is the ratio of the actual price in a time period compared to that in a selected base period (a defined point in time or the average price in a certain year), multiplied by 100. Raw materials, products and 'energy prices, labor and construction costs change at different rates, and plant construction cost indexes are actually a composite, able to compare generic chemical plants capital costs.

To update an item cost (equipment, projects) from period A to period B, is necessary to multiply period A's cost by the ratio of period B's index over period A's index, according to the following equation:

index at A

Cost at A Cost at B • index at B

As a rule-of-thumb, cost indexes permit fairly accurate estimates for cost escalation if the difference between period A and period B is less than 10 years. Differences between the actual equipment and labor prices and those predicted by the index tend to grow over the years, surpassing the typical error verified in budget-level estimates. [The selection of the proper index to use depends on the industry in which it is applied. For example, while U.S. CE, M&S or IC Index are typically employed for chemical process industries, the ENR (Engineering News-Record) construction index is used for general industrial construction and takes in account the prices for fixed amounts of structural steel, cement, lumber and labor:

The majority of cost indexes demonstrate a time lag, due to data collection and its compilation for publishing. As stated before, some indexes use information published by other organizations and a delay in data may be verified (like those provided by the BLS). Exceptions to this are the ENR construction and the IC indexes, which present relatively current values.

POPULAR PUBLICATIONS

ECO-17

POPULAR PUBLICATIONS

5. a) Describe different areas of management decision.
 b) Dimpy Co., a radio manufacturing company finds that the existing cost of a component, Z 200, is Rs. 6.25. The same component is available in the market at Rs. 5.75 each, with an assurance of continued supply.
 The breakup of the existing cost of the component is:

	Rs.
Materials	2.75 each
Labour	1.75 each
Other variables	0.50 each
Depreciation and other Fixed cost	<u>1.25 each</u>
	<u>6.25</u>

- i) Should the company make or buy? Present the case, when the firm cannot utilize the capacity elsewhere, profitably and when the capacity can be utilized, profitably.
 ii) What would be your decision, if the supplier has offered the component at Rs. 4.50 each?

[WBUT 2016]

Answer:

a) Different areas of management decisions are -

- i) Operation management
- ii) Quality management
- iii) Materials management
- iv) Finance management
- v) Human resource management
- vi) Marketing management
- vii) Project management
- viii) Systems management

b) When the firm cannot utilize the capacity elsewhere

	Z 200 (per unit)
Materials	2.75
Labour	1.75
Other variables cost	0.50
Variable cost of manufacture	<u>5.00</u>

Since variable cost of manufacture is less than supplier's price, therefore the company should make the product

When the firm can utilize the capacity elsewhere

	Z 200 (per unit)
Supplier's price	5.75
Less: Variable cost of manufacture	5.00
Difference	<u>0.75</u>

In this case

- i) If the firm can get a contribution more than 0.75 Rs. per unit of the component by utilizing the capacity elsewhere, then they should buy the component.

POPULAR PUBLICATIONS

tc NOMI firm cannot get a contribution at least equal to 0.75 Rs. per unit, then by utilizingo thecapacity elsewhere then it should make the component.

ii) If the supplier :has offered the ,component at 4.50 each, then the firm should buy the coniponent because by buying it will gain an amount of (5.00 - 4.50) = 0.50 RSV per unit than making.

) Differentiate elaborately between Absorption Costing and Marginal costing.

[WBUT 2017)

Answer:

Marginal costing and absorption costing differ from each other in the following respects.

1. Cost in the treatment ments in of produfixed ct factory cost;. (manufacturing) Marginal costing overheads and absorption in the accounting costing differ recordsonly

and financial statement. In both the costing it is agreed that selling and administrative expenses, whether variable or fixed, are period costs and these costs are not treated as product costs with the result that selling and administrative expenses are not included in the costs of inventories and costs of goods sold. Similarly it is also agreed that variable manufacturing costs are product costs, i.e., costs to be charged to the product. The disagreement between the two is only in regard to the treatment of fixed manufacturing costs. Under absorption costing, fixed manufacturing costs are charged to inventory and costs of goods sold. Under marginal costing, these costs are not charged to inventory and cost of goods sold but are treated as period expenses when incurred.

Marginal costing is relatively at a lower figure as inventories are determined in terms of only variable production costs. In absorption costing, the value of inventories is comparatively at a higher figure because it considers fixed factory overhead also besides the variable production costs.

3. Difference in net income: The treatment of fixed factory overhead brings 77TéFäÄ7iiTz--üfi7GFfigures in the two costing techniques. The manufacture of any difference in net income is a function of fixed manufacturing costs per unit and the change in inventory levels.

b) Variable cost per unit is Rs. 12. Selling price per unit is Rs. 20. Fixed expenses are Rs. 60,000. Find BEP. What will be the selling price per unit if the BEP is brought down to 6000 units? [WBUT 2017]

Answer:

Fixed cost

Fixed cost

B.E.P (units) -

Contribution (per unit) Selling Price (pu) -- Variable cost (pu)

$$\underline{60,000} \quad 60,000 = 7,500 \text{ units}$$

$$20-12 \quad 8$$

$$\text{Fixed cost} \quad \underline{\text{Fixed cost}} \quad \underline{60,000} \quad 60,000 \times 20 = \text{ISO, 000 Rs. B.E.P (Rs.) -8}$$

p/v ratio	<u>contribution (pu)</u>
Selling price (pu)	20

ECO-19

When B.E.P is brought down to 6,000 units

60,000

6,000 =

Selling price per unit (Required) — 12

Assuming Fixed expenses and Variable Cost (per unit) remaining constant.

60,000

i.e., 6,000 =

- 22 Rs.

Therefore the required selling price per unit =

7. Write short notes on the cost following: estimation [WBUT 2012, 2012, 2014, 2017]

- a) Power sizing model of [WBUT]
- b) Life cycle costing [WBUT 2015]
- c) Sunk cost and variable cost [WBUT 2016]
- d) Segmenting Model [WBUT 2018]
- e) Use of price indexes in engineering economic analysis

Answer:

- a) Power sizing model of cost estimation

This model expresses that cost of producing / manufacturing any product will increase in different proportion as the units are increased. This is a practically an effect of economy of scale. The model "scales up" or "scales down" known costs, thereby accounting for economies of scale that are common in industrial plant and equipment costs. Consider the cost to build a Factory. Would it cost twice as much to build the same facility with double the capacity? It is unlikely. The power-sizing model uses the exponent (x), called the power-sizing exponent, to reflect economies of scale in the size or capacity.

Cost of economic comparable production cost depends on an exponential factor termed as Power Sizing Exponent: To estimate the cost of B based on the cost of comparable item A, use the equation.

Where x is the power-sizing exponent, costs of A and B are at the same point in time (same rupee basis), and size or capacity is in the same physical units for both A and B. The power-sizing exponent (x) can be 1.0 (indicating a linear cost-versus-size/capacity relationship) or greater than 1.0 (indicating diseconomies of scale), but it is usually less than 1.0 (indicating economies of scale). Generally the ratio should be less than 2, and it should never exceed 5. This model works best in a "middle" sized asset not for very small or very large size.

b) Life cycle costing

Life cycle costing applies mixture of managerial, engineering and financial practices to physical assets to achieve the economic life cycle cost of the physical assets. Its objective is to use the physical assets in such an efficient way so that it results in lowest cost

ECO-20

higher capital cost and lower running and maintenance costs

applying the inventory control on a JIT basis to avail the necessary spares maintenance departments want exactly in the same quantity as which leads to elimination of the need to keep spares inventory which reduces the maintenance JIT philosophy is also applied in life cycle costing to eliminate waste resulting from manufacturing process and hence the application of life cycle costing reduces the machine down time over its life and its setup cost,

c) Sunk cost and variable cost:

sunk cost is the cost which is already being incurred in past and is not relevant to any decision making process. e.g., any survey or market research cost to decide whether any job to be undertaken or not is a sunk cost. Here the cost is not relevant to the decision whether to start the job or not as it is already being incurred and not depended / relevant to the decision. Thus sunk cost is which cannot be recovered.

Variable Costs are those items of costs which change with changes in the level of output in the short run i.e. they increase or decrease with the rise or fall of the output e.g. wages of labour, prices of raw materials, fuel, power etc.

The distinction between fixed and variable costs is valid in the short run because the distinction originates from the distinction between the fixed and variable factors which is only valid in the short period while in the long run all inputs being variable, all costs are also variable costs. The distinction is of the degree not in kind.

d) Segmenting Model

Here partitions the total estimation task into segments. Each segment is estimated, and then the segment estimates are combined for the total cost estimate. Like if cost for any student fest to be calculated first it is segmented into the category of decoration, attire cost, entertainment and food, travelling, advertisement etc. cost of each segment is calculated and then added to derive the total cost.

e) Use of price indexes in engineering economic analysis:

Engineering economic analysis is concerned with making estimates of future events: the outcomes of yearly costs and benefits, interest rates, salvage values; and tax rates are all examples of such estimates. Associated with these estimates are varying degrees of uncertainty. The challenge for the engineering economist is to reduce this uncertainty for each estimate. Historical data provide a snapshot of how the quantities of interest have this past (historical) behavior should provide insight on

estimating how to estimate. This is where their behavior the data that in the price future, indexes as well provide as to come reduce into the play. uncertainty Although of that is

very dangerous to extrapolate past data into the future in the short run, price index data can be useful in making estimates (especially when considered from a long-term perspective). In this way the engineering economist can use average historical percentage

Increases (or decreases) commodity-specific and composite indexes, along with data

from market analyse and other sources, to estimate how economic quantities may behave in the future. One may wonder how both commodity-specific and composite price indexes may be used in engineering economic analyses. The answer to that question is reasonably straightforward. As we have established, price indexes can be useful in making estimates of future outcomes. The following principle applies to commodity-specific and composite price indexes and such estimates: When the estimated quantities are items that are tracked by commodity specific indexes, then those indexes should be used to calculate average historical percentage increases (or decreases). If no commodity-specific indexes are kept, one should use an appropriate composite index to make this calculation. For example, to estimate electric usage costs for a turret lathe over a 5-year period, one would first want to refer to a commodity-specific index that tracks this quantity. If such an index does not exist, one might use a specific index for a very closely related commodity—perhaps, in this case, an index of electric usage costs of screw lathes. In the absence of such substitute or related commodity indexes, one could use appropriate composite indexes: there may be a composite index that tracks electric usage costs for industrial metal-cutting machinery. Or, as before, a related index could be used. The key point is that one should try to identify and use a price index that most closely relates to the quantity being estimated in the analysis.

POPULAR PUBLICATIONS
POPULAR PUBLICATIONS

4. A uniform series of payment occurring at equal interval of time is called [WBUT 201
a) Annuity b) Amortization c) Depreciation d) Bond

Answer: (a)

Short Answer Questions

1. A company wants to set up a reserve which will help it to have an annual amount equivalent to Rs.v for every year for the next 20years towards its employees welfare measure. Find the single payment that has to be made [Given i = 15 %/01. [WBUT 2012] Answer:

The company sets up a reserve which will result in a annuity of Rs. 1,00,000 per year for 20 years. The single payment to be made at present should be equal to the present worth of Rs. 1,00,000 per annum for 20 years which can be calculated as follows: Amount of single payment

$$= \text{PVIFA}_{(150/0.20v)}$$

2. A person has invested Rs. 10,000 in a bank at an interest of 10% p.a. How much amount will receive after 2 years if the compounding is done: [WBUT 2013]

- a) Annually
b) Semi Annually
c) Quarterly
d) Monthly
e) Daily. Answer:

mn m

where, FV = Future value after n years n = number of years m —number of times compounding is done in a year.

Ix2

(a) $FV = PV \times (1 + r)^n$

(b) $FV = 10,000 \times (1 + 0.10)^2$

$$= \quad =$$

12,160 Rs.

ECO-24

0.10 4x2•

4

$$= 10,000(1.025)^8$$

$$FV = 10,000 \begin{array}{r} 0 \\ 10 \\ 12 \end{array} = 10,000(1.025)^8 \times 365$$

$$\begin{array}{r} 12,190 \\ \text{Rs.} \end{array}$$

$$.00833)24$$

3. A student took an education loan on years. calculate amount of money to be

a) Compound interest (compound annually)

b) Find out the effective interest rate. [WBUT 2014] Answer:

a) Compounded annually

FW after 5 years x FVPF

2013 of Rs. 7 Lakhs @ 9% p.a. for 5 repaid after 5 years under

$$\begin{array}{r} 8.1551 \text{akhs} \end{array}$$

Therefâre the student has to repay Rs. 8.1 55Aakhs after 5 years.

b) Effective interest rate = r% (let) p.a

Sr 0.539

.. Effective simple interest rate p.a. = 10.78% (Ans.)

4. An automobile company recently advertised its car for a down-payment of Rs.

Alternatively the car can be takén home by the customer without any immediate down-payment but he has to pay an equal yearly amount of Rs. 25,000 for years at an interest rate of 18% compounded annually. Suggest the better option to the customer. PN BUT 2014] Answer:

Antualized equivalent worth of down payment

$I' = 1,50,000 \times \text{capita recovery factor}$

$$\frac{1,50,000}{5.092} = 29, \quad \text{Rs.} > 25,000 \text{ Rs.}$$

Since the AE W of down payment is greater than equal yearly installment, therefore the better option for the customer is to purchase the car by paying an equal yearly amount of Rs. 25,000 for 15 years.

5. Define time value of money. Discuss its importance.

Answer:

It is known to all that Rs. 100 on hand now is more valuable than Rs. 100 receivable after one year. Diff&ently speaking, we will not part with Rs. 100 now in return for a firm assurance that the same sum will be repaid after a year. But we might part with Rsnow if we are assured that something more than Rs. 100 will be paid at the end of the first year. This extra compensation required for parting -with Rs. 100 now is called 'interest' or the time value of money.

Money has time value for the following reasons:

- (d) Money can be employed productively in order to generate real returns. e.g., if Rs. 100 is invested in material and labour produces finished goods worth Rs. 105 we can say that the investment of Rs. 100 has earned a return of Rs. 5 per cent.
- (e) During inflation, value of a rupee today is more (higher purchasing power) than a rupee in future.
- (t) As because future is uncertain, people like current consumption more than future consumption.

Companies need to take new projects for the purpose of expansion, diversification or modernization. A project involves investing a sum of money now, in anticipation of benefits spread over a period of time in the future. Whether a project is financially viable or not can be determined by adding the benefits occurring over the future period and by comparing the total value of the benefits with the initial investment. If the aggregate value of benefits exceeds the initial investment, the project is considered to be financially viable. Apparently this approach seems to be satisfactory, but we should be aware of the fact that behind this approach there is the assumption of considering value of money remains the same. In other words, we have assumed that: value of one rupee now = value ⁴ of one rupee at the end of year 1 = value of one rupee at the end of year 2 and so on. But this assumption is incorrect because money has time value.

6. If Rs 100 is invested at a compound interest @ 10% p.a. for 3 years, what will be the respective future value for consecutive 3 years? [WBUT 2017]

Answer:

we know, $FV = PV(1 + r)^n$

Here $n = 1, 2, 3$ years respectively

FI_n ; = Future value at end of nth year

$$\text{Future value after 1 year} = FV_1 = 100(1 + 0.10)^1 = 110 \text{ Rs}$$

$$\text{Future value after 2 years} = FV_2 = 100(1.10)^2 = 121 \text{ Rs}$$

$$\text{Future value after 3 years} = FV; \\ = 133 \text{ AO Rs}$$

EC 0-26

What is Capital Recovery Factor?

A(jswen)

paid in order to redeem a loan of a specified amount together with the interest at a given rate for that period, today is to be repaid in five equal instalments payable at the end such a way that the interest at 'for the' intervening period also repaid. The annuity amount in this case can be computed as follows:

Annuity Amount $PV + PVAF$ the table Showing factors for present value of a future annuity

Therefore, Annuity Amount = IQs. 100,000 / 3.791 26,378 the amount of Rs. 26,378 if paid at the end of each next 5 years then the initial loan of together with interest at 10% will be repaid.

$[Factor I + PVAF(r, n)]$ is known as the Capital Recovery Factor.

8, Ten years from now Mr. X will start receiving a pension of Rs.3,000 a year. The payment will continue for sixteen years. How much is the pension worth now, if his interest rate is 10%?

[MODEL QUESTION]

Answer:

In this case, Mr. X shall receive first payment after 10 years from now and thereafter he will receive 15 more payments. This annuity of Rs.3,000 (total 16 payments) can be discounted by $PVAF(16, 10\%)$ to find out the present value of the annuity. But this present value will be located in the beginning of year 10 from now or at the end of year 9 from now. This value can be further discounted by to find out the present value as follows:

$$\begin{aligned} \text{Rs.3,000} \times PVF(10\%, 16) &= 3,000 \\ \times 7.824 \times 0.424 &= \text{Rs.9,952.} \end{aligned}$$

[MODEL QUESTION]

9, Explain the motives of holding cash.

Answer:

According to Keynes, cash is held for the following three motives by a business concern-

Transaction motive: The collection of cash by firms from sale of goods, sale of assets and additional financing is not perfectly synchronized with the disbursement of cash for purchase of goods, purchase of capital assets and meeting other obligations so that some cash balance is required as a buffer.

Precautionary motive: To protect itself against uncertainties involved with the magnitude and timing of the cash inflows from sale of goods, assets etc. and Uncertainty about cash outflows on account of purchase and other obligations.

speculative motive: Out of a launch A cash-rich profit making opportunities better prepared arising to exploit from fluctuations, such as bargains of

prices! security prices, interest rates and foreign exchange rates.

[MODEL QUESTIONI¹

0. Find out present values of the following:

- a) Rs.1,500 receivables in 7 years at a discount rate of 15%;
- b) an annuity of Rs.760 starting after 1 year for 6 years at an interest rate of

Of

- c) (c) an annuity of Rs.5,500 starting in 7 years time lasting for 7 years at a discount rate of 10%; Answer:

(a) PV of Rs. receivable in 7 years @ 15% is:

$$= \text{Rs.} 1,500 \times \text{PVF}(10\%)^7 = \text{Rs.} 1,500 \times 0.376 = \text{Rs.} 564 .$$

(b) PV of Rs.760 starting after 1 year for 6 years @ 12%

$$\text{PV} = \text{Rs.} 760 \times \text{PVAF}(12\%, 6) = \text{Rs.} 760 \times 4.111$$

(c) PV of Annuity of Rs.5,500 starting in 7 years time for 7 years @ 10% = $5,500 \times \text{PVAF}(10\%, 7)$ x PVFI(P

$$= 8y) = \text{Rs.} 15,100 .$$

Long questions
Answer
Type

1. Write short notes on the following:

a) Debt repayment [WBUT

2012,

2017]

b) Effective interest rate and nominal interest rate [WBUT
2013]

Answer:

a) Debt repayment:

Debt repayment can be also called loan amortization. Although the manner in which the debt is repaid, i.e., repayment schedule depends on the terms of agreement between lender and debtor but generally there are two common methods of loan repayment periodic payment which normally includes interest in a lump sum. Most loans are repaid in equal periodic installments which can be normally quarterly or annually covering interest as well as principal known as amortized. The amount of each installment of repayment of amortized loan can be calculated as

Loan amount

PVIFA (no. of years of maturity, interest rate)

b) Effective interest rate and nominal interest rate:

The Nominal Interest Rate (also known as an Annualised Percentage Rate or APR) nominal interest rate is this: it's the interest rate before inflation gets added into the mix. It's also the one you're most likely to be exposed to as it's the interest rate lenders commonly quote in loan and deposit agreements. Nominal interest is directly affected by the rate of inflation and can make a big dent in an investor's purchasing power.

Effective Interest Rates correct for this by "converting" nominal rates into annual compound interest.

Confusingly, in the context of inflation, 'nominal' has a different meaning. A can mean a rate before adjusting for inflation, and a real rate is a constant-prices rate

ECO-28

ECNQUEIIGEQBENGINEERS

to avoid confusion about the term 'nominal'. Which has these different meanings: finance textbooks use the term 'Annualised Percentage Rate' or APR rather than 'nominal rates' when they are discussing the difference between effective rates and APR%.

The effective interest rate is always calculated as if compounded annually. The effective rate is calculated in the following way, where r is the effective rate, i is the nominal rate and n the number of compounding periods per year.

ECO-29

6. IRR stands for the rate of return for which [WBUT
a) $NPV \pm 0$ b) $NPV = 0$ Answer: (a). 2018) c) $NPV = -I$ d) NPV is maximum
7. At Break-even point [WBUT 20181
a) Total revenue = -Total Cost
c) Total revenue = Total Variable Cost b) Total revenue = Total Fixed Cost
d) All of these
Answer: (a)

Short Answer Type Questions

- . Discuss in detail the concept of Sensitivity Analysis. [WBUT 2012] OR,
What is sensitivity Analysis? Discuss the merits and demerits of sensitivity analysis. [WBUT 2014] OR,
State the concept of Sensitivity Analysis. [WBUT 2017] Answer:
Sensitivity analysis: Refer to Chapter at a Glance.

Advantages:

1. It is a very popular method of assessing risk because it shows how robust or vulnerable a project is to changes in values of underlying variables.
2. It indicates whether further work is necessary because if NPV is highly sensitive to changes in some factor, it may be worthwhile to explore how the variability of the critical factor may be reduced.
3. It is intuitively very appealing because it articulates the concerns the project evaluators normally have.

Disadvantages:

1. It does not provide any idea of the probability of the change in the variable — only shows what happens to NPV if there is a change in that variable.
2. In the real world many variables change together whereas in sensitivity analysis ^{only} one variable is changed at a time.
3. The results of sensitivity analysis may be interpreted by different decision-makers differently — one may accept the project — another may reject.

2. Assuming that the cost structure and selling price remain same in 2014 and 2015, find out
- i) PIV ratio; ii) Break Even point of sales; iii) Profit when sales are of Rs.
 - iv) Sales required to earn a profit of Rs. 60,000 and
 - v) Margin of safety in 2015 20151

ECO-32

	4	Sales Rs.	ECONOMI SF R, od
<u>Peri</u>	<u>5</u>		<u>Profit Rss</u>
	<u>201</u>	420,000	27,000
	<u>201</u>	<u>change in profit</u>	<u>39,000</u>

L ratio 12,000 1 i) change in sales = $0.20 = 20\%$ (Ans.)
 60,000 5

ii) Break-even-point sales p/v ratio

Fixed cost = Total cost in 2015 variable cost in 2015

$$\begin{aligned}
 -J &= (\text{Sales in 2015} - \text{profit in 2015}) - \text{variable cost in 2015} \\
 &= (4,20,000 - 39,000) - \\
 &= 3,81,000 \text{ Rs.} \\
 &\quad \quad \quad = 45,000 \text{ Rs.} \\
 &\quad \quad \quad 45,000
 \end{aligned}$$

- Break-even point sales==

0.20
Fixed cost + Profit

. Now, sales —

P/v ratio

45,000 + Profit

3, 00,000 =

0.20 iii) — Profit = (3,00,
5,000 = 60,000 45,000 =
))

F

$$\frac{P/V \text{ ratio}}{\underline{45,000 + 60,000}} = 5, 25,000 \text{ Rs. (Ans.)}$$

v) Margin of safety in 2015

= Actual sales in 2015 — Breakeven-sales = $— 2,25,000$ L R.s.

sow,

Define IRR (Internal Rate of Return).
variable cost to sales ratio

[WBUT
20151

Answer:

S
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Internal rate of return is a percentage discount rate used in capital investment appraisals which makes the present value of the cost of the projects equal to the future cash flows of the Project. It is the rate Of return which equates the present value of anticipated net cash flows with the initial outlay. The IRR is also defined as the rate at which the net present value is zero. The test Of profitability of a project is the relationship between the internal

ECO-33

ROPULAR PUBLICATIONS

rate of return (%) of the project and the minimum acceptable rate of return. The IRR be determined by solving the following equation for r which is discount rate.

C.

a) What is the significance of Profit-Volume ratio? [WBUT 2015]

b) Calculate price of a product from the following information:

Profit Volume ratio is 30%

Variable cost of the product is Rs.

140/Answer:

a) Profit-volume ratio: It represents the ratio of contribution to sales and called as p/v: ratio. It has a property fundamental that p/c ratio remains constant at various levels activity provided there is no change in either selling price (per unit) or variable cost (per; unit). p/v ratio can be increased by reducing variable cost, or by increasing selling price or by increasing overall p/v ratio of the sales mix.

Under normal or ordinary circumstances, difTerent products are to be ranked in, descending order of p/v ratios in determination of optimum-product-mix to generate maximum profit when there is no particular constraint on production or sale. Therefore, under normal or ordinary circumstances, Profit-Volume ratio is the tneasure of efficiency of a product.

b) Given. p/v ratio = 30% = 0.30

Variable cost 140 IQs.

mow, variable cost to Sale Price Ratio = 1 - p/v ratio= 1 -0.30 = 0.70

$$\text{Sale Price} = \text{Variable cost}^x = 140 \\ 0.70 \qquad \qquad \bullet 00 \text{ Rs. (Ans.)}$$

5. Explain the concept of 'Break-even' analysis. [WBUT 2015] Answer:

Break-even-analysis involves the method of presenting to management the effect changes in volumes on profits by indicating at what level the total cost and tot ^{al} vyill

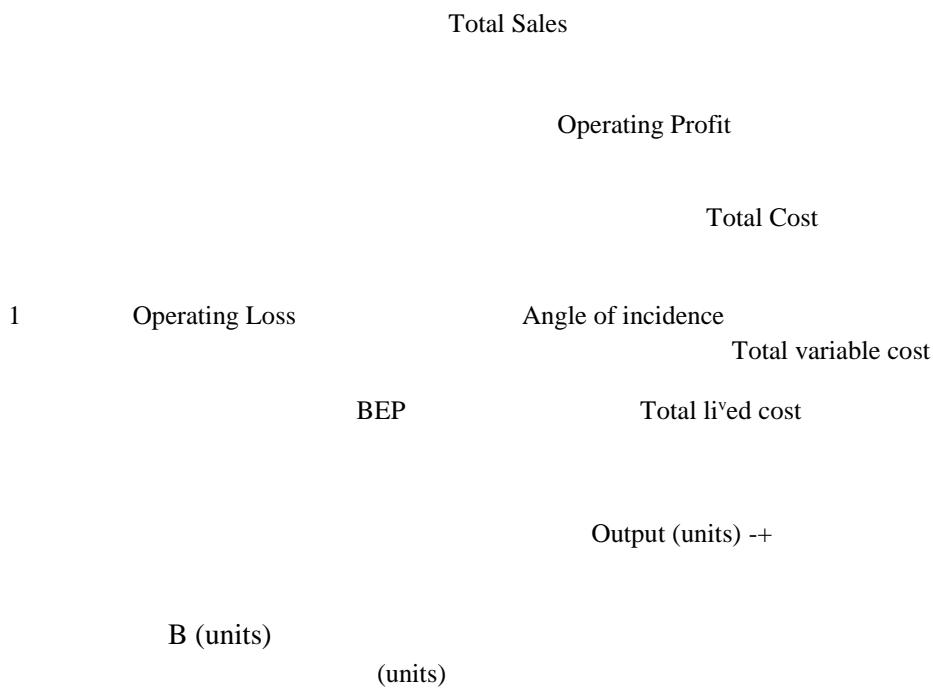
be in equilibrium, i.e., by indicating the Break-even Point. It is one form application of Cost-Volume-Profit Analysis which, is an useful tool in ^{the hands} management by applying which the management ascertains the impact on profit one or more of the various factors which affect profit such as selling price (per volume of sales, Total Fixed Cost, Variable Cost (per unit). combinations in various product lines are sold etc. changes. Break-even analysis is a technique -a preview of profit prospects and a tool of profit-planning by integrating revenue estimates to ascertain the profits and losses associated with different output.

ECO-34

Break-even point. Represent the elements diagrammatically and derive

6, DefineBEP and BEP sales algebraically. 2016) Analysis: Refer to Question No. 5
ofShort Answer Type Questions.

Break-even-Point where Total is that Revenue volume and of Total production Cost lines and intersect.sales where there is no profit or no



Contribution

Since, p/v ratio =

Sales

Contribution p/v ratio P/ v

ratio at BEP, since profit = nil, so that

Fixed Cost

Bread-even sales (Rs.) p/ v ratio

$$\begin{array}{rcl}
 \text{B E Sales (Rs.)} & \text{Fixed Cost} & 1 \\
 \text{Break-even sales (in units)} & \text{Sale Price Unit} & \text{S.P.(Pu)} \\
 & & \text{--- ratio} \\
 & \text{Fixed Cost} & \text{Fixed cost x S.P.(Pu) x Units} \\
 = \text{Contribution} & \text{S.P(Pu)} & \text{Contribution x S. P.(Pu)} \\
 \\
 & \text{Sales} & \\
 & & \text{Fixed Cost} \\
 & \text{Fixed Cost} & \\
 & \text{Contribution Contribution per unit} & \\
 & \text{Units} &
 \end{array}$$

ECO-35

POPULAR PUBLICATIONS

Answer e uestions

Lon

and 1. a) IRR? What is NPV? What are its limitations? What are the differences between Npv

b) What are the two ways of defining benefit-cost ratio?

c) The expected cash flows of a project Year are Cash as flow follows:

0	-100,000
.1	20,000
2	30,000
3	40,000
4	50,000
5	30,000

The cost of capital is 12%. Calculate the following:

- i) Net present value
- ii) benefit-cost ratio
- iii) Internal rate of return.

CWBUT 20121

Answer:

a) r^t Part:

Net Present Value (NPV) Method

In this method all cash flows attributable to a capital investment projects are discounted by a chosen percentage e.g. the firms weighted average cost of capital to obtain the present value of the future cash flows. If the present value of the future cash flows is higher than the present value of the investments the proposal is accepted else rejected. In order to arrive at the net present value the present value of the future cash flows is deducted from the initial investment.

$$c, NPV =$$

where C_0 = initial investment (cash out flows)

C_t = cash inflows occurring at time t

K = Discount rate.

2nd Part:

Limitations of NPV Method

It is difficult to calculate as well as to understand.

Calculating the discount rate is complicated.

This method is an absolute „measure. When two projects are considered this method will favour the project with the higher NPV.

e If two projects with different life spans are evaluated using this method • this method may not yield satisfactory result.

ECONOMICS FOR ENGINEERS

difference between NPV and IRR value: part:

the net present value method the cash flows are discounted rates which is usually taken to be the firm's cost of capital. Under the IRR method no such discount rate is given and it is to be selected such that the capital outlay exactly equals the PV of net cash flows.'

, NPV tries to maximize the benefit from the project in terms of PV which is in line the corporate objective, i.e. maximization of value of firm whereas IRR denotes the interest rate at which the investment in the original cost of the asset is recovered during the life span of the asset.

NPV is based on more logical assumption to reinvestment than of IRR whose principal shortcoming is the assumption that the firm has opportunity to reinvest a project's released funds at IRR, whereas NPV assumes that the opportunity to

b) A benefit-cost ratio (BCR) is an indicator used in the formal discipline of costbenefit analysis, which attempts to summarize the overall value for money of a project or proposal. • A BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values.

Benefit cost ratio (BCR) takes into account the amount of monetary gain realized by performing a project versus the amount it costs to execute the project. The higher the BCR the better would be the investment General rule of thumb is that if the benefit is higher than the cost the project is a good investment. The two ways of defining benefit-cost-ratio are:

1) NPV which determines the net benefit i.e., Benefit minus cost of project in absolute term because

Net Present Value = Present value of cash inflows — Present value of cash outflows

2) Profitability index which determines the net benefit from the project in relative terms, 'in terms of a ratio, i.e., PI measures the benefit per rupees of investment in the project Present value of cash inflows and given by PI =

Present value of cash outflows

(1) Year	(2) Cash Flow	(3) fi12 % PVIF	PV of cash flow
		1.000	
00	20,000	0.893	17,860
	30,000	0.797	23,910
02	40,000	0.636	31,480
03	50,000	0.567	31,850
04	30,000		17,010
05		(i) Net Present Value =	

ECO-37

PV of cash inflows 19,060 -l- 20 (approx.)

(ii) Beneficvsi ratio PV outflows '1*00.000

(iii) of NPV

(50,000 x 0392) 0.519) 0(1000

1 23.0704 279000 29.600 + 15.570 00, 000

of NPV tilt

$$(20,000 \text{ OR} 62) (30,000 \times 0.743) \pm (40,0641)$$
$$(50,000 \times 0.52) + (30,000 \times 0.476) = 0,000 i$$
$$7.240 + 22,290 + 25,640 = 27,600 + 14,280 - 1,00,000$$
$$1,00,000 =$$

Calculation of NPV rti, 20vo

$$(20,000 \text{ OR} 33) (30,000 \times 0.694) (40,000 Y,$$
$$(50,000; 0.482) 4 (30,000) I. 000$$
$$20,8204 23,160 .+ ! 2,060$$

IDiscount r afg

$$\begin{array}{c} \text{IRR} \\ 200 \end{array}$$

Therefore, applying interpolation, we get. IRR

$$\begin{array}{c} 16 \quad 0.7. \\ 204) \end{array}$$

$$\begin{array}{c} \text{IRR } 16 \\ 4 \\ 16 \ 2 \\ \text{IRR} \end{array}$$

2 a) What do you mean by NPV? Why do you consider this to be so

Answer: [WBUT 21] 1 41

Part: Refer to Question Spot I(P^t Part) of Long Answer Type Questions.

ECO-38

ECONOMICS FOR ENGINEERS

present value of the future cash flows is higher than the present value of investment i.e., NPV is positive, then the Proposal is accepted else rejected. In arrive at the net present value the Present value of the future cash deducted from investment. Therefore NPV is a critical decision-making

b) In a project being considered, the initial outlay is Rs. 30,000; useful life of the project is 10 Years; net cash inflow per annum is Rs. 200,000. The rate of interest is 200%. The salvage value of the plant at the end of 10 years is Rs. Is the

Answer:

[WBUT 20141

1, PV of initial outlay 30,000

2. PV of Net cash inflow PVIFA

(20%, 10 1)

$$= 8,00,000 \times 4.193 = 33,54,400 \text{ Rs.}$$

PV of salvage value =

$$= 0.162 = \text{Rs.}$$

Therefore NPV = (2) + (3)

$$= 33,54,400 + 1, \text{Rs.}$$

Since NPV is highly positive. therefore the project is very much possible and profitable commercially.

. Explain the importance of Ratio Analysis and Capital budgeting methods in an organization? [ONBUT 2017] Answer: part:

A ratio is an arithmetical relationship between two figures. Financial ratio analysis is a study of ratios between various items or groups of items — (1) in Liquidity financial statements. ratios, (2) Financial Leverage ratios can be classified into five broad categories ratios, (3) Turnover ratios, (4) Profitability ratios, and (5) Valuation ratios.

Liquidity ratios measure the capacity of a firm to meet its short term obligations. Leverage ratios signify the ability of the concern to meet long-term obligations. Turnover ratios measure how efficiently assets are employed by a firm. Profitability ratios signify the profit-earning capacity of business whereas valuation ratios indicate how the equity stock of the company is assessed in the capital market. Some important ratios are:

current assets should be ideally higher than which indicates a)

Current ratio =

current liabilities existence of idle funds and lesser than which indicates danger of incurring of normal day-to-day operations.

ECO-39

POPULAR PUBLICATIONS

Cost of goods sold, high ratio indicates expansion of business

b) Inventory Average turnover = inventory

with dangers of overtrading and stock-out whereas low ratio indicates accumulation of slow-moving, non-moving or obsolete stock resulting from inefficient inventory management.

Profit before interest and tax

c) 1st Part: Return on capital employed Capital employed

It signified overall efficiency of concern,

2nd part:

Importance of capital budgeting

Capital expenditure involves long term commitment of resources to realize future profits.

Therefore capital expenditure reflects basic company objectives and has a long-term and significant effect on the well being of the firm. Effective planning and controlling of such expenditure are particularly important for following reasons:

1. Time Period: Capital budgeting decisions has got long term implication because its effect extends into many years in future which may involve unforeseen situations.
2. Risk: Capital budgeting decisions change the risk complexion of the firm because the average benefits of the firm increases as a result of investment which causes frequent fluctuations in earnings making more risky situation.
3. Amount: Capital investment decision involves large amount of funds blocked through life time of project. In most cases supply of capital is not abundant because firm has scarce capital resources -- therefore, capital investment decisions must reduce the risk from point of supply of capital as far as possible ensuring the following:
 - a) Regular return: From the project equal to/higher than its cost,
 - b) Recovery of capital: Invested during life span of project.
 - c) Best possible results: Of such investment
4. Reversibility: Once a capital budgeting decision taken, they are not easily reversible within short term period because there may neither be any market such second hand capital goods nor there be any possibility of conversion of such capital assets into other usable assets the remedy being disposal of the same sustaining heavy capital losses.
5. Decision: Penalties for any wrong capital budgeting decision is very severe.
there may be heavy loss due to obsolescence of fixed assets due to technology changes.
6. Others: Capital budgeting decisions provide the structure that supports the operating activities of the firm and also has effect upon Break-even point, Total supply', Total

ECO-40

The following details are on the cash flows of two projects A and B:

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Year Project A cash flows Project B cash flows

1	4,009000	
2		
3		
4		
5	compute PEP, NPV and PI for A and B	and suggest which

should be

Answer:

Calculation of a back period

[WBUT 2017)

Yr.

	Project A		
	Cash flows (IRS.)	Cumulative Cash flows	Cumulative Cash flows
01	2,00,000	2400.000	
02		1,75,000 3,75,000	1,00,000
		<u>—2400.000</u>	
03		<u>7,00,000</u> 300,000	

4,

PPB of Project A $\frac{2,00,000 - 3,75,000}{-2} = -2.077$ years (Ans.)
3,25,000

5,00,000 - 3,00,000

PPB of Project B $\frac{3,00,000 - 3,00,000}{-2} = 2.667$ years (Ans.)

y. Write short notes on the following:

a) Profitability Index Method (PI) / Benefit cost ratio

[WBUT 2014, 2018]

b) Relevance of Capital budgeting

[WBUT

2015]

c) Sensitivity analysis

[WBUT

2015]

d) NPV vs. IRR.

[WBUT 2016, 2018]

e) Average Rate of Return (ARR)

[WBUT 2017]

f) Importance of Break Even analysis

[WBUT 2018]

Answer:

a) Profitability Index Method (PI): Refer to Chapter at a Glance.

b) Relevance of Capital budgeting:

Capital budgeting is the process of identifying and selecting investments in the long lived assets or the assets which are expected to produce benefits over a period of time than a year. Business is all about exploring avenues for growth and innovation, which requires evaluation of possible investment opportunities. Capital expenditure involves long term commitment of resources to realize future profits. Therefore capital expenditure reflects basic company objectives and has a long-term and significant effect.

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objectives and has a long-term and significant effect

ECO-

41

on the well-being of the firm. Effective planning and controlling of such expenditure are particularly important for the following reasons:

1. Time Period: Capital budgeting decisions have got long term implication because its effect extends into many years in future which may involve unforeseen situations.

2. Risk: Capital budgeting decisions change the risk complexion of the firm because the average benefits of the increases as a result of investment which causes frequent fluctuations in earnings making more risky situation.

3. Amount: Capital investment decision involves large amount of funds blocked through life time of project. In cases supply of capital is not abundant because firm has scarce capital resources therefore, capital investment decisions must reduce the risk of firm. point of supply of capital as far as possible ensuring the following:

a) Regular return: From the project equal to/higher than its cost.

b) Recovery of capital: Invested during life span of project.

c) Best possible results: Of such investment

4. Reversibility: Once a capital budgeting decision taken, they are not easily reversible (within short term) period because there may neither be any market for such second hand capital goods nor there be any possibility of conversion of such capital assets into other usable assets the remedy being disposal of the same sustaining heavy capital losses.

c) Sensitivity analysis: Refer to Question No. I of Short Answer Type Questions.

d) NPV vs. IRR:

Refer to Question No. I(a) (3"/ Part) of Long Answer Type Questions.

e) Average Rate of Return (ARR):

Average rate of return _____ %

Average annual profit after taxes x 100 / Average investment during the life of project Alternatively,

Average annual cash flows after taxes

x 100

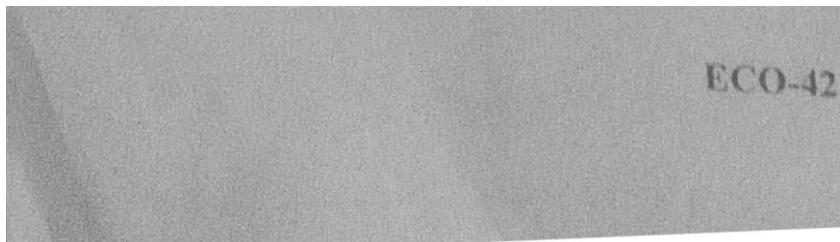
Average interest

The concept of average investment is used because it is very sound and conceptually more logical. Average investment may be

(a) Original cost of the project i.e. original investment

(b) Average invest Inent Net working capital Savage value +

Average invest ntent I I al the depreciable part 1/2 (Original value - S\value) whole of non-depreciable
pan of cost of inestnWl'it



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in ease book-value Of asset to zero at end •fits depreciable depreciable COSt is divided by two. as •the end of the life of project and therefore an amount in the project throughout •its life end of project life then also consider such net Working

of ARR Method

to understand and use.

It does not involve complicated

of Break Even analysis:

analysis are listed as follows:

the Number of Units to be Sold: The calculation of break-even analysis is to determine the number of units to be sold in order to break-even i.e. no gross loss. The selling price of each product, the cost of each product, costs are required to determine the break-even analysis.

Budgeting and Setting Targets: Since you know at which point you can break even can set budgets. Also, break-even analysis can be used in setting targets for the business. This is possible because know at which point a firm achieves profits and hence, you can use this break-even point to set or targets for your firm. If you are not well-versed in analyzing your firm, hire a financial controller who will help you make a budget and set realistic

äennine the *Margin of Safety The margin of safety can be calculated by subtracting ievel of sales less the break-even point and then dividing it by the selling price In the event of a recession or an economic downturn, sales tend to decline. So,

to ensure make profits. By knowing the margin of safety of a particular product or service, managers can make better business decisions.

Control and Monitoring: Since managers know the fixed and the variable costs of profitability of the business, they can determine the effect to the extent the changes of changes to costs

sis. It helps them to affect

the and the break-even point.

OPULAR IICATIONS

6. Beta Limited is considering the acquisition of a personal computer costing Rs 50,000. The effective life of the computer is expected to be five years. The company plans to acquire the same either by borrowing Rs. 50,000 from its bankers at 15% interest per annum or by lease. The company wishes to know the lease rentals to be paid annually which will match the loan option. The following further information is provided to you:

- c) The principal amount of the loan will be paid in five annual equal installments.
- b) Interest, lease rentals, principal repayment are to be paid on the last day of each year.
- c) The full cost of the computer will be written off over the effective life of the computer on a straight-line basis and the same will be allowed for tax purposes.

The company's effective tax rate is 40% and the after tax cost of capital is 9%. The computer will be sold for Rs. 1,700 at the end of the 5th year. The commission on such sales is 9% on the sale value and the same will be paid.

You are required:

To compute the annual lease rentals payable by Beta Limited which will result in indifference to the loan option.

The relevant discount factors are as follows:

[MODEL QUESTION]

Year	1	2	3	4	5
------	---	---	---	---	---

ii) Interest on loan

Year	1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.	Rs.
Principal amount outstanding at the start of the year.(a)	50,000	40,000	30,000	20,000	10,000
Interest at 15% (b) $\times 0.15$	7,500	6,000	4,500	3,000	1,500

iii) Annual depreciation on straight line basis $\frac{Rs.50,000}{5} = Rs.10,000$

iv) Cash inflow at the end of year 5

	Rs.
Salvage value	1,700
Less: Commission at 9%	153
	1,547
Less : Tax at 40%	619
Net inflow	928

ECO-44**Discount Factor 0.92 0.84 0.77 0.71 0.65 Answer:**

Working Notes:

Rs.50,000

i) Yearly loan installment= 10,000

line basis = 10,000

5

5

Salvage value.

Less: Commission at 9% 153

I ,547

Less : Tax at 40% 619

Net inflow 928

ECO-44

	Rs. 10,000	Rs. 10,000	Rs. 10,000	3	4	5	Total
Principal	10,000	0,00010,000	0,00010,000				50,000
(repayment)							
Interest (form (ii))	7,500	6,000	4,500	3,000	1,500		
Total A	17,500		16,000				22,500
Less: Tax savings at Interest (form (ii))	400/0		14,500	13,000	1,500		72,500
Total (A)	7,500	6,000	4,500				
Less: Tax savings at 40%	17,500	16,000	14,500				
On depreciation	4,000	4,000	4,000				
On interest	3,000	2,400	1,800				
(B)	7,000	6,400	5,800				
Less : Cash inflow at the end of 5th year			4,000				20,000
			600				9,000
			6,400				29,000
Less : Cash inflow at the end of 5th year(C)			5,800	5,200	4,600		928
Net cash outflow							
(A-B-C)	10,500	9,00	8,700	7,800	5,972		42,572
P.V. Discount factor @ 9%	0.92	0.84	0.77	0.71	0.65		
	9,660	8,064	6,699	5,538	3,882		33,843

v) Computation of net cash outflow under loan option

Year

B

1

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S FOR ENGINEERS

	Total Rs.
0	50,000
0	22,500
0	72,500
0	20,000
0	9,000
0	29,000

PV of desired total cash outflows	Rs.33,843
PVAF @ 9% for five years	3.89

$$\text{Required annual after tax cash outflow} = \frac{\text{Rs.}33,843}{3.89} = \text{Rs.}8,700$$

Annual lease rental is given by:

$$\frac{\text{Annual after tax outflow}}{1 - \text{rate}} = \frac{\text{Rs.} 8,700}{1 - 0.4} = \text{Rs } 14,500$$

Therefore, the annual lease rentals should be Rs. 14,500 to be indifferent for the loan option.

7. Best Flight, Inc. is considering three mutually exclusive alternatives for implementing an automated passenger check-in counter at its hub air port. Each alternative meets the same service requirements, but differences in capital investment amounts and benefits (cost savings) exist among them. The study period is 10 years and the useful lives of all three alternatives are also 10 years. Market values of all alternatives are assumed to be zero at the end of their useful lives. If the airline's MARR is 10% per year, which alternative should be selected in views of the cash-flow diagrams.

Answer.

Solution by the PW Method

$$PW(10\%) = \$200,000 + \$60,000(P/A, 10\%, 10) = \$33,977$$

$$PW(10\%) = \$390,000 + \$69,000(P/A, 10\%, 10) = \$106,148$$

$$PW(10\%) = -\$660,000 + \$133,500(P/A, 10\%, 10) = \$160,304.$$

Computation of the annual lease rentals to be indentified to loan option

PV of desired total cash outflows Rs.33,843

PVAF @ 9% tbr five years

Required annual after tax cash outflow — Rs.33,843 =

3.89

Annual -lease rental is given by:

Annual after tax outflow Rs.8,700

rate

1 - 0.4

Therefore, the annual lease rentals should Rs. 14,500 to

7. Best Flight, Inc. is considering three mutually implementing an automated passenger check-in Based on the PW Method, alternative C would be selected because it has the value (\$ 160.304). , The order of preference is C, B and A respectively, where mean; preferred to

Solution by the AW Method

$$\begin{aligned} \text{AW}(10\%) &= -\$390,000 (\text{A}/\text{P}, 10\%, 10) + \$69,000 = \$5,547 (10\%) \\ &= -\$920,000 (\text{A}/\text{P}, 10\%, .10) + \$167,000 = \\ &= -\$660,000 (\text{A}/\text{P}, 10\%, 10) + \$133,500 = \$26,118 \end{aligned}$$

Alternative C is again chosen because it has the largest AW value (\$26,118),

Solution by the FW Method

$$\begin{aligned} \text{FW}(10\%) &= -\$390,000 (\text{F}/\text{P}, 10\%, 10) + \$69,000 (\text{P}/\text{A}, 10\%, 10) \\ \text{FW}(10\%) &= 10\%, 10) + 10\%, 10) = \$415,801. \end{aligned}$$

Based on the FW method, the choice is again alternative C because it has the largest FW value (\$415,801). For all three methods (PW, AW and FW) in this example, that because of the equivalency relationship among the methods. Also, notice Rule a (Section 6.2.2) applies in this example, since the economic benefits (most significant) vary among the alternatives.

INFLATION AND PRICE CHANGE

Chapter at a Glance

Inflation may be defined as a general rise in the prices in a persistent

It causes a

. the purchasing power of a currency. It happens when many prices increase simultaneously. In inflation causes money to lose purchasing power. What a rupee hundred can buy today be less in coming in coming days. Thus the rupee hundred loses the purchasing due to the price, rise, that is inflation. In engineering economic analysis it requires cost benefit analysis of any investment that requires comparison be made on an equivalent basis. On the contrary, when the purchasing power increase the situation is deflation. But this situation does not exist.

control of inflation: There is no single remedy to combat the inflation rather monetary and non-monetary fronts rare to be considered to have control on it. (The aim is to reduce monetary expenditure) Anti-inflationary measures can be classified as

a. Monetary measures: The best remedy for fighting inflation is to reduce the aggregate spending.

Non-monetary policy can help in reducing the pressure on demand by increasing cost of borrowing from banks thus reducing the demands for funds.

Fiscal measures: It includes spending both in private and government level. Government reduces expenditures and private expenditure is reduced increasing tax

c. Physical and non-monetary measures: Measures like increasing output, imports, decrease exports so as to increase the available supply of goods in short supply, so as to bring the demand and supply at parity and thus the prices tend to be controlled.

Price changes with indexes: The term "inflation" refers to a rise in a broad price index representing the overall price level for goods and services in the economy. Inflation is measured by price index numbers. As we know, a price index measures the general level of prices in reference to some base period, The Consumer Price Index (CPI), the Personal Consumption Expenditure Price Index (PCEPI) and the GDP deflator are examples of broad price indices. "inflation" may also be used to describe a rising price level within a narrower set of assets, goods or services within the economy, such as commodities (including food, fuel, metals), tangible assets (such as real estate), financial assets (such as stocks, bonds), services (such as entertainment and health care), or labour. The Reuters-CRB index (CCI), the Producer Price Index, and Employment Cost Index (ECI) are examples of narrow price indices used to measure price inflation in particular sectors of the economy e

PUBUT 2012,

Multiple Choice Type Questions

particular sectors of questions

2017) inflation

makes

- a) Future rupees less valuable than present rupees
- b) Future rupees more valuable than present rupees
- c) Future rupees equal to present rupees
- d) None of these

Give the causes of inflation and its controlling measures.

(WBUT 20141

The main causes of inflation are as follows:

Inflation occurs when the aggregate demand for products exceeds the aggregate supply of products. Prices usually increase when aggregate demand is higher than aggregate supply. Put in other words, factors such as increase in money supply, the government budget deficit, increase in export earnings, etc. create new demands and if supply does not match this increased demand, demand-pull inflation arises. In this type of inflation, the unemployment level is at a minimal level. Inflation is called Demand-pull inflation.

Inflation may also occur due to increase in the cost of factors of production. The increase in the cost of factors of production results in a decrease in the supply of products by producers in the economy, or it makes producers push up the prices of their products to cover their higher costs of production. In cost-push inflation, the unemployment level may be high if high costs reduce production and thus employment of factors of production including labor. Such inflation is called Cost push inflation.

nd

Measures to Control Inflation: The measures to control inflation can be classified into monetary, fiscal and other measures.

Monetary measures: Monetary policy is framed by the central bank of a country. The central bank is required to regulate the money supply in the economy in order to control the rate of inflation. Quantitative and qualitative measures are used to control the money supply. Quantitative credit control measures are in the form of bank rate policy, open market operations and variable reserve ratio, which influences the cost and availability* of credit in an economy. The cash reserve ratio is the most significant monetary control measure and a high cash reserve ratio requirement reduces the capacity of the banks to lend. Qualitative or the selective control measures include the regulation of consumer credit, directives, moral persuasion, publicity, etc, to control monetary expansion in the

Fiscal measures: Some of the fiscal measures to control inflation are public expenditure taxation and public borrowing.

POPULAR PUBLICATIONS

Public expenditure: A decrease in the public expenditure by the government can control the inflation rate. The public expenditure should not be reduced in productive areas, but should be cut in the non-productive areas.

Taxation: The amount of disposable income depends on the taxation policy of the government. The imposition of direct or indirect taxes reduces the purchasing power of the people. Anti-inflationary taxation should reduce that part of the disposable income which would otherwise have been spent on consumption.

Public borrowing: During inflationary periods, government can start special saving programs to take away the extra purchasing power which would otherwise increase pressure on demand. Similarly, government can offer bonds to public at attractive interest coupon rates

Other measures

Price control and rationing: Price control is a situation where the government fixes an upper limit on the prices of goods and services. Rationing helps in distribution of essential goods evenly among the people.

Wage policy: The government can undertake certain steps like restriction of additional increments etc) undetQlke benefits to employees. their salaries. eve,

2v Discuss the causes of inflation.

[WBUT 20161

Ans» er:

Res,Qr to Question ;Vo. 1(1⁰ Part o./Short dinsvcer Questions.

a) Discuss about Long Answer Questions creeping inflation, walking inflation, galloping inflation and running inflation,

b) Distinguish between (i) open and repressed inflation (ii) comprehensive and sporadic inflation.

c) Define inflationary gap.

[WBUT 2014]

a) Creeping Inflation: When prices are gently rising, it is as Creeping Inflation. It is the mildest of inflation and also known as a Mild Inflation or Low Inflation. According to Rep. Kent, when prices rise by not more than (i.e. Up to) 3% per annum (year), it is called Creeping Inflation.

Inflation: When the rate of rising prices is higher than the Creeping it is known as Walking Inflation. Erratic Inflation is its another name. When prices rise by more than but less than per annum (i.e., between 3% and 10% per annum), it is called Walking Inflation. According to some economists, we must take walking inflation seriously as it gives a cautionary signal for the occurrence of Running inflation. Furthermore, if not checked in due time, it can eventually result in Galloping Inflation.

Galloping Inflation: According to Prof. Saini, if prices rise by dual or triple digit inflation rates like 30% or over 999% yearly, then it is termed as (Galloping Inflation).
rise by more than 20%, but less than 1000%
situation can
When prices
per annum

between 20% to 1000% per annum), Galloping Inflation occurs in Jumping FOR ENGINEERS

another name. India has been witnessing it from second five-year plan period. Jumping Inflation: A rapid acceleration in the rate of inflation.

This is called Running

not suggesting a fixed range for measuring running inflation, we may consider a price inflation.

of per annum (double-digit inflation rate) as a Running

b) (i) Open Inflation: When government does not attempt to restrict inflation, it is known as an Open Inflation. In a free-market economy, where prices are allowed to take

Repressed Inflation: When government prevents the price rise through price controls, rationings, etc., it is known as Suppressed Inflation. Repressed Inflation is its another name. However, when government removes its controls, it becomes Open Inflation. It then leads to corruption, black marketing, artificial scarcity,

(ii) Comprehensive Inflation: When the prices of all commodities rise in the entire economy, it is known as Comprehensive Inflation. Economy-Wide Inflation is its another name.

Sporadic Inflation: Tilne when prices of only a few commodities in some regions (areas) rise, it is called Sporadic Inflation. It is sectional in nature. For example, increase in food prices due to bad monsoon (winds that bring seasonal rains in India).

c). An inflationary gap, in economics, is the amount by which the actual gross domestic product exceeds potential full-employment GDP. It is one type of output gap, the other being a recessionary gap.

The inflationary gap is always an ex-ante phenomenon, it is always expected to occur in the future. It arises when expected expenditure will not equal expected consumption at a future date. Keynes defines it as the excess demand in the market for consumption of goods and services. He defined an inflationary gap as an excess of planned expenditure over the available output at pre-inflation or base prices. Given a constant average propensity to save, rising: Money incomes at full employment level would lead to an excess of demand over

supply and to a consequent inflationary gap. Thus Keynes used the concept of the inflationary gap to show the main determinants that cause an inflationary rise of prices.

When an initial increase in aggregate demand produces inflation (so called demand-pull inflation) and real GDP increases, the price level and real GDP are determined at the point where the new aggregate demand and the short-run aggregate supply meet. This point is known as above full-employment equilibrium, since the short-run aggregate supply is above the long-run aggregate supply, i.e. above the aggregate supply at full

employment. The gap created between real GDP and potential GDP is the consequence of inflation, this is one of the reasons this type of gap is called an inflationary gap.

Obviously, this situation cannot last forever, because there is a shortage of labour.

Shortage of labour produces the rise of wage rates, which makes the short-run aggregate supply decrease, until it reaches the full-employment ECO-51 level. The short-run aggregate

9

'decisive' creates an upward pressure on price levels consequently causing the once-accelerated gap between real GDP and potential was, the sign this is another reason this type of gap is called an inflationary gap, cause the gap is considered to be expansionary monetary policies carried out previously. An inflationary gap is a signal that the economy is in the boom

The Trade cycle. Resources are being used over their capacity, factories are operating at maximum average costs; wage rates increase because labour is used beyond hours at overtime pay rates. A case may arise when consumer or investor interest is when demand is increasing or when government expenditure increases.

2. a) What are the causes of inflation?

b) A company is planning to start an employee welfare fund. It needs Rs. 10,000 the first year and it increases by 6% every year thereafter up to the fifth year. The above figures are in terms of today's rupee value. The annual average rate of inflation is 6% for the next five years. The interest rate is 8%, compounded annually. Find the single deposit which will provide the required series of fund towards employee's welfare scheme after taking the inflation rate into account.

(WBUT 2018)

Refer Question / Various Part) of Short Answer Type Questions.

h) Fund during the first year = Rs. 10,000

increase in the third requirement =

inflation rate 6% compounded

annually

Iteration of the present of the annual fund requirements is summarized in Table below

T*blc: Computation or the Present Worth of the Annual Requirements

fund	Inflation requirements	factor	Inflated annual	Present worth of inflated annual fund requirements	.Nnnuai
			fund requirements		
			BxC	DRE	
ss.00000	I .060	53,00,000	0.8475	44,91,780	
		61 982,000	0.7182	44,39912	
		7 946,000	0.6086	43,49,086	
70.009000		82.03,000	0.5158	42,31 ,107	
			0.4371	40.93,879	

of the single deposit to be made now to receive the specified series for the

ECO-52

on the cost

lito Of now

of

deitnand infl@tioo

Of inflation

inflation

2012)

(WPA.JT 2013)

(WBI.JT 2013, 20161

(WBUT 2015)

(WBUT 2018)

cost iii'e oc asset

cost lito Ots any new ja,asset• is the years 'it which the El JAC is minimized.
lite should be lesser than the actual / physical etvopetvatins, lilaintenance cost in
the later years ol' asset,f an asset, due to the the tniniutti cost fov

any new asset. [01 lowing points are to be

cost Ots operation nmaintenance of a machine increases due to passagc of

the tvsplacillk\ ntaehine IdetQnderl titne should be fixede

Replaement policy gradual deterioration value to be detecnnined

prior to the decision nnak'ing.

Pirae alue of tvsplaeing asset, discussed the tvplacement decision would be at which the EUAC is minilnun. This can be made in two aspects.

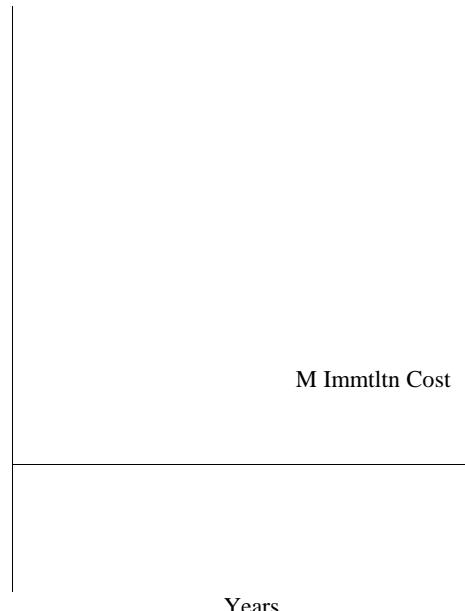
El},NC Price of equiptnent — value of machine after life

[i.e.. salvage value + Maintenance cost for the years.

The process:

Here. C = Cost of the Inachine, S.V.= Salvage value and

M (t) = cunnulative maintenance cost.



ECO-53

POPULAR PUBLICATIONS

The Life Cycle Cost can be explained by a curve which indicates the total operating cost for the asset (value on the Cycle Cost axis) as well as the economic life of the new asset (corresponding value on the Year of Intervention axis) at each possible replacement interval. The Life Cycle cost for a new asset at each replacement tilning is calCULated by taking the sum of the annualized capital costs and the annualized risk costs.

b) Importance of index numbers

Index numbers are the numerical figures which indicate the relative position in respect of price, or quantity or value of a group. of articles at certain periods of time as compared with another period — called base period. When compared with price it is called price Index Number, when with quantity- quantity Index number with value — value index nunlber. Index number for the base period is 100. Index nutnber for the other year is the current period. Index numbers possess much practical importance in measuring changes in the cost of living, production trends, trade, incojne variations, etc.

Benefits of index number and its uses:

Index nunnbers are used —

- a) in determining the purchasing power of money
- b) in Measuring Changes in the Value of Money
- c) in the calculation of dearness allowance payable to employees.
- d) in deflating. i.e., in the process of finding real values like real wages, real income, real sales

- e) in studying seasonal variations
 - t) in measuring the Cost of Living
 - g) in measuring changes in Industrial Production
 - h) in analysing markets for goods and services
 - i) Index numbers are useful in the formulation of economic and business policies.
 - j) Index numbers reveal trends and tendencies.
- k) in forecasting future economic activity and in prediction.
- l) in determining the Foreign Exchange Rates

c) Cost push and demand pull inflation

Demand pull inflation is a situation in which aggregate demand increases at a much faster rate than increase of aggregate supply which increases at a much slower rate because of

either full employment or near full employment occurring in the economy, as a result, the price-level is pulled upwards by an increasing demand function. There are two theories of Demand pull inflation Classical and Keynesian.

Classical economist opined that the increase in money supply increases the demand for goods leading to price rise..

Increase in demand leads to rightward shift of demand curve in classical approach in the context of full employment, money supply brings about an equi-proportionate change in price level (Index).

ECO-54

ECONOMICS FOR ENGINEERS

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Inetone

It is shown that with the rise in income the demand curve (DD) shifts to the right (DD') resulting to rise in the price level (index) from P₀ to P₁.

Keynesian theory explains that there is no relation between the money supply and the rise in price level and the aggregate demand may rise due to rise in consumer demand or investment demand or government expenditure or export demand or combination of these four. At a given level of full employment such increase in aggregate demand leads to an upward pressure in price, such situation is the demand pull inflation.

Inflation may be due to the rise in overall increase in cost of production leading to price rise, known as Cost Push Inflation. Cost of production increases due to increase in cost of raw materials, wages and other cost factors of production leading price rises and thus cost push inflation. Prices may also rise due to increase in profit margin (known as profit push inflation).

Therefore, cost push wage push + profit push

Wage push arises due to strong trade unions putting pressure upon management causing increase in wages which in labour intensive production system causes increase in cost of production resultantly decreasing supply when demand is constant so that supply curve shifts leftwards causing price level to rise. Profit push factor arises due to rising cost of production reducing profit-motive of producers who in turn shift their burden of higher cost on consumers by increasing the sales prices of goods and services produced by them causing inflation.

d) Causes and effects of inflation:

Causes: Refer to Question No. I(1St Part) of Short Answer Type Questions.

Effects of inflation:

Economic impacts of inflation: There is a growing concern about inflation the world over as it has wide ranging implications for the entire global economic system. It also has an impact on the balance of payments of a country. Generally, it leads to worsening of balance of payments position. Inflation results in redistribution of income and hence, wealth the various sections of the society and affects output.

ECO-55

POPULAR PUBLICATIONS

Effect of Inflation on the Distribution of Income and Wealth: As stated above inflation refers to a persistent increase in the prices of goods and services over a period time. If along with the increase in prices of the basket of goods, the returns of the factor inputs such as wages, rent and interest also increase by the same amount then there will not be any impact on the people and the economy.

Effect of Inflation on Output and Growth: The impact of inflation on production of goods and services seems to be very obvious, as at higher prices it is always profitable the producers to produce more goods and earn greater profits. But whether the changes in output would continue for a longer period of time or not would depend on whether we are dealing with short run or long run. The impact of inflation is not the same in short run

and long run. In short run, inflation does affect the output and in the long run there many factors, which would decide whether the output would increase, or decrease,

e) Types of inflation:

Refer to Question No. I(a) & (b) of Long Answer Questions.

PRESENT WORTH ANALYSIS

s chapter at a Glance

field of the year convention it above the basic assumption taken as the receipt or disbursement is generally taken to be end of any year. Like its and project yields and revenue it is assumed to be in the end of year. This is known as End of the Year Convention. This convention is used for the time value of money for preparation of the present worth (value) factor table for compound interest factors etc.

the compound interest formulae as derived is, $A = P \times [1 + i]^n$

A is the Future value of money invested at the end of the year (i) P principal amount invested or value of money at $t=0$

Rate of return / Rate of return/ Cost of Capital for financing any project,

Here $[1 + i]^n$ is the interest rate factor

Major Areas of Analysis Economic view point

Borrowed money view point: Any investment requires a lot of funds to be invested at the beginning of even at in between the project life. This investment is required to be financed from various sources. The financing does incur cost and is a vital factor for capital budgeting analysis. Thus we get an interest rate for financing which is used to determine the time value of money for the Present worth analysis. From the above compound interest formulae we can get

Here, P = Present worth [Present- value] of money. [Cash inflow from the investment made at present time]

A = Returns / cash inflow in the n th year i = is the interest rate or cost of borrowing for the financing.

Here, $\frac{1}{[1 + i]^n}$ is the Present worth / Discounting rate factor.

Inflation and deflation: Using of proper present worth rate / discount rate depends on whether the benefits and costs are measured in real or nominal terms. To be consistent and free from inflation bias, the cash flows should match with discount rate. This equivalence value means that an asset what cost today a certain sum of money can be expected to cost the same amount several years hence for the purpose analysis.

Taxes: Tax is incorporated in the present worth analysis as the future return or cash inflow is after adjustment of tax. But it is assumed in a present worth analysis, done at Present ($t=0$), tax rate to be kept constant for the purpose of analysis only.

Depreciation: Depreciation is the loss due to wear and tear of the purchased asset in use. It is used to calculate as to determine the cash flow after charging depreciation and tax. As per tax rules tax is applicable on profit after charging depreciation.

ECO-57

Multi Choice Type Questions

Contribution is the

- a) excess of sale price over variable costs
- b) excess of sale price over fixed costs
- c) excess of sale price over both variable and fixed costs.
- d) none of these Answer: (a)

2. What is the full form of PVIF?

- a) Present Value Income Factor
- b) Present Value Interest
- c) Profit Value (neeme factor)
- d) None of these

Answer:

3. If actual sales are Rs 40,000 and BE? sales are Rs, the margin of safety is

- a) 70,000

Answer: (b)

4. FVI =

- a) f.oso

Answer: (c)

5. In NPV method, cash flow is generally calculated on the basis of

- a) present value b) future value c) annuity

Answer: (a)

6. What could be the value of present sum for Rs- at interest rate?

- a) Rs. 9,263 b) Rs. 9.261 (d)

Short Choice Type Questions

a) Define Break-even point. Represent the elements derive the SEP and SEP sales algebraically.

b) The following data relates to ASC Co. for 20%:

Fixed Factory Overhead = Rs. 30,000

Fixed Selling Overheads = Rs 50,000

Variable Manufacturing Cost per unit = Re 5.00

Variable Selling Cost per unit = Rs.

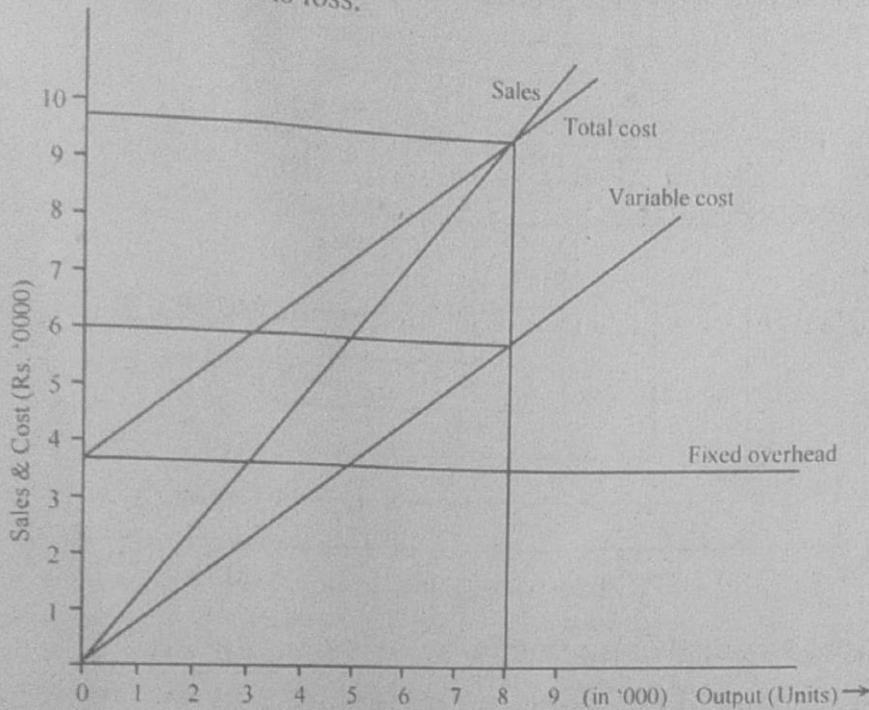
Selling Price Per unit Rs. 12.00 Calculate

i) Break-even point in terms of units and SE sales in terms rupees. ii)

Number of units that need to be sold to make a profit of Rs-

Answer:

a) Break-even-point is that level of sales at which total cost and total revenue will be in equilibrium, i.e., it is that level of sales at which there is neither profit nor loss. If actual sales exceed Break-even-sales, then, there is profit but if actual sales are less than break-even-level of sales, then, there is loss.



$$\begin{aligned}
 \text{b) i) BEP}(\text{units}) &= \frac{\text{Fixed cost}}{\text{Contribution (per unit)}} \\
 &= \frac{\text{Fixed Factory Overhead} + \text{Fixed selling overhead}}{\text{Selling price (per unit)} - \text{Variable cost per unit}} \\
 &= \frac{30,000 + 6,000}{12 - (6 + 1.50)} = \frac{36,000}{12 - 7.50} = \frac{36,000}{4.50} = 8,000 \text{ units}
 \end{aligned}$$

$$\begin{aligned}
 \text{BEP}(\text{Rs.}) &= \frac{\text{Fixed cost}}{\text{p/v ratio}} = \frac{\text{Fixed cost}}{\frac{\text{Contribution (per unit)}}{\text{Selling price (per unit)}}} \\
 &= \frac{36,000}{4.50} = \frac{36,000 \times 12}{4.50} = 96,000 \text{ Rs.}
 \end{aligned}$$

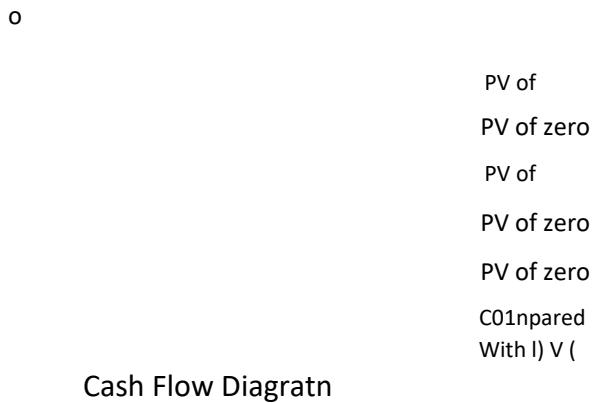
ii) No. of units needed to be sold to make profit of Rs. 45,000

$$\begin{aligned}
 &= \frac{\text{Target profit} + \text{Fixed cost}}{\text{Contribution (per unit)}} \\
 &= \frac{45,000 + 36,000}{4.50} = \frac{81,000}{4.50} = 18,000 \text{ units.}
 \end{aligned}$$

2. For the following cash flow situation shown in Table 3.4, draw the [WBUT cash flow diagram and solve for Present Value (PV) at a 12% interest rate.

Year	Cash Flow L. E)
0	
2	
3	
4	
5	-600

Answer:



$$= (600 \times 0.567) + (400 \times 0.712) = 625 \text{ Rs}$$

3, Find the better choice b usin Future Worth [WBUT 2012]

choice b usin Future Worth

Given i = 12%

Machine	Initial Cost	Return/Year	Life
	40 Lakhs	8 Lakhs	4 Years
B	45 Lakhs	1 Lakhs	4 Years

Calculation of FW of

Answer:

Calculation of Future Worth of machine A

FW of initial cost = 40,00,000 ×

$$1.574 = (62,96,000)$$

FW of initial cost = 40,00,000 FVIFA(

$$= 1.574 = (62,96,000) 3$$

NFW of machine A

2

e

machine B

$$\begin{aligned}
 \text{FW of initial cost} &= 11574 & ' = (70.839000) \\
 &= \\
 \text{FW of initial cost } i & . x : _{4.774.} & ' \{ \} \\
 & x & ' -- \\
 &] I = (47 79.00 O) & \\
 & \quad \quad \quad \text{NFW of machine A} & (23.04) \\
 & \quad \quad \quad \text{ECO-60} \\
 & \quad \quad \quad \text{fit.}
 \end{aligned}$$

so
if One Of 10 be t hut
Of

.assumed that ret ums per year are given in

the nest cf a project requiring an initial investment of Rs, gnd provides a cash flow RSF 12,000 each year for 6 years. the cost fund% to pm and there is no scrap Value.

present value an annuity for 6 years at 8% p.a. interest is 4.623).

[WBUT 2013]

Ansøer:

p 7 d cc-Jh	---	'(f cash
		- 40.000

a) Distinguish between Present Worth (PW) and Future Worth (FW). Choose the better alternative for the metro rail project, use present worth (PW), rate of interest = 6%

A: Stage costing Rs- 30 crores now and stage 25 years later at Rs 35 crores.

Option B: Both stages together now costing Rs- 40 crores [WBUT 2014 Answer:

z) The value (FM) measures the nominal future sum of money that a given sum of is "worth" at a specified time in the future assuming a certain interest rate, or more of return. The FV is calculated by multiplying the present value by the accumulation function. This does not include corrections for inflation or other that affect the true value of money in the future. The process of finding the FV is called capitalization.

On the other hand, the present value (PV) is the value on a given date of a payment or of payments made at other times. The process of finding the PV from the FV is called discounting.

POPULAR PUBLICATIONS

PV and FV are relaxed, reflects compounding interest (simple interest has n divided by i , instead of as the exponent). Since it's really rare to use simple interest, this formula is the important one-

FV of a single payment

PV and FV are directly related.

PV and FV vary directly: When i increases, the other increases, assuming that the rate and number of periods remain constant.

ECO-61

The interest rate (or discount rate) and the number of periods are the two other variables that affect the FV and PV, the higher the interest rate, the lower the PV and the higher the FV. The same relationships apply to the number of periods. The more time that passes, or the more interest accrued per period, the higher the FV will be if the PV is constant, and vice versa. The formula implicitly assumes that there is only a single payment. If there are multiple payments, the PV is the sum of the present values of each payment and the FV is the sum of the future values of each payment.

b) PW of option A = $30 +$

$$= 30 + (35 \times 0.233) = 30 + 8.155$$

38.155 crores

PW of option B = 40 crores

Therefore choose option B having higher PW than option A.

6. What is the present value of the following cash flow, assuming a discount rate of 8%? [WBUT 2015]

Year	Cash flow
1	30000
2	20000
3	10000
4	10000

Answer:

Calculation of present value

Year (1)	Cash Flow (Rs.) (2)	PVIF (08%) (3)	Present value (IRS.)
01	30,000	0.926	27,780
02	20,000	0.857	17,140
03	10,000	0.794	7,940
04	10,000	0.735	7,350
Present value of cash flow			

Long Answer Type Questions

1. a) Life of a dam is 50 years. Initial Cost = Rs. 25,000, $i=10\%$, Find E(PW)

Profit Rs	5000	8000	10000
Probability	0.3	0.6	0.1
Life Yrs	6	9	
Probability	0.67	0.33	

ECO-62

ECONOMICS FOR ENGINEERS

i) ^{1350/0.} What should be the optimum height of the dam?

Height (Mts)	Prob.(Flood)	Initial Cost	Damage/year (if flood)
0	0.25	0	800,000
20	0.05	700,000	500,000
30	0.01	800,000	300,000
40	0.002	900,000	200,000

[WBUT 2014]

ⁿ) Expected value of profit probability \times Profit
 $= (0.3 \times 000) (0.1) 8,000 - E(O.I \times I O, 000)$

$$= 1,500 + 4,800 + 1,000 = [7,300 \text{ Rs.}]$$

$$E = \sum \text{probability} \times \text{Life (yrs)}$$

$$= (0.67 \times 6) + (0.33 \times 9) = 4 + 3 = [7 \text{ years}]$$

Expected life = 7 years, expected present worth

$$\begin{aligned} &= E(\text{PW}) \text{ of profit} - E(\text{PW}) \text{ of interest} \\ &= 7,300 \times PVIFA_{(10\%, 7)} - 25,000 \\ &= (7,300 \times 4.868) - 25,000 \\ &= 35,536.40 - 25,000 \\ &= [10,536.40 \text{ Rs.}] \end{aligned}$$

b) Calculation of expected present worth at different height = probability

{Initial cost + Damage per year \times PVIFA_(5%, 7)}

E(PW) at height = 0

$$0.25 \{0 + 8,000 \times 5.786\} = [11,57,198 \text{ Rs.}]$$

$$\begin{aligned} \text{E(PW) at height} &= 20 \text{ Mts } 0.0517 \times 10,000 + 5,00,000 \times \\ &5.786 = [1,79,650 \text{ Rs.}] \end{aligned}$$

E(PW) at height 30 Mts

$$0.01 \{8,000 + 3,00,000 \times 5.386\} = [25,358 \text{ Rs.}]$$

[i(PW) at height = 40 Mts

$$0.002 \{9,00,000 + 2,00,000 \times 5.386\} = [4,114 \text{ Rs.}]$$

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Since E(PW) is Diinimlln at height 40 Mts or the dann. therefore optilnunn that height nneans. of clan)40 . is that height for which present value of relevance cost is rninitnunl.

Illetetx

2. ABC Ltd. is considering an investment proposal whose initial outlay is Rs. 100,000. Project life will be 4 years. Other estimates 10,000 are:units

Annual sales volume: _____
Rs. 26,00 0

Fixed cost per annum:
Contribution per units: Cost
of capital:



ECO-63

Present value of As. 1 payable or receivable annually the end of 4 years at
u

3.3121.Fclmment

ii) By how much can each factor change before ABC Ltd. becomes indifferent ■
li)ii) on the sensitivity of the factors based on your answers in (ii).

(WBUT 6)

Answer:

f cash flow after tax 6)	
Contribution (10,000	omooo 2?oooo• 34.000
Less: Fi.xed cost (PBDT) Project	Deprecia 00,000 4 Depreciation and Tax
Less: Depreciation	9.000 Nil
(PBT) Profit before tax	9.000 25.000
Less: Tax	
(PAT) Profit after tax	34.000
Add: Depreciation (CFAT) Cash flow after	I.OO.OOO
PV ofCFAT (34,000×3.3121)	

Calculation o

Less: Investment
NPV

--

i) Contribution per unit

$$\text{If NPV} = 0, \text{ then CFAT} = \frac{30,192}{3.3121}$$

$$\therefore \text{Contribution} = + 30.192 = 56.192$$

$$\therefore \text{Contribution per unit} = \frac{56,192}{10,000} = 5.6192$$

$$\therefore \text{Contribution per unit should decrease by } \underline{6-5.61926x} = 6.35\% \quad 6$$

ii) Fixed cost for NPV to be zero = $60,000 - 30,192 = 29,808$ Rs.

$$\therefore \text{Fixed cost increased by } \frac{29,808 - 26,000}{26,000} \times 100 = \boxed{14.65\%}$$

iii) Sales volume for NPV = zero Contribution = 56,192

When sale price per unit = 6 Rs.

$$\text{Then sales volume} = \frac{56,192}{6} = 9,366 \text{ units}$$

ECO-64

$$\text{Sales volume should decrease by } \frac{10,000 - 9,366}{10,000} \times 100 = \boxed{6.35\%}$$

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10.000 it is clear than the sensitivity of NPV with respect to

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before
65%) compared
lower (6.35%).

fixed cost is highest [redacted] to sensitivity to sales price per unit and sales volume of which