2. Time Value of Money

Time Value of Money

The time value of money has been referred to as an axiom of financial management. The concept of TVM refers to the fact that money received today is different in its worth from the money receivable at some other time in future. In other words, the same principle can be stated as that the money receivable in future is less valuable than the money received today. There are several reasons for this preference for current money as follows:

1. Future Certainty
2. Preference for present consumption.
3. Reinvestment opportunity.

The Future Value (FV) of Present Value (PV) Money is calculated as follows:

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

where

FV = future value
PV = present value
r = % rate of interest
n = Time gap

Example:

The above formula can be also written in terms of finance as

$$FV = PV\ (CV\ f(r,t)]$$

Note:

If compounding is made N number of times in a year then FV is calculated as follows:

$$FV = PV\ (1+r/M)^{M.n.}$$

Or

$$FV = PV \times CV\ f(r/M, Mn)$$

Effective Rate of Interest

The effective rate of interest is the annually compounded rate of interest that is equivalent to an annual interest rate compounded more than once per year. The effective rates of interest are equal whenever they generate the F.V.

Mathematically:

$$1+r_e = (1+r/M)^{Mxn} - 1$$

where re = effective rate of interest
r = normal rate of interest p.a.
M = number of compounding period in a year.

Future value of a series of equal cash flows or annuity of cash flows:

When same amount is deposited under same interval of time in that case future value is determined by using the formula of compound value annuity factor.

$$FV = \text{Annuity amount} \times CVAf_{(r,n)}$$

Discounting Technique

The reverse of compounding technique is known as discounting technique. In case of discounting technique the future cash inflow determined in terms of present cash inflow. There are two way of finding PV of FV.

1. Present Value Factor
2. Present Value Annuity Factor
    1. In case of present value factor the cash inflow in future in a particular point of time for example. If we receive `1000 after five years then PV is calculated as
    PV = 1000 x PV f(r,5)

2. Present value annuity factor is used. If certain amount in each year received for example. If `1000 is received at the end of each year from 1 to 5.
   PV = 1000 x PVA f(r,5)
   Perpetuity: - A perpetuity may be defined as an infinity series of equal cash flows occurring at regular intervals.

$$PVp = \frac{\text{Anual Cash Flow}}{r}$$

For example:
Find out the present value of an investment which is expected to give a return of `2500 p.a. indefinitely & the rate of interest is 12%.

$$PVp = \frac{2500}{0.12} = 20833.33$$

0.12

$$PVp = \frac{\text{Anual Cash Flow}}{r}$$

at r = 8% = 0.08

$$PVp = \frac{80}{0.08} = 1000 \text{ No.}$$

at r = 5% = 0.05

80

$$PVp = \frac{80}{0.05} = 1600 \text{ Yes}$$

Annuity Due: -
The discussion of FV or the PV of an annuity was based on the presumption that the cash flows occur at the end of each of the periods starting from now. However, in practice the cash flow may also occur in the beginning of each period. Such a situation is known as annuity due.
FV of an annuity due
FV = [Annuity amount x CVA f(r,n)] (1+r)
PV of an annuity due
PV = [Annuity amount x CVA f(r,n)] (1+r)

Sinking Funds
It is a fund which is created to accumulate a target amount over a given period inclusive of interest for a period in such a way that the annual amount being subscribed over the period is same for all years.
FV of an annuity due
FV = [Annuity amount x CVA f(r,n)]
It may be noted that factor 1/CVA f(r,n) is also known as the sinking fund value factor.

Capital Recovery
Some times, one may be interested to find out the equal amount paid in order to redeem a loan of a specified amount over a specified period together with the interest at a given rate for that period. For example, `1,00,000 borrowed today is to be repaid in five equal installments payable at the end of each next 5 years in such a way that the interest at 10% p.a. this annuity amount is calculated as follows:
PV = [Annuity amount x PVAf (r,n)]

$$\text{Annuity Amount} = \frac{PV}{PV\ f(r,n)}$$

$$= \frac{1,00,000}{3.791} = 26.378$$

- **INTRODUCTION**
- **COMPOUNDING TECHNIQUE**
- **EFFECTIVE RATE OF INTEREST**

Q. 1. A deposit of `10, 000 is made in a bank for a period of 1 year. The bank offers two options:
(i) to receive interest at 12% p.a. compounded monthly or **Ans.** 12.68 %
(ii) to receive interest at 12.25% p.a. compounded half yearly.
Which option should be accepted? **Ans.** 12.65%

- **DISCOUNTING TECHNIQUE**

Q. 2. Find out present values of the following:
a) `1, 500 receivables in 7 years a discount rate of 15%;
Ans. 564
b) an annuity of `760 starting after 1 year for 6 years at an interest rate of 12%.
Ans. 3125
c) an annuity of `5, 500 starting in 7 years time lasting for 7 years at a discount rate of 10%; **Ans.** 15110
d) an annuity of `1, 000 starting immediately and lasting until 9^{th} year at a discount rate of 20%; **Ans.** 4837

- **DISCOUNTING TECHNIQUE IN CASE OF PERPETUITY**

Q. 3. Find out the present value of an investment which is expected to give a return of `2, 500 p.a. indefinitely and the rate of interest is 12% p.a.
Ans. 20833.33
Q. 4. A finance company makes an offer to deposit a sum of `1, 100 and then receive a return of `80 p.a. perpetually. Should this offer be accepted if the rate of interest is 8%? Will the decision change if the rate of interest is 5%?
Ans. 1000
Q. 5. Find out present values of the following:
A perpetuity of `400 starting in year 3 at a discount rate of 18%.
Ans. 1596

- **SINKING FUNDS**

Q. 6. An amount of `1, 00, 000 is required at the end of 5 years from now to repay a debenture liability. What amount should be accumulated every year at 10% rate of interest so that it ultimately becomes `1, 00, 000 after 5 years?
Ans. 16380

- **CAPITAL RECOVERY**

Q. 7. Calculate yearly installment to be paid for `1, 00, 000 borrowed today is to be repaid in five equal installments payable at the end of each of next 5 years in such a way that the interest at 10% p.a. for the intervening period is also repaid.
Ans. 26378

- **DEFFERED ANNUITY**

Q. 8. A loan of `1, 00, 000 is taken on which interest is payable @ 10%. However, the repayment is to start only at the end of third year from now. What should be the annual payment is the total loan and interest is to be repaid in six installments?
Ans. 27784
Q. 9. What is the present value of cash flows of `750 per year forever (a) at an interest rate of 8% (b) at an interest rate of 10% ?
Ans. 9375, 7500
Q.10. A company has issued debentures of `50 lacs to be repaid after 7 years. How much should the company invest in a sinking fund earning 12% in order to the able to repay debentures ?
Ans. 495589

Q.11. What is the present worth of operating expenditures of `1, 00, 000 per year which are assumed to be incurred continuously throughout in 8 year period if the effective annual rate of interest is 12% ?

Ans. 496763

Q.12. A firm purchases a machinery for `8, 00, 000 by making a down payment of `1, 50, 000 and remainder in equal installments of `1, 50, 000 for six years. What is the rate of interest to the firm?

Ans. 10%

Q.13. Mr. X borrows `1, 00, 000 at 8% compounded annually. Equal annual payments are to be made for 6 years. However, at the time of fourth payment, the individual elects to pay off the loan. How much should be paid ?

Ans. 60207

Q.14. Ten year from now Mr. X will start receiving a pension of `3, 000 a year. The payment will continue for sixteen years. How much is the pension worth now, if his interest rate is 10% ?

Ans. 9952

Q.15. Novelty Industries is establishing a sinking fund to redeem `50, 00, 000 bond issue which matures in 15 years. How much do they have put into the fund at the end of each year to accumulate the `50, 00, 000, assuming the funds are compounded at 7% annually?

Ans. 19873

Q.16. XYZ Ltd. is creating a sinking fund to redeem its Preference capital of `5 lac issued on Jan 1, 1998 and maturing on Dec 31, 2009. The annual payment will start on Jan 1, 1998. The company will make equal payments and expects that the fund will earn 12% per year. How much will be the amount of sinking fund payment?

Ans. 18500

6. Capital Budgeting

Project Planning & Capital Budgeting

Project Planning:

The management accountant has to play a very valuable role in the process of project planning. Project Report

Various Aspect of Project Report:

It is working plan for implementation of project proposals after an organization has decided to undertake an investment project. It seeks to evaluate the economic, technical, financial, social, managerial and commercial viability of a project before it is undertaken. A project report deals with the various aspects of a new project with reference to:

(a) Location of the Project:

This is decided by comparing the relatives cost advantages of setting up the project at various places. It encompasses the consideration of availability of the raw materials, the basic infrastructure facilities, proximity to the markets and availability of skilled labour, power, railway siding facilities, transport and communication, etc.

(b) The Size and Capacity Level:

This includes preparation of projected cost statement under various capacity levels to determine the implications of having a plant of a larger or a smaller size.

(c) The Technological Aspects:

It deals in production process, availability of raw materials, requirements of labour and machines.

(d) Management Policies:

This deals in how to acquire the raw material, what will be labour policy, credit policy and administration policy. These are drawn so that future becomes more certain. This includes working up differential cost of various alternatives and examining their financial and tax implications to help the management in taking a correct decision.

Advantages of a Project Report:

It lays down objectives in various spheres of business.

It evaluates the objectives in the right perspective.

It identifies constraints on resources.

It paves the way for management to seek financial accommodation from financial institutions and banks.

Preparation for Project Report:

The job of preparing project report requires a team of specialized and technical experts to cover different aspects viz. financial, technical, commercial, socio-economic and government rules and regulations and also to follow a multi-disciplinary approach to analyze the following factors:

(a) To undertake technical analysis comprising systems analysis using techniques of Operations Research to solve the problems like allocation problems, replacement problems, inventory problems etc.

(b) Marketing research to forecast demand for goods and services.

(c) Financial analysis to project future cash flows, profitability, profits planning, budgeting and resource allocation etc.

Techno-economic Analysis to explore economic conditions to absorb projects products etc.

Project design and network analysis i.e. detailed work plan of the project and its time profile.

Contents of a Project Report:

Information about industry and its status in the economy.

Market trend of the product and by-products within and outside the country for 5 years. Raw material survey for quality of raw materials required and their sources of availability. Production process – broad description of different processes and their relative economies. Availability of technical know-how within and outside country.

Location of Plant, its advantages and justifications. Assessing the needs of water, power and fuel and analyzing the economic source of these. Assessing the type and quality of effluents and planning about their treatment and disposal. Implementation and construction program in the form of CPM/PERT and flow charts indicating critical path and schedules. Estimation of the cost of Project including cost of Land & Building, Plant and Machinery. It deals also estimate of Preliminary expenses, contingencies etc. Details of capital structure or financing mix-broad pattern to be indicated in the report. Detail for the Cost of production like Break Even Point, effect of variation of cost of raw materials, utilities, selling price etc. Profitability for five years after commission of the project. Cash flow statement and pay back period should be worked out for the project. Technical feasibility is discussed in detail with financing viability. Organizational and management – description of corporate management, promoters experience and background, organizational chart, key personnel and delegation of power and responsibility structure to be fully described.

Techniques of Evaluation

1.Pay Back Period: One of the simplest methods is to calculate the period within which the cost inflows from the project equal the cost of project. Cash inflows means profit after tax but before depreciation.

Merits

This method of its quite simple and easy to understand. It is used when funds are limited or where the risk of obsolescence is very high, they may be made to do more selecting projects having shorter pay back periods. It also works in the case of routine projects also.

The pay back period can be compared to a break-even point, the point at which the cost is fully recovered but profits are yet to commence. However, the technique of payback period is not a very scientific method because of the following reasons:

It stresses capital recovery rather than profitability. It does not take into account the returns from the project after its pay back period. This method does not work when the cash inflows are uneven in two projects. The method does not give any consideration to time value of money. Some Accountants calculate payback period after discounting the cash flows by a predetermined rate and the payback period so calculated is called '**discounted payback period'**.

Payback Reciprocal:

As the name indicates it is the reciprocal of payback period. It is, however, argued that the reciprocal of the payback would be a close approximation of the internal rate of return if the life of the project is at least twice the payback period and the project generates equal amount of the annual cash inflows. The payback reciprocal can be calculated as follows:

$$\frac{\text{Average annual cash flow}}{\text{Initial Investment}}$$

Accounting or Average Rate of Return Method (ARR):

Accounting or Average Rate of Return means the average annual yield on the project. Under this method profit after tax and depreciation as percentage of total investment is considered. This rate is compared with the rate expected on other projects, had the same funds been invested alternatively in those projects. Sometimes, the management compares this rate with the minimum rate (called – cut off point) they may have in mind. For example, management may decide that they will not undertake any project, which has an average annual yield after tax less than 15%. Any capital expenditure proposal, which has an average annual yield of less than 15% will be automatically rejected. Merits and Limitations:

This method is quite simple and popular because it is easy to understand and includes income from the project throughout its life.

However, it is based upon a crude average of profits of the future years. It ignores the effect of fluctuations in profits from year to year. It thus ignores the time value of money that is very important in capital budgeting decisions.

The Net Present Value Method:

The net present value of project is equal to the sum of present values of all the cash flows associated with the project. A point to note is that this method will give valid results only if money's can be immediately reinvested at a rate of return equal to the firm's cost of capital.

Acceptance Rule: The project can be accepted if NPV is positive i.e. NPV>0 and rejected when NPV is negative i.e. NPV<0. If NPV=0, a project may be accepted. NPV=0 implies that project generates cash flows at a rate just equal to the opportunity cost of capital.

Merits and Demerits of NPV Method:

NPV method takes into account the time value of money. The whole stream of cash flows is considered. The NPV uses the discounted cash flows i.e. expresses cash flows in terms of current rupees. The NPVs of different projects therefore can be added/compared. This is called the value additivity principle implying that NPVs of separate projects can be added. It implies that each project can be evaluated independent of others on its own merit.

Desirability Factor / Profitability Index:

In certain cases we have to compare a number of proposals each involving different amounts of cash inflows. One of the methods of comparing such proposals is to work out what is known as the 'desirability factor' or profitability index.

The desirability factor is calculated as below:

$$\frac{\text{Sum of discounted net cash inflows}}{\text{Initial cash outlays}}$$

Limitations of Profitability Index:

1. Profitability index as a guide in resolving capital rationing fails where projects are indivisible. Once a single large project with high NPV is selected, possibility of accepting several small projects, which together may have higher NPV than the single project is excluded.
2. Situations may arise where a project with a lower Profitability Index selected may generates cash flows in such a way that another project can be taken up one or two years later, the total NPV in such case being more than the one with a project with highest Profitability Index.
   The Profitability Index approach thus cannot be used indiscriminately but all types of combinations of projects will have to be worked out.
5. Internal Rate of Return: Internal Rate of Return (IRR) is that rate at which the discounted cash inflows are equal to the discounted cash outflows. The internal rate of return of a

project is the discount rate, which makes net present value equal to zero. This is the discount rate in the equation.

Merits:

The time value of money is taken into account. All the cash flows in the project are considered. IRR is easier to use as instantaneous understanding of desirability can be determined by comparing it with the cost of capital.

Demerits: The calculation process is tedious if there are more than one cash outflows interspersed between the cash inflows; there can be multiple IRRs, the interpretation of which is difficult. The IRR approach creates a peculiar situation if we compare two projects with different inflow outflow patterns. If mutually exclusive projects are considered, then IRR cannot solve the problem.

Capital Rationing

Capital Rationing means selection of a combination of investment proposals within the specific limits providing maximum profitability by putting them in descending order according to their rate of return. Capital rationing can be experienced due to external factors mainly imperfections in capital markets which can be attributed to non – availability of market information, investor attitude etc. Internal capital rationing is due to the self – imposed restrictions imposed by management like not to raise additional debt or laying down a specified minimum rate of return on each project.

Various ways of resorting Capital Rationing

A. Taking full utilization of budget as primary consideration:

In Capital Rationing it may also be more desirable to accept several small investment proposals than a few large investment proposals so that there may be full utilization of budgeted amount. This may result on accepting relatively less profitable investment proposals.

B. By way of Retained Earnings: For instance, a firm may effect capital rationing budgets. It may also put up a ceiling when a decision has been taken to finance the investment proposals only by way of retained earnings (ploughing back of profits) the amount of capital expenditure in that situation cannot exceed the amount of retained earnings.

C. By way of Responsibility Accounting:

Whereby management may introduce Capital Rationing by authorizing a particular department to make investment only upto a specified limit, beyond which the investment decisions are to be taken by higher-ups.

Whether the Capital Rationing always leads to optimum results Capital Rationing may also mean that the firm foregoes the next most profitable investment following after the budget ceiling even though it is estimated to yield a rate of return much higher than the return. Thus capital rationing does not always lead to optimum results.

Sensitivity Analysis & Social Cost Benefit Analysis

Sensitivity Analysis is a tool which helps in analyzing change in the project's net present value (NPV) or internal rate of return (IRR) for a given change in one of the variables. It shows how sensitive a project's NPV or IRR is to changes in particular variables. The analysis takes care of estimation errors by using a number of possible outcomes in evaluating a project. The sensitivity analysis provides different cash flow estimates under these assumptions:

Steps involved in the analysis:

Identifying the variables which have an effect on the project's NPV/IRR. Defining the mathematical relationship between the variables. Analysing the implication to change in each of the variables on the project's NPV.

Advantages:

Helps the decision marker in understanding the investment project in total it compels him to identify the variables which has influence on the cash flow forecasts.

It assists in finding out critical / weak spots in the project.

It guides the decision marker to concentrate on relevant variables only.

Disadvantages:

In case of sensitivity analysis, we take the effect of changes in one variable at a time on the present value. This may in fact be highly misleading. It assumes variables to be completely unrelated to each other which they are not. It is only when the combined effect of changes in the set of interrelated variables is considered that we can get the right picture.

The management while using sensitivity analysis uses different values of uncertain variables purely on ad hoc basis. But taking values of variables in such an arbitrary manner is unscientific. These should be based on the analysis of the reasons of uncertainty.

Social Cost Benefit Analysis

It is being increasingly recognized that commercial evaluation of industrial projects is not enough to justify commitment of funds to a project specially when it belongs to the public sector and irrespective of its financial viability, it has to be implemented in the long – term interest of the nation. In the context of the national policy of making huge public investment in various sectors of the economy, the need for a practical method of making social cost benefit analysis has acquired great urgency. Hundreds of crores are committed every year to various public projects of all types – industrial, commercial and those providing basic infrastructure facilities, etc. Analysis of such projects has to be done with reference to the social costs and benefits since they cannot be expected to yield an adequate commercial return on the funds employed, at least during the short run.

Social cost benefit analysis is important for the private corporations also who have a moral responsibility to undertake socially desirable projects. In analyzing the various alternatives of capital expenditure, a private corporation should keep in view the social contribution aspect. It can thus be seen that the purpose of social cost benefit analysis technique is not to replace the existing techniques of financial analysis but to supplement and strengthen them.

The concept of social cost benefit analysis has now progressed beyond the stage of intellectual speculation.

The Planning Commission has already decided that in future, the feasibility studies for public sector projects will have to include an analysis of the social rate of return. In the case of private sector also a socially beneficial project may be more easily acceptable to the Government and hence this analysis will be relevant while granting various licenses and approvals, etc. Also, if the private sector includes social cost benefit analysis in its project evaluation techniques, it will assume ensure that it is not ignoring its own long – term interest, since in the long run only those projects will survive that are socially beneficial and acceptable to the society.

Effect of Inflation on Financial Management

Our present accounting system has following two bases:

The rupee, which is the measuring rod of the accountant, does not maintain its purchasing power.

The measurement of income and the valuation of assets / liabilities is done in accounting on the basis of the 'historical cost' concept, which may give totally irrelevant and unrealistic results in an inflationary situation.

Effect of Inflation on Profit and Assets:

Firstly, it is irrational to add together the acquisition costs of the various assets purchased at different point of time, because the value of rupee at all such points of time, is not the same. Thus, it is not logical to add the rupee cost of a table purchased in 1979 for Rs.500/- to the rupee cost of an identical table purchased in 1999 for Rs.1,050/-. If we do so, the total of Rs. 1,550/- would reflect the value of the two tables neither in terms of rupees of 1984 nor in terms of rupees of 1999.

Second, during inflation the historical cost accounting method results in exaggerating the figure of net profit as shown by the profit and loss account in following ways:

(i) The depreciation charge under the present method of accounting is based on historical costs of fixed assets and it does not take into account the changes in the replacement cost of the fixed assets.

(ii) Profits are shown by traditional accounting methods is the valuation of the same quantities of closing stocks at progressively higher figures in successive years of inflation.

Effect of inflation on Financial Information:

(i) When the financial analyst attempt to compare the financial results/ratios of a company over a period of time, particularly in the situation of different rates of inflation. Historical cost accounting data are distorted from year to year as a result of inflation. Financial ratios, particularly those dealing with profitability, are also distorted.

(ii) Apart from the companies financial ratios being distorted over a period of time due to inflationary conditions, inter-company comparisons may also be distorted. When historical costs are used, in an inflationary environment, the company with older fixed assets with often show a higher return on investment than a company whose fixed assets were acquired more recently.

Techniques to handle Effect of the Inflation on the Financial Analysis:

Inflation greatly affects the financial affairs and planning of the firm. The finance manager cannot control the inflation, but he can try to measure the impact of inflation of his decisions so as to re-orient various financial management policies according to the fast changing circumstances. The prominent areas required to be re-oriented are dividend payout policy, capital restructuring, depreciation policy, profit planning , working capital and tax planning. If the financial analyst wishes to differentiate performance based on conventional accounting data from real profitability, he will need to adjust the accounting data.

A. Current Purchasing Power Method (CPP):

This method seeks to adjust the financial statements by removing the effects of changes in the general purchasing power of money on traditional accounts. A general price index is used for this purpose since it is the best indicator of the changes in the purchasing power of money as a whole. As the values in historical rupees are to be converted into rupees of purchasing power, as at the end of the period, two index numbers are required – one showing the general price level at the end of the period and the other reflecting the same at the date of transaction.

B. Current Cost Accounting Method (CCA):

The objective of this method is to ascertain the current cost operating profit (before interest), which is arrived at by making three adjustments to the historical cost profit. The adjustments to be made are:

(a) Depreciation adjustment
(b) Cost of sale adjustment (COSA)
(c) Monetary working capital adjustment

If the accounting system were to clearly focus the impact of inflation it is reasonable to assume that over a period of time.

(a) Inflation will be regarded as an element of cost just the same way as other items of costs are considered. This will result in suitable adjustments in pricing so that the community at large will share the burden.
(b) Government will think in terms of suitable fiscal reliefs so as to reduce the burden of inflation as has been done in the case of capital gains.

The above measures, if followed will definitely contribute towards sound financial management of business organizations under inflationary conditions.

Social Cost Benefit Analysis

It is being increasingly recognized that commercial evaluation of industrial projects is not enough to justify commitment of funds to a project specially when it belongs to the public sector and irrespective of its financial viability; it has to be implemented in the long-term interest of the nation. Social cost benefit analysis is important for the private corporations also who have a moral responsibility to undertake socially desirable projects. In analyzing the various alternatives of capital expenditure, a private corporation should keep in view the social contribution aspect.

The concept of social cost benefit analysis has now progressed beyond the stage of intellectual speculation. The Planning Commission has already decided that in future, the feasibility studies for public sector projects will have to include an analysis of the social rate of return.

Need for Social cost benefit analysis (SCBA)

1. Market prices used to measure costs and benefits in project analysis do not represent social values due to imperfections in market.
2. Monetary cost benefit analysis fails to consider the externalities or external of a project. The external effects can be positive like development of infrastructure or negative like pollution and imbalance in environment.
3. Taxes and subsidies are monetary costs and gains, but these are only transfer payments from social point of view and therefore irrelevant.
4. The SCBA is essential for measuring the redistribution effect of benefits of a project as benefits going to poorer section are more important than one going to sections which are economically better off.
5. Projects manufacturing liquor and cigarettes are not distinguished from those generating electricity or producing necessities of life. Thus merit wants are important appraisal criterion for SCBA.

Different Criterions of Analysis of Social Cost Benefit

Actually cost or revenues do not necessarily reflect the monetary measurement of cost or benefits to the society. Cost benefit analysis is usually valued at "opportunity cost" or shadow prices to judge the real impact of their burden as costs to society.

1. **Employment Potential Criterion:** Under this criterion, the impact of the proposed project on the employment situation is considered. Projects are therefore ranked according to the number of persons expected to find additional employment per unit of capital investment. The projects having a higher employment potential are naturally preferred in developing countries.
2. **Capital Output Ratio:** This ratio shows the value of expected output in relationship with the capital employed. In developing countries where the capital resources are scarce, this ratio would be a good indicator of the desirability of a project by indicating whether a project gives enough output or not in terms of capital employed.
3. **Value Added per unit of Capital :-** The main advantage of this method is that it takes into account the net contribution of a company to the national economy in so far as it does not include bought out materials etc.
4. **Foreign Exchange Benefit Criterion:** This seeks to evaluate the likely impact of a project on the overall balance of payments of the country. The projects, which promise to earn the largest net profit in foreign exchange, are given preference.
5. **Cost Benefit Ratio Criterion:** This attempts to measure the total effects of all the social benefits and cost involved in a project. Social benefit in the broadcast sense can be defined as any benefit to society whether economic or not.

Various steps involved in working out social costs and benefits in a project:

1.All financial costs on the project are converted into social costs.

Local currency costs have to be classified in three categories, viz. tradable, labour and residuals. The treatment of each category would be different.

Tradable are those items that are dealt in international market. Social costs are calculated by converting the local currency costs into international prices by appropriate conversion factor.

To assess the social costs of the labour payments, the local manpower needs to be divided into three categories, i.e. supervisory or skilled personnel, semi-skilled labour and unskilled workers. The social cost of each of these categories is to be worked out separately on the basis of the technique of shadow pricing or opportunity cost.

Residuals are those items, which are neither tradable nor labour charges. The opportunity cost of these residuals has to be worked out depending upon the nature of each item of cost.

The total social costs are compiled on the basis of capital and operating costs adjusted on the basis of their opportunity costs and shadow prices.

The total value of benefits from a project is assessed as total tradable value of the finished products.

Once social costs and social benefits, as suggested above have been worked out the social cost benefits ratio can be ascertained. Since the various social costs and benefits would arise at different points of time, the technique of discounted cash flows can be used in which case the internal rate of social return can also be worked out.

Margin Money

Bankers keeps a cushion to safeguard against changes in value of securities against which loans are given to customer. This cushion represents the Margin Money.

The quantum of Margin money depends upon the credit worthiness of the borrower and the nature of security.

In project financing, Margin Money has to come from Promoter's contribution.

In the case of borrowing for working capital Margin money has to be provided as per norms that are prescribed from time to time by RBI. In the case of new projects Margin money required for working capital is included in the Project Cost.

Note on Appraisal of projects under Inflationary conditions

The timing of project appraisal is significant from the point of view of appraisers. A project under normal conditions is viewed from different angles, viz. technical feasibility, commercial and financial viability and economic and social considerations and managerial aspects. However, normal conditions seldom exist and a project is subjected to inflationary pressures from time to time because the project has to be implemented over a long time frame. During such a period, it will be difficult to predict when the trade cycle sets in and the up-turn the economy is generated. Besides this, this size and magnitude of the project also varies from organization to organization. In such a situation, inflation is bound to affect the project appraisal and implementation process.

In a developing country like ours, inflation has become a part of life and has been steadily increasing over a period of years. Therefore, it is always prudent to make adequate provision for a probable escalation in the project costs as a cushion to inflationary jerks.

It is well known that during a period of inflation, the project cost is bound to escalate on all heads viz. labours, raw material, cost of fixed assets, building materials, remunerations of technician and managerial personnel etc. Besides, such conditions erode the purchasing power of the consumers and are likely to affect the pattern of demand. Thus, not only the costs of production but also the projected statements of profitability, cash flows etc., will get seriously affected. Financial institutions may revise their lending rates of interest during such inflationary times. In these circumstances, project appraisal has to be done generally keeping in view the following guidelines which are adopted normally by governmental agencies, banks and financial institutions.

(a) It is always advisable to make provisions for cost escalation for all heads keeping in mind the rate of inflation, likely delay in completion of project etc.

(b) The various sources of finance should be scrutinized carefully with response to possible revision in the rates of interest by lenders which will affect the cost of borrowing, the collateral securities offered, margins required etc.

Adjustments are to be made in the profitability and cash flow projections to take care of the inflationary pressure affecting future projections.

It is also advisable to critically examine the financial viability of the project at the revised rates and reasons the economic justification of the project. The appropriate measure for this is the economic rate of return for the project which will equate the present cost of capital expenditure to net cash flows over the project life. The rate of return should be acceptable which also accommodates the rate of inflation.

In an inflationary situation, projects having early pay back periods should be preferred because projects with a longer pay back periods may tend to be risky.

Because inflation can have major effect on business, it is critically important and must be recognized "The most effective way to deal with inflation is to build into each cash flow element, using the best available information about how each element will be affected, since one cannot estimate future rates of inflation, errors are bound to be made. Therefore, inflation adds to uncertainty, riskness and complexity to capital budgeting. Fortunately, computers and spread

sheet models are available to help inflation analysis. Thus, in practice, the mechanics of inflation adjustments are not difficult.

Q. 1. What are the issues that need to be considered by an Indian investor and incorporated within the Net Present Value (NPV) model for the evaluation of foreign investment proposals?

Ans. The issues that need to be considered by an Indian investor and incorporated within the Net Present Value (NPV) model for the evaluation of foreign investment proposals are the following:

(1) **Taxes on income associated with foreign projects:** The host country levies taxes (rates differ from country to country) on the income earned in that country by the Multi National Company (MNC). Major variations that occur regarding taxation of MNC's are as follows:

Many countries rely heavily on indirect taxes such as excise duty, value added tax and turnover taxes etc.

Definition of taxable income differs from country to country and also some allowances e.g. rates allowed for depreciation.

Some countries allow tax exemption or reduced taxation on income from certain "desirable" investment projects in the form of tax holiday's exemption from import and export duties and extra depreciation on plant and machinery etc.

Tax treaties entered into with different countries e.g. double taxation avoidance agreements.

Offer of tax havens in the form of low or zero corporate tax rates.

(2) Political risks: The extreme risks of doing business in overseas countries can be seizure of property/nationalization of industry without paying full compensation. There are other ways of interferences in the operations of foreign subsidiary e.g. levy of additional taxes on profits or exchange control regulations may block the flow of funds, restrictions on employment of foreign managerial/technical personnel, restrictions on import of raw materials/supplies, regulations requiring majority ownership vetting within the host country.

NPV model can be used to evaluate the risk of expropriation by considering probabilities of the occurrence of various events and these estimates may be used to calculate expected cash flows. The resultant expected net present value may be subjected to extensive sensitivity analysis.

(3) Economic Risks: The two principal economic risks which influences the success of a project are exchange rate changes and inflation.

The impact of exchange rate changes and inflation upon incremental revenue and upon each element of incremental cost need to be compared.

Certainty Equivalent Approach:

This approach recognizes risk in capital budgeting analysis by adjusted estimated cash flows and employs risk free rate to discount the adjusted cash flows. Under this method, the expected cash flows of the project are converted to equivalent risk less amounts. The greater the risk of an expected cash flow, the smaller the certainty equivalent value of receipts and longer the C.E. value for payment. This approach is superior to the risk adjusted discounted approach as it can measure risk more accurately.

This is yet another approach for dealing with risk in capital budgeting to reduce the forecasts of cash flows to some conservative levels. In Certainty Equivalent Approach we incorporate risk to adjust the cash flows of a proposal so as to reflect the risk element. The Certainty Equivalent Approach adjusts future cash flows rather than discount rates. This approach explicit recognizes risk, but the procedure for reducing the forecasts of cash flows is implicit and likely to be inconsistent from one investment to another.

PREVIOUS YEAR QUESTION

Q. 1. **[2006-June]** "The cash flow approach of measuring future benefits of a project is superior to the accounting approach." Discuss.

An. Capital budgeting is concerned with investment decisions which earn return over a period of time in future. For evaluation of investment proposal an estimation of the future benefits accruing from the investment proposal is required to be made. To quantity the benefits, two alternative criteria are available and they are accounting profit and cash flows. The basic differentiating factor is the inclusion of certain non-cash expenses in the profit and loss account, such as, depreciation. Hence, the accounting profit is to be adjusted for non-cash expenditure to determine the actual cash inflow. The cash flow approach of measuring future benefits of a project is superior to the accounting approach as cash flows are theoretically better measures of the net economic benefits of costs associated with a proposed project, because of the following three reasons:

It considers economic value which is determine by the economic outflows and inflows.

The use of cash flows avoid accounting ambiguities.

The cash flow approach take into account time value of money whereas the accounting approach ignores it.

Practical question

Q. 2. **(a)** A company is considering an investment proposal to install new milling controls at a cost of Rs. 50,000. The facility has a life expectancy of 5 years and no salvage value. The tax rate is 35 percent. Assume the firm uses the straight-line depreciation and the same is allowed for tax purposes. The estimated cash flows before depreciation and tax (CFBT) from the investment proposal are as follows:

Year	**CFBT**
1	Rs. 10, 000
2	10, 692
3	12, 769
4	13, 462
5	20, 385

Compute the following:

(i) Pay Back Period — Ans. – 4.328 yer.

(ii) Average Rate of Return — Ans. – 9%

(iii) Internal Rate of return — Ans. - 6.6 %

(iv) Net present value at 10% discount rate. — Ans. - (4648)

(v) Profitability index at 10 percent. — Ans. - 0.907

(b) A company is considering a proposal to install a machine. The cash flows are as follows:

Machine	Immediate Cash out flows(in lakhs of Rs.)	Cash inflows(in lakhs of Rs.) at the end of Year				
		1st	2nd	3rd	4th	5th
Machine A	45	10	14	16	17	15

The Company's cost of capital is 10%. You are required to make these calculations.

(1) Net Present Value Ans. - 8.596
(2) Profitability Index Ans. – 1.191
(3) Payback Period Ans. – 3.29 Yer.
(4) Discounted Payback Period Ans. – 4.08 Yer.
(5) IRR Ans. – 17.13%

Note: Present Value of Re. 1 at 10% discount rate are as follows:

Year	0	1	2	3	4	5
P.V.	1.00	0.909	0.826	0.751	0.683	0.621

Q. 3. Santosh & Co. is considering setting up a new unit. The following data has been complied by the company for the purpose of determining the acceptability of the proposal for setting up the new unit.

(i) Land
  (a) To be paid at the time of purchase (t =0) ` 2 lakhs
  (b) 1st, 2nd and 3rd installment at the end of next 3 following years each installment ` 1 lakh
(ii) Factory Buildings: (Total ` 20 lakhs)
  (a) Initial payment on signing of contract ` 2 lakhs
  (b) At the end of year 2 ` 10 lakhs
  (c) Balance at the end of year 3 ` 8 lakhs
(iii) Plant, Machinery & equipment:
  To be paid at the beginning of
  - year 4 ` 15 lakhs
  - year 5 ` 5 lakhs
(iv) Extra Margin for working capital (at the end of year 5) ` 4 lakhs
(v) Operations will begin in the 6th year and will continue for 10 years upto year 15. Assume revenue and costs at the end of each year.
(vi) Buildings, plant machinery and equipment will be depreciated on straight line method over 10 years starting from year 6, as under:
  Building @ 5%
  Plant, Machinery and equipment @ 10%
(vii) Buildings are expected to be sold for ` 6 lakhs and land for ` 8 lakhs at the end.
(viii) Plant, Machinery & equipment will have a salvage value of ` 2 lakhs.
(ix) Cost of capital is 12%
(x) Other operating data:
  Annual sales – ` 30 lakhs
  Variable sales of operation – ` 12 lakhs

Fixed costs (excluding depreciation) – ` 8 lakhs; and Tax rate – 50%.

Advise whether the company should accept the project or reject it on the basis of NPV of the project:

P.V. Factors at 12% for Re.1

Year 1 – 0.893	Year 6 – 0.507
Year 2 – 0.797	Year 7 – 0.452
Year 3 – 0.712	Year 8 – 0.404
Year 4 – 0.636	Year 9 – 0.361
Year 5 – 0.567	Year 10 – 0.322

Present value of annuity of Re.1 for 9 years at 12% = 5.328.

Ans. NPV -11.721

Q. 4. Following are the data on a capital project being evaluated by the management of X Ltd.

	Project M	
Annual cost saving	` 40, 000	
Useful Life	4 years	
I.R.R.	15%	
Profitability Index (P.I.)	1.064	
NPV	?	Ans. – 7304
Cost of Capital	?	Ans. – 12%
Cost of project	?	Ans. 114200
Payback	?	Ans.– 2.855
Salvage value	0	

Find the missing values considering the following table of discount factor only:

Discount Factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 year	0.756	0.769	0.783	0.797
3 year	0.658	0.675	0.693	0.712
4 year	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

Conflict of Rankings

Q. 5. The Cash Flows of projects C and D are reproduced below:

	Cash Flow					
Project	**C0**	**C1**	**C2**	**C3**	**NPV at 10%**	**IRR**
C	` 10, 000	+2000	+ 4000	+12,000	`4139	26.5%
D	` 10, 000	+10, 000	+ 3000	+ 3000	+`3823	37.6%

(i) Why there is a conflict of rankings ?

(ii) Why should you recommend project C inspite of lower internal rate of return ?

Ans.

(i) Suppose the discount rate as 0, 10, 15, 30 and 40 percent. The NPV for each of the projects is given below:

	NPV	
Discount rate (%)	**C**	**D**
0	8, 000	6, 000
10	4, 134	, 821
15	2, 660	2, 942
30	- 634	831
40	- 2164	238

It is noticed that for project C, the larger cash flows occur later in its life. At the lower discount rates, project's C NPV will be higher than of project D. As in discount rates start increasing, project C's NPV Will, however, fall as a faster rate simply because its largest cash flows come late in life when the compounding effects of timings are most significant. Till the discount rate reaches 14% (approximately), project C has higher NPV than project D. After his break – even discount – rate, project D has higher NPV as well as higher IRR. Thus, the rankings of the projects have differed because of the difference in time – patterns of cash flows.

(ii) If the opportunity cost of capital is 10%, project C should be under taken because the firm will be richer by additional ` 313 (i.e. ` 4134 – ` 3821). This can be better appreciated if we calculate the profitability of the incremental investment (C – D).

	Cash Flows					
Project	***C0***	***C1***	***C2***	***C3***	***NPV at 10%***	***IRR***
C – D	0	-8000	+1000	+9000	+313	12%

The incremental project C – D involves on outlay of ` 8000 in year 1 and produces cash in flows ` 1000 and ` 9000 in year 2 and 3. At 10% opportunity cost of capital, the NPV is positive, ` 313. The IRR is 12%. What does this imply? It implies that project C has all the benefits of project D as well as gives additional wealth.

Q. 6. A company is considering which of two mutually exclusive projects it should undertake. The Finance Director thinks that the project with the higher NPV should be chosen whereas the Managing Director thinks that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after tax cash flows of the projects are as follows:

Year	**0**	**1**	**2**	**3**	**4**	**5**
(cash flows figs 000)						
Project X	(200)	35	80	90	75	20
Project Y	(200)	218	10	10	4	3

Required: -

(a) Calculate the NPV and IRR of each project.
(b) State, with reasons, which project you would recommend.
(c) Explain the inconsistency in the ranking of the two projects.
(d) At what cost of capital decision will be changed.

The discount factors are as follows:

Year	**0**	**1**	**2**	**3**	**4**	**5**
(cash flows figs 000)						
Project X	1	0.91	0.83	0.75	0.68	0.62
Project Y	1	0.83	0.69	0.56	0.48	0.41

Q. 7. A project has the following cash flows:

(` In lakhs)

Year 0	**Year 1**	**Year 2**	**Year 3**
- 100	52	40	50

Required:

(a) What is the IRR of the project ?
(b) Calculate the unrecovered investment balances using the IRR.
(c) If you were to calculate the unrecovered investment balances using a rate equal to 10% what is the final investment balance ?
(d) What is the NPV of the project if the cash flows are discounted at 10% ?
(e) What is the relationship, if any, between your answers to questions (c) and (d) ?

Ans. (A) 20%, (B) 0, (C) 23.82, (D) 17.858, (E) T. V = N.P.V $(1+r)^n$

REPLACEMENT DECISION

Q. 7. A machine is purchased six years back for ` 1,50,000 has been depreciated to a book value of ` 90, 000. It originally had a projected life of fifteen years and zero salvage value. A new machine will cost ` 2,50,000 and result in a reduced operating cost of ` 30,000 per year for the next nine years. The older machine could be sold for ` 50,000. The machine also will be depreciated on a straight line method on nine year life with salvage value of ` 25,000. The company's tax rate is 50% and cost of capital is 10%.
Determine whether the old machine should be replaced.
Given – Present value of Re. 1 at 10% on 9^{th} year – 0.424 and present value of an annuity of Re. 1 at 10% for 8 years = 5.335.

Ans. (39820)

Q. 8. P Ltd. has a machine having an additional life of 5 year, which costs ` 10,00,000 and has a book value of `4,00,000. A new machine costing `20,00,000 is available. Though its

capacity is the same as that of the old machine, it will mean a saving in variable costs to the extent of `7,00,000 per annum. The life the machine will be 5 years at the end of which it will have a scrap value of `2,00,000. The rate of income tax is 46% and P Ltd. policy is not make an investment if the yield is less than 12% per annum. The old machine if sold today will realize `1,00,000 it will have no salvage value if sold at the end of 5th year. Advise P Ltd., whether or not the old machine should be replaced. (Present value of Re.1 receivable annually for 5 years at 12% = 3.605, present value of Re.1 receivable at the end of 5 years are 12% per annum = 0.567). Capital gain is tax-free. Ignore Income tax savings on depreciation as well as on loss due to sale of existing machine.

Ans. (423910)

Q. 9. AP Udyog is considering a new automatic blender. The new blender would last for 10 years and would be depreciated to zero over the 10year period. The old blender would also last for 10 more years and would be depreciated to zero over the same 10 year period. The old blender has a book value of ` 20, 000 but could be sold for ` 30,000 (the original cost was ` 40, 000). The new blender would cost ` 1,00,000.

It would reduce labour expense by ` 12,000 a year. The company is subject to a 50% tax rate on regular income and a 30% tax rate on capital gains. Their cost of capital is 8%. There is no investment tax credit in effect.

You are required to:

(i) Identify all the relevant cash flows for this replacement decision.

(ii) Compute the present value, net present value and profitability index.

(iii) Find out whether this is an attractive project.

Given: The present value of annuity @8% for rupee one for
10 ears = 6.710.

Ans. 73,000, 10,000, 0.919 No.

Q.No 10. Anuj Enterprises Ltd. is a manufacturer of high quality running shoes. Ms. Dazling, President is considering computerizing the companies ordering, inventory and billing procedures. She estimates that the annual savings from computerization include a reduction of ten clerical employees with annual salaries of Rs. 15,000 each, Rs. 8,000 from reduced productions delays caused by raw materials inventory problems, Rs.12,000 from lost sales due to inventory stock outs and Rs. 3,000 associated with timely billing procedures. The purchase price of the system is Rs. 2,00,000 and installation cost are Rs. 50,000. These outlays will be capitalized (depreciated) on a straight line basis to a zero book salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual salaries if Rs. 40,000 per person. Also annual maintenance and operating (cash) expenses of Rs. 12,000 are estimated to be required. The companies tax rate is 40% and its required rate if return (cost of capital) for this project is 12%.

You are required to:

(a) find the projects initial net cash outlay.

(b) find out the projects operating and terminal value cash flows over its five years life.

(c) Evaluate the project using the NPV method.

(d) Evaluate the project using PI method.

(e) Calculate the projects payback method.

(f) Find the project cash flows and NPV [parts (a) through (c)] assuming that the system can be sold for Rs. 25, 000 at the end of five years even though the book salvage value will be zero.

(g) Find the project cash flow and NPV [parts (a) through (c)] assuming that the book salvage value for depreciation purpose is Rs. 20, 000 even though the machine is worthless in terms of resale value.

Ans. (A) 2,50,000 (B) 68600 (C) (2697) (E) 3.64 Yer. (F) NPV 5808
(G) (3929)

Q.No 11. Manu Bahi & Co. is considering purchase of a machine that will enable production to increase by 25% from 80,000 units to 1,00,000. The machine costs Rs. 2 lakhs and has a useful life of 10 years with a salvage value of 5%. The company is eligble for investment allowance of 25%. There will be increased requirement of working capital to the extent of Rs. 40, 000.

The following additional information is also furnished to you:

Variable Cost [Per Unit]: Rs. 5

Fixed Cost [Per Annum]: Rs. 2, 00, 000

The variable cost will remain the same but the fixed cost will increase by the amount of depreciation on the new machine. The current selling price is Rs. 10 per unit which may have to be brought down by 50 paise in order to sell the entire production of 1, 00, 000 units. The company adopt a straight line method of depreciation, Tax rate is 50% and the minimum require rate of return is 15%. P.V. factors at 15%.

(a) Present value of an annuity of Re. 1 at the end of 9 years = 4.772.

(b) Present value of Re.1 receivable at the end of 10 years is .247.

Discuss whether it would be advisable for the company to purchase the machine.

Ans. NPV 29,495

Q12. An existing company has a machine, which has been operation for 2 year; it's remaining estimated useful life is 10 years, with no salvage value at the end. It current market value is Rs. 1, 00, 000. The management is considering a proposal to purchase an improved model of a similar machine, which gives increased output. The relevant particulars are as follows:

Particulars	**Existing Machine**	**New Machine**
Purchase price	Rs. 2, 40, 000	Rs.400000
Estimated Life	12 years	10 years
Salvage value	Nil	Nil
Annual operating hours	2, 000	2, 000
Selling price per unit	Rs. 10	Rs. 10
Output per hour	15 units	30 units
Materials cost per unit	Rs. 2	Rs. 2
Labour cost per hour	Rs. 20	Rs. 40
Consumable stores per year	Rs. 2, 000	Rs. 5, 000
Repairs and maintenance per year	Rs. 9, 000	Rs. 6, 000
Working Capital	Rs. 25, 000	Rs. 40, 000

The company follows the straight line method of depreciation and is subject to 50% tax. Should the existing machine be replaced ? Assume that the company's required rate of return is 15%.

Note:

(i) Present Value of annuity of Re. 1 at 15% rate of discount for 10 years is 5.019.

(ii) Present Value of Re. 1 at 15% rate of discount, received at the end of 10^{th} year is 0.247.

Ans. N.PV 290795

Q13. The management of M.S. & Co. is considering the replacement of its existing machine. The WDV of the existing machine is Rs. 75,000 and its cash salvage value is Rs. 30, 000. Labour charges involved in removing the machine is Rs. 75,00. Cost of the new machine is Rs. 30 lakhs and its expected life is 10 years. M.S. & Co. adopts straight line depreciation without taking into account scrap value.

M.S. & Co. incurred other expenses pertaining to the new machine such as:

(a) Installation : Rs. 22, 500

(b)	Training of workers	:	Rs. 7, 500
(c)	Additional working capital	:	Rs. 15, 000
(d)	Consultant fees	:	Rs. 15, 000

The annual saving before tax from the new machine is amounted to Rs. 3 lakhs. The income tax rate is 45%. The company's required rate of return is 15%. Advise whether the company should purchase the new machine or not.

Q14. A chemical company is presently an outside firm Re. 1 per gallon to dispose off the waste material resulting from its manufacturing operations. At normal operating capacity, the waste is about 50, 000 gallons per year.

After spending Rs. 60, 000 on research, the company discovered that the waste could be sold for Rs. 10 per gallon if it was processed further. Additional processing would, however, require an investment of Rs. 6, 00, 000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.

Except for the costs incurred in advertising Rs. 20, 000 per year, no change in the present selling and administrative expenses is expected, if the new product is sold. The details of additional processing costs are as follows:

Variable: Rs. 5 per gallon of waste put into process.
Fixed: excluding depreciation): Rs. 30, 000 per year.

In costing the new product, general administrative overheads will be allocated at the rate if Rs. 2 per gallon.

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in that very year. Estimates indicates that 40, 000 gallons of the product could be sold each year.

The management when confronted with the choice of disposing off the waste of processing it further and selling it, seeks your advice. Which alternative would you recommend ? Assume that the firm's cost of capital is 15% and it pays on an average 35% tax on its income.

Note: Present value of annuity of Re. 1 at 15% rate of discount for 10 years is 5.019.

Ans. PV Dispose up off = 1,63,118, Processing = 37,872

EXPANSION & DIVERSIFICATION

Q15. Sagar Industries is planning to introduced a new product with a projected life of 8 years. The project to be set up in backward region, qualifies region, qualifies for a one – time (as its starting) tax-free subsidy from the government of Rs. 20 lakhs. Initial equipment cost will be Rs. 140 lakhs and additional and additional equipment costing Rs. 10 lakhs will be needed at the beginning of the third year. At the end of 8 years, the original equipment will have no resale value, but the supplementary equipment can be sold for Rs. 1 lakh. A working capital of Rs. 15 lakhs will be needed. The sales volume over the eight year period have been forecast as follows:

Year	Units
1.	80, 000
2.	1,20, 000
3 – 5	3, 00, 000
6 – 8	2, 00, 000

A sale price of Rs. 100 per unit is expected and variable expenses will amount 40% of sales revenue. Fixed cash operating costs will amount to Rs. 16 lakhs per year. In addition an extensive advertising campaign will be implemented, requiring annual outlays as follows:

Year	Rs. (in lakhs)
1	30
2	15
3-5	10
6-8	4

The company is subject to 50% tax rate and considers 12% to be an appropriate after tax cost of capital for the project. The company follows the straight-line method of depreciation. Should the project be accepted ? Assume that the company has enough Income from its existing products.
Note: Present value of Rs. 1 at 12% rate of discount is as follows:

Year	PV factor at 12%
1	0.893
2	0.797
3	0.712
4	0.636
5	0.567
6	0.507
7	0.452
8	0.404

Ans. Out flow = 142.97, In Flow = 286

Q30. Television Ltd. has a proposal for manufacturing car televisions. The project would involve cost of plant at Rs. 500 lacs, installation cost of Rs. 100 lacs and working capital of Rs. 125 lacs. The annual capacity of the plant is to manufacture 20,000 sets. Price per set is Rs. 20,000/-, with a variable cost ratio of 65%. Cash – fixed costs in the first year, including promotion expenditure of Rs. 120 lacs, is Rs. 420 lacs and is thereafter Rs. 300 lacs each year. Depreciation is at 25% WDV. Working capital requirements is 25% of sales. The company expects that the plant's capacity utilization over its estimated useful life of seven years is as under:

Year	1	2	3	4	5	6	7
Capacity utilization%	25	40	50	75	100	100	100

Terminal value of the project is 20% at invoice price. If the hurdle rate is 12%, and tax rate is 35% plus 5% surcharge, can the project be accepted? While evaluating you have to keep in mind that the Company has other sources of income against which the losses if any from this project, can be set off. Also assume that the terminal value would include release of funds blocked in working capital.

Ans. 942

Q17. Ashoka company is setting up a project at a cost of Rs. 150 lakhs. If the company locates the projects in a backward area it would get a cash subsidy of Rs. 7.5 lakhs and taxable profit to the extent of 10% exempt for ten years. These benefits will not be available if the company locates the project in a developed area. But in their case the project requires a borrowing of Rs. 100 lakhs. It would cost 12% in developed area and 10% in backward area. The borrowing have to repaid in 4 equal installments beginning from the end of the 4th year.

Further Information:

(i) the company adopts straight line depreciation with no residual value.

(ii)

Year: EBI and depreciation (in lakhs)	**Developed**	**Backward**
1	(3)	(25)
2	17	(10)
3	27	5
4	37	10
5	54	22.5
6	71	50
7	78	77.5
8	115	95
9	165	115
10	215	165

(iii) Cost of capital is 18%.

As a financial manager suggest to your board of directors the proper location of the project.

Ans. B NPV (24.262) D 43.684

Q16. A product is currently manufactured on a machine that is not fully depreciated for tax purposes and a has a book value of Rs. 70, 000. It was purchased for Rs. 2, 10, 000 twenty years ago. The costs of the product are as follows:

	Unit Cost Rs.
Direct Labour	28.00
Indirect Labour	14.00
Other variable overhead	10.50
Fixed Overhead	17.50

In the past year 10, 000 units were produced. It is expected that with suitable repairs the old machine can be used indefinitely in future, the repairs are expected to average Rs. 75, 000 per year.

A equipment manufacturer has offered to accept the old machine as a trade in for new equipment. The new machine would cost Rs. 4, 20, 000 before allowing for Rs. 1, 05, 000 for the old equipment. The project costs associated with new machine are as follows:

	Unit cost (Rs.)
Direct Labour	14.00
Indirect Labour	21.00
Other variable overhead	7.00
Fixed overhead	22.75
	64.75

The fixed overhead cost are allocations from other departments price plus the depreciation of the equipment.

The old machine can be sold now for Rs. 50, 000 in the open market. The new machine has expected life of 10 years and salvage value of Rs. 20, 000 at that time. The current corporate income tax rate is assumed to be 50%. For tax purpose cost of the new machine and the book value of the old machine may be depreciated in 10 years. The minimum required rate is 10%. It is expected that the future demand of the product will stay at 10, 000 units per year. This present value of an annuity of Re.1 for 9 years @ 10% discount factor is 5.759. The present value of Re.1 received at the end of 10^{th} year @ 10% discount factor is = 0.386.

Should the new equipment be purchased ? (Assume no capital gain taxes).

Ans. 347162.5

Q18. A product is currently manufactured on a plant that is not fully depreciated for tax purposes and has a book value of Rs. 60,000 (it was bought for Rs. 1,20,000 six years ago). The cost of product is as under: -

		Unit Cost Rs.
Direct Costs	24.00	
Indirect Labour		8.00
Other variable over heads	16.00	
Fixed over heads	16.00	
	64.00	

10, 000 units are normally produced. It is expected that the old machine can be used, indefinitely into the future, after suitable repairs, estimated cost Rs. 40,000 annually, are carried out.

A manufacturer of machinery is offering a new machine with the latest technology at Rs. 3,00,000 after trading off the old plant for Rs. 30,000. The projected cost of the equality of the product will then be:

		Per Unit Rs.
Director Costs		14.00
Indirect Labour		12.00
Other variable overheads	12.00	
Fixed Overheads	20.00	
		58.00

The fixed overheads are allocations from other departments plus the depreciation of plant and machinery.

The old machine can be sold for Rs. 40, 000 in the open market. The new machine is expected to last for 10 years at the end of which, its salvage value will be Rs. 20, 000. Rate of corporate taxation is 50%. For tax purposes, the cost of the new machine that of the old one may be depreciated in 10 years. The minimum rate of return expected is 10%.

It is also anticipated that in future the demand for the products will stay at 10, 000 units. Advise whether the new machine can be purchased. Ignore capital gain taxes.

Ans. NPV 214683

Q20. A product is currently being manufactured on a machine that has a book value of Rs. 30, 000. The machine was originally purchased for Rs. 60, 000 ten years ago. The per unit costs of the product are: Direct Labour Rs. 8.00; direct materials Rs. 10.00; variable overheads Rs. 5.00; fixed overheads Rs. 5.00; and total is Rs. 28.00. In the past year 6, 000 units were produced and sold for Rs. 50.00 per unit. It is expected that the old machine can be used indefinitely in the future.

An equipment manufacturer has offered to accept the old machine at Rs, 20, 000, a trade – in for a new version. The purchase price of the new machine is Rs. 1, 00, 000. The projected per unit costs associated with the new machine are: direct labour Rs. 4.00; direct materials Rs. 7.00; variable overheads Rs. 4.00; fixed overheads Rs. 7.00 and total is Rs. 22.00.

The management also expects that, if the new machine is purchased, the new working capital requirement of the company would be less by Rs. 10, 000. The fixed overheads costs are allocations from other departments plus the depreciation of the equipment. The new machine has an expected life of ten years with no salvage value; the straight line method of depreciation is employed by the company. It is also expected that the future demand of the product would

remain at 6, 000 units per year. Should the new equipment be acquired ? Corporate tax is @50%.

Notes**:** (i) Present value of annuity of Re. 1.00 at 10% rate of discount for 9 years is 5.759. (ii) Present value of Re. 1.00 at 10% rate of discount, received at the end of 10^{th} year is 0.386.

Ans. NPV 100127.5

Q21. A theatre with some surplus accommodation proposes to extend its catering facilities to provide meals to it patrons.

The Management Board is prepared to make initial funds available to cover capital costs. It requires that these be repaid over a period of five years at a rate of interest of 14% and discounting factors at this interest rate are indicated below:

Year	**0**	**1**	**2**	**3**	**4**	**5**
Discounting Factor	1	0.88	0.77	0.67	0.59	0.52

The capital costs are estimated at Rs. 60, 000 for equipment that will have a life of five years and no residual value. Running costs of staff etc., will be Rs. 20, 00 in the first year, increasing by Rs. 2, 000 in each subsequent year. The board proposes to charge Rs. 5, 000 per annum for lighting, heating and other property expenses and wants a nominal Rs. 2, 500 per annum to cover any unforeseen contingencies. Apart from this, the Board is not looking for any profit, as such, from the extension of these facilities, because it believes that this will enable more theatre seats to be sold. It is proposed that costs should be recovered by setting prices for the food at double the direct costs.

It is not expected that the full sales level will be reached until Year 3. The proportions of the level estimated to be reached in Years 1 and 2 are 35% and 65% respectively.

You are required to:

Calculate the sales that need to be achieved in each of the five years to meet the Board's targets. Ignore taxation and inflation.

Ans. 128449

Q22. A company invests Rs. 3, 00, 000 in a project for manufacture of a new product. The life of the project is 4 years. The manufacturing cost of the first year is estimated at Rs. 1, 50, 000 which will increase by Rs. 15, 000 every year from the second year onwards. Sales will be normal in the fourth year. In the first three years, sales are expected to be 35%, 60% and 75% of the normal sales respectively. Selling price is to be fixed to earn a profit of 25% on selling price. The cost of capital is 15%. Discounting factors at 15% for years 1 to 4 respectively are 0.870, 0.756, 0.658 and 0.572.

You are required to determine the annual sales of each of the four years.

Ans. 574117

 # <u>CAPTIAL RATIONNING</u>

Q23. A company has investible funds of Rs. 10 lakhs and is considering the following projects:

Project	**Amount (Rs.)**	**Profitability Index**
A	3,00,000	1.22
B	1,50,000	0.95
C	3,50,000	1.20
D	4,50,000	1.18
E	2,00,000	1.20
F	4,00,000	1.05

(a) Which of the above investments should be undertaken ? Assume that projects are divisible.

Ans. 203000

(b) Which of the above investments should be undertaken ? Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting.

Ans. 191000

Q24. XYZ Ltd. has a cost of capital of 10 per cent and has a limit of Rs. 1,00,000 for investment. The following projects are being considered. All these projects have 5 years' life.

Project	**A**	**B**	**C**	**D**	**E**
Investment	35, 000	40, 000	65, 000	48, 000	23, 000
NPV	17, 500	22, 500	38, 000	31, 500	9, 000

(a) Select the optional investment plan if the above projects are divisible.

(b) Select the optimal investment plan if the above projects are indivisible and the surplus funds can be invested to produce 12 percent p.a. for 5 years.

(A) 61900, (B) 55500

Q25. Alpha Ltd. is considering five capital projects for the years 1994 and 1995. The company is financed by equity entirely and its cost of capital is 12%. The expected cash flows of the projects are as below:

Year and Cash Flows (Rs. '000)

Project	**1994**	**1995**	**1996**	**1997**
A	(70)	35	35	20
B	(40)	(30)	45	55
C	(50)	(60)	70	80
D	-----	(90)	55	65
E	(60)	20	40	50

Note: **Figures in brackets represent cash outflows.**

All projects are divisible i.e. size of investment can be reduced, if necessary in relation to availability of funds. None of the projects can be delayed or undertaken more than once.

Calculate which project Alpha Ltd. should undertake if the capital available for investment is limited to Rs. 1, 10, 000 in 1994 and with no limitation in subsequent years. For your analysis, use the following present value factors:

Year	1994	1995	1996	1997
Factor	1.00	0.89	0.80	0.71

Ans. 45.58

Q26. A company has investiable funds of Rs. 22 lakhs in first year & there shall be no fund constraints in second year onwards. It is considering the following projects:

Project	**PV Outflows**	**Initial Outflows (Rs. In lakhs)**	**NPV**	**Remarks**
A	3	3	12	Indivisible
B	6	5	18	=
C	10	8	20	=
D	9	6	6	=
E	4	4	5	=
F	10	8	5	=
G	10	8	(-2)	=

Project C & D are mutually exclusive and Project A is complementary to G. Any uninvested amount in first year would results in a negative N.P.V. of one rupee for every ten rupees of uninvested amount. Select the most desirable combination of Projects.

Ans. 42.90

Q27. Venture Ltd. has Rs. 30 lakhs available for investment in capital projects. It has the option of making investment in projects 1, 2, 3 and 4. Each project are entirely independent and have an equal life of 5 years. The expected present value of cash flows from the projects are as follows:

Project	Initial Outlay	Present value of cash flows
1	8,00,000	10,00,000
2	15,00,000	19,00,000
3	7,00,000	11,40,000
4	13,00,000	20,00,000

Which of the above investment should be undertaken. Assume that the cost of capital is 12% and risk free interest rate is 10% per annum.

Given compounded sum of Re. 1 at 10% in 5 years is Rs. 1.611 and discount factor of Re. 1 at 12% rate for 5 years is 0.567.

Ans. 13.226

RISK UNCERTAINITY

Q28. A company is considering two mutually exclusive projects X and Y. Projects X costs Rs. 30, 000 and Project Y is Rs. 36, 000. You have been given below the net present value profitability distribution for each project:

Project X		Project Y	
NPV Estimate Rs.	Probability	NPV Estimate Rs.	Probability
3, 000	0.1	3, 000	0.2
6, 000	0.4	6, 000	0.3
12, 000	0.4	12, 000	0.3
15, 000	0.1	15, 000	0.2

(i) Compute the expected net present value of Projects X and Y.

(ii) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.

(iii) Which project do you consider more risky and why ?

(iv) Compute the profitability index of each project.

Ans. (i) X=Y=9000, (ii) X=3795, Y=4450, (iv) X=1.3, Y=1.25

INFLATION

Q29. The following are the sales and cost figures for the three years. The initial investment is Rs. 5 lacs.

Details	Year 1	Year 2	Year 3
Sales	5	9	15

Costs 3 6 9

Compute NPV under each of the following situations. Each situation is to be considered separately.

(i) Inflation is zero. The discount rate is 5% **Ans.** 4.809

(ii) All cash flows are in money terms. Inflation is 10%. Money discount rate is 15%. **Ans.** 2.956

(iii) All cash inflows are in money terms. Inflation is 10%. RDR is 8%

(iv) All cash flows are in real terms. Inflation is 10%. Real discount rate is 6%.

Ans. (iii) (0.542) (iv) 4.596

(v) All cash inflows are in real terms. Sales Inflation is 10%. Cost inflation is 5%. MDR is 15%. **Ans.** 8.087

(vi) All cash flows are in real terms. Sales Inflation is 8%. Cost inflation is 5%. MDR is 4%. **Ans.** 5.033

(vii) All cash inflows are in real terms. Sales Inflation is 10%. Cost inflation is 5%. MDR is 12%. **Ans.** 8.937

(viii) All cash flows are in money terms. Sales Inflation is 10%. Cost inflation is 6%. MDR is 15%. **Ans.** 2.956

All cash inflows are in money terms. Inflation is 10%. Cost inflation is 8%. RDR is 4%.

Ans. 0.174

Q.30. PQR Company is examining an investment proposal requiring an initial outflow of ` 8 lacs and expected inflow in real terms (i.e. today's purchasing power ) is ` 2,80,000 per year for the next 4 years .The company's out of pocket monetary cost of capital is 9% and inflation is expected to be 3.2% p.a. over the next four years .

(i) Compute the company's real (net of inflation) cost of capital)

(ii) What is the present value of cash inflow if real cost of capital is taken into consideration?

(iii) Calculate present value of cash inflow if nominal cost of capital is taken into consideration.

Q.No 73 A company has under review a project involving the outlay of Rs. 55,000 and expected to yield the following net cash savings in current savings :

Year	**1**	**2**	**3**	**4**
Rs.	10,000	20,000	30,000	5,000

The company's cost of capital, incorporating a requirement for growth in dividends to keep pace with cost inflation, is 20 percent and this is used for the purpose of investment appraisal. On the above basis, the divisional manager involved has recommended rejection of the proposal.

Having regard to your own forecast that the rate of inflation is likely to be 15 percent in year 1 and 10 percent in each of the following years .You are asked to comment fully on his recommendation .

Q.No 74 ABC and Co. has the following information relating to an investment proposal .The inttial outlay of Rs. 24,00,000 is expected of year 0 with a life of 4 years. The firm has an annual profit before tax and depreciation of `10,00,000 and pay tax @ 40% .The annual cash inflows (i.e. profit after tax + Depreciation) of Rs. 8,40,000 is expected .Assuming that the real discount rate is 5% calculate :

(i) The NPV of the project given that there is no inflation .

(ii) The NPV given that there is an inflation of 10% and the annual profits keep pace with the inflation

Q.No 75 E Ltd. Is considering the replacement of a machine used exclusively for the manufacture of one its product Y .The existing machine have a book value of Rs. 65,000 after deducting straight line depreciation from historical costs ,however it could be sold only for Rs.

45,000 .The new machine would cost Rs. 1,00,000 E Ltd. Excepts to sell product Y for four more years .The existing machine could be kept in operation for that period economically desirable to do so .After four years the scrap value of both the existing machine and the new machine would by zero .

The current cost is per unit manufacturing Y on the existing and machine are as follows :

	Existing Machine(Rs.)	**New Machine (Rs.)**
Materials	22.00	20.00
Labour (32 hours @ Rs. 1.25)	40.00	(16 hours @ Rs. 1.25) 20.00
Overheads (32 hours @ 0.600	19.20	(16 hours @ Rs. 1.80) 28.00

Overheads are allocated to products on the labour –hour rate method .The hourly rates of 0.60 and 1.80 comprise 0.25 and 0.625 for variable overheads and 0.35 and Rs. 1.175 for fixed overheads , including depreciation .Current sales of Y are 1000 units per annum at Rs. 90 each. If the new machine were purchased, output would be increased to 1200 units and selling price reduced to Rs. 80.

E Ltd. Require a minimum rate of return on investment of 20% per annum in money terms .Material cost overheads and selling prices are expected to increase at the rate of 15% per annum , in line with the index of retail prices .Labour costs are expected to increase at the rate of 20% p.a.

You are required to :

(i) Given calculations to show whether purchase of the new machine would be worth white .

(a) Comment on the treatment of inflation and the estimation of 20% money cost

of capital

Q.No 76 A company is considering a new project .The project would involve an initial investment of Rs. 1,20,000 in equipment which would life of 5 years and no scrap value the selling price is now year 0) would be Rs. 60 and is expected to increase in line with the retail price index .Sales are expected to be constant at 2000 units each year .

The following estimates about unit costs are available :

Cost element	**Cost at years 0 prices**	**Rate of increases**
Wages	Rs. 20	2% p.a. faster than retail prices
Other	Rs. 25	In line with retail prices
Total	Rs. 45	

All transaction take place at yearly intervals on the last day of the year .No increase in working capital will be required .The following estimates of the rate of increase in retail prices and interest rates are available :

Year	**Rate of increase in retail prices (%)**	**Interest rate (%)**
1	15	16
2	20	20
3	25	22
4	40	20
5	30	18

Q.No 77 PQ Ltd. A motor components subsidiary of a XY holding company , has to decide near the end of year 0 whether to invest in a new production line .The project involves equipment

costing Rs. 6,00,000 and working capital costing Rs. 1,80,000 at year 0 , and the projected net cash inflows for the products are Rs.2,00,000 per annum for five years at current price levels .At the end of five years it is projected that the equipment will have a terminal value of Rs. 50,000 and the elimination of working capital will provided an inflow equal to its year 0 book value .
PQ Ltd's post –tax cost of capital is 14 percent in nominal (money) terms and the inflows equal to rates is projected to be 5 percent per annum .

Taxation data is also follows :-

(i) The equipment will be subject to writing –down allowances of 25 percent per annum on a reducing –balance basis ,which can be claimed against taxable profits as from the current year (year 0) which is shortly to end . A balancing charge or allowance will arise on disposal .

ii) The rate of corporation tax is 35 percent payable one year in arrears .

Determine whether or not the Net Present Value of the project will justify the investment

Q31. Phoenix Industries, is investigating the replacement of an existing assembly line with a new automated one. The existing assembly line was installed 3 years ago at a cost of Rs. 50,000/-. It is being depreciated on straight – line basis for tax purposes to a zero value over its normal recovery period of 5 years. The old equipment will last for 5 more years, at which time its resale value will be Rs. 20,000, but it could be sold now for Rs. 40,000/-, By replacing the existing line with the new automated one, the yearly expenses would reduce from Rs. 5,10,000/- to Rs. 2,00,000/-. However, the new line would required an increase in inventory of Rs. 2000 the cost of new line is Rs. 10 lacs and it is to be depreciated on straight – line basis over its 5 – year normal recovery period. The estimated resale value of the new line in 5 years is zero. Phoenix's tax rate is 40% and the required rate of return is 16% post tax. It is viable to replace the existing line with the new automated one ?

Ans. -1.18

Q32. Fast – run Automobiles Spares Ltd. (FASL) is considering investment in one of three mutually exclusive projects A, B and C. The Company's cost of capital is 15% and the risk – free rate of return is 10%. FASL has gathered the following basic cash – flow and risk index data for each project:

	PROJECT		
	A	**B**	**C**
	Rs.	**Rs.**	**Rs.**
Initial Investment	15,00,000	11,00,000	19,00,000
Cash inflows after – tax for year:			
1	6,00,000	6,00,000	4,00,000
2	6,00,000	4,00,000	6,00,000
3	6,00,000	5,00,000	8,00,000
4	6,00,000	2,00,000	12,00,000
Risk index	1.80	1.00	0.60

Using the risk adjusted discount rate, determine the risk adjusted NPV for each of the project. Which project should be accepted by the company ? Give reasons.

(i) RADR (Risk Adjusted discount rate) = Risk free rate + Risk index x (Ke – Rf)

(ii) Note: Present value of Re. 1 for five years:

Year	Rate	1	2	3	4	5
	9%	0.9174	0.8417	0.7722	0.7084	0.6499
	11%	0.9009	0.8116	0.7312	0.6587	0.5935
	13%	0.8850	0.7831	0.6931	0.6133	0.5428
	15%	0.8696	0.7561	0.6575	0.5718	0.4972
	17%	0.8547	0.7305	0.6244	0.5337	0.4561
	19%	0.8403	0.7062	0.5934	0.4987	0.4190

Q33. A & Co. is contemplating whether to replace an existing machine or to spend money on overhauling it. A & Co., currently pays no taxes. The replacement machine costs Rs. 90,000 now and requires maintenance of Rs. 10,000 at the end of every year for eight years. At the end of eight years it would have a salvage value of Rs. 20,000 and would be sold. The existing machine requires increasing amounts of maintenance each year and its salvage value falls each year as follows:

Year	Maintenance (Rs.)	Salvage (Rs.)
Present	0	40,000
1	10,000	25,000
2	20,000	15,000
3	30,000	10,000
4	40,000	0

The opportunity cost of capital for A & Co. is 15%.

Required:

When should the company replace the machine ? (Notes: P.V. of an annuity of Re. 1 per period for 8 years at interest rate of 15%: 4.4873; present value of Re. 1 to be received after 8 years at interest rate of 15% : 0.3269)

Q34. Company Y is operating an elderly machine that is expected to produce a net cash inflow of Rs. 40,000 in the coming year and Rs. 40,000 next year. Current salvage value is Rs. 80,000 and next year's value os Rs. 70,000. The machine can be replaced now with a new machine, which costs Rs. 1,50,000, but is much more efficient will provide a cash inflow of Rs. 80,000 a year for 3 years. Company Y wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Ignore tax. Take opportunity cost of capital as 10 percent. Advise with reasons.

Q35. A company is considering a project with life of 5 years. The initial outflows will be Rs. 50 lakhs. The annual inflows will be Rs. 13 lakhs. The rate of return from project will be 10% p.a. Calculate Base NPV. If tax rate is 40% and 12% debenture of Rs. 20 lakhs used to finance the project. Calculate adjusted present value.

Q36. A company is considering a project with life of 4 years. The initial outflows will be Rs. 30 lakhs. The annual inflows will be Rs. 10 lakhs. The rate of return from project will be 15% p.a. Calculate Base NPV. If tax rate is 35% and 20% debenture of Rs. 10 lakhs used to finance the project. Calculate adjusted present value. **Ans.**

Base NPV -1.45, Adjusted NPV 0.36

Q37. S Ltd. is evaluating a project costing Rs. 20 lacs. The project generates savings of Rs. 2.95 lacs per annum, perpetuity. Business risk of the project warrants a rate of return of 15%.

(a) Calculate Base case NPV of the project assuming no tax.

(b) Assuming tax rate of 30% with 12% cost of debt constituting 30% of the cost of the project, determine Adjusted present value.

(c) Find out minimum acceptable Base case NPV as well as minimum IRR.

Q38. Nine Gems Ltd. has just installed Machine – R at a cost of Rs. 2,00,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 1,50,000 units, which can be sold at Rs. 6 per unit. Annual operating costs are estimated at Rs. 2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at Rs. 3 per unit for the same level of production.

Nine Gems Ltd. has just come across another model called Machine – S capable of giving the same output at an annual operating cost of Rs. 1,80,000 (exclusive of depreciation). There will be no change in fixed costs. Capital cost of this machine is Rs. 2,50,000 and the estimated life is for five years with nil residual value.

The company has an offer for sale of Machine – R at Rs. 1,00,000. But the cost of dismantling and removal will amount to Rs. 30,000. As the company has not yet connected operations, it wants to sell Machine – R and purchase Machine – S. Nine Gems Ltd. will be a zero – tax company for seven years in view of several incentives and allowances available.

The cost of capital may be assumed at 14% P.V. factors for five years are as follows:

Year	1	2	3	4	5
P.V. factors	0.877	0.769	0.675	0.592	0.519

(i) Advise whether the company should opt for the replacement.

(ii) Will there be any change in your view, if Machine – R has not been installed but the company is in the process of selecting one or the other machine ?

Support your view with necessary workings.

Ans. (i) 111360 (ii) 18640

Q39. Following cash flow details are available for project A and B. Having an initial outlay of Rs. 5.4 crores and 4.7 crores respectively.

Year	**Project A (Rs. in lacs)**			**Project B (Rs. in lacs)**		
	PAT	**Depre.**	**Interest**	**PAT**	**Depre.**	**Interest**
0	(540)	----	-----	(470)	----	------
1	185	50	60	100	45	50
2	110	50	50	105	45	40
3	195	50	40	135	45	30
4	225	50	30	125	45	20
5	175	50	20	175	45	10

Tax rate = 30%, cost of capital = 20%, only one of the two project can be chosen. Identify which is to chosen based on

		A	B
(a)	**NPV**	222.29	101.53
(b)	**IRR**	37.86%	29.15%
(c)	**PI/(benefit cost ratio).**	1.413	1.212

Q40: Diamond Industries is considering investment in specialized moulds, which cost Rs. 1.00 lakh, with a life of 2 years, after which there is no expected value. The possible incremental cash flows (post tax) are

Year 1		Year 2	
Cash Flow	**Probability**	**Cash Flow**	**Probability**
60, 000	0.20	50, 000	0.20
70, 000	0.50	60, 000	0.50
80, 000	0.30	70, 000	0.30

The risk – free rate of return required by the company is 10%.

Required:

(a) Assume that the cash flows are perfectly correlated. Calculate the net present value and the standard deviation of the net present value of the probability distribution of possible net present values ?

(b) If the NPV were normally distributed what is the probability of the investment providing a negative net present value ?

(c) If the cash flows were independent what would be the probability of the NPV being negative ?

Ans. (a) 14925, 12149 (b) 0.1093 (C) 0.0409

Q41 XYZ Ltd. has determined the following discrete probability distributions for net cash flows generated by a contemplated project:

PERIOD 1		PERIOD 2		PERIOD 3	
Prob.	**Cash Flow**	**Prob.**	**Cash Flow**	**Prob.**	**Cash Flow**
0.10	1, 000	0.20	1, 000	0.30	1, 000
0.20	2, 000	0.30	2, 000	0.40	2, 000
0.30	3, 000	0.40	3, 000	0.20	3, 000
0.40	4, 000	0.10	4, 000	0.10	4, 000

(a) Assume that probability distributions of cash flows for future periods are independent. Also, assume that the risk – free rate 7 percent. If the proposal will require an initial outlay of Rs. 5, 000, determine the mean net present value.
Ans. NPV 1614

(b) Determine the standard deviation about the mean. **Ans.** 1452

(c) If the total distribution is approximately normal and assumed continuous, what is the Probability of the net present value of being zero or less ?
Ans. 0.1335

(d) What is the Probability that the net present value will be greater than zero ?
Ans. 0.8665

(e) What is the Probability that the profitability index will be 1.00 or less?
Ans. 0.1335

(f) What is the Probability that the profitability index will be greater than 2.00 ?
Ans. 0.0099

#DECISION TREE

Q42. A firm has an investment proposal, requiring an outlay of Rs. 40, 000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year I, there is a 0.4 probability that cash inflow after tax will be Rs. 25, 000 and 0.6 probability that cash inflow

after tax will be Rs. 30, 000. The probabilities assigned to cash inflows after tax for the year II are as follows:

The Cash inflow year I **Rs. 25, 000** **Rs. 30, 000**

The Cash inflow year II	**Probability**	**Probability**	
Rs. 12, 000	0.2	Rs. 20, 000	0.4
Rs. 16, 000	0.3	Rs. 25, 000	0.5
Rs. 22, 000	0.5	Rs. 30, 000	0.1

The firm uses a 10% discount rate for this type of investment.

Required:

(a) Construct a decision tree for the proposed investment project.

(b) What net present value will the project yield if worst outcome is realized ? What is the probability of occurrence of this NPV ?

(c) What will be the best and the probability of that occurrence ?

(d) Will the project be accepted ?

(10% Discount Factor 1 year 0.909, 2 year = 0.826)

Ans. (b) -7355, 0.08 (c) 12050, 0.06

Q.No 68 P company is evaluating a new saw with a life of 2 years .The saw costs Rs. 3,000 and further after –tax cash follows depends on demand for the company's products The probability tree of possible future cash follows associated with the new saw is

Year 1		**Year 2**		
Initial Probability	**Cash flow**	**Conditional Probability**	**Cash flow**	**Branch**
0.4	Rs. 1,500	0.3	Rs. 1,000	1
		0.4	1,500	2
		0.3	2,000	3
0.6	Rs. 2,500	0.4	Rs. 2,000	4
		0.4	2,500	5

(a) What are the joint probability of occurrence of the various branches ?

(b) If the risk free rate is 10 percent ,what are the mean and standard deviation of the probability distribution of possible net present values ?

(c) Assuming a normal distribution ,what is the probability the actual net present value will be less than zero ?

Abandonment

Q.No 69 ABC Corporation is ordering a special –purpose piece of machinery costing Rs. 9,000 with a life of2 years after which there is no expected salvage value .The possible incremental net cash flows are

Year 1		**Year 2**	
Cash Flow (Rs.)	**Probability**	**Cash Flow (Rs.)**	**Probability**

6,000	0.3	2,000 3,000 4,000	0.3 0.5 0.2
7,000	0.4	4,000 5,000 6,000	0.3 0.4 0.3
8,000	0.3	6,000 7,000 8,000	0.2 0.5 0.3

The company's required rate of return for this investment is 8 percent .

(a) Calculate the mean of the probability distribution of possible net present net present values .

(b) Suppose now that the possibility of abandonment exists and that the value of the project at the end of year 1 is Rs. 4,500 .Calculate the new mean NPV assuming the company abandons the project if it is worthwhile to so .Compare your calculations with those in part a.What are the implications ?

SENSITIVE ANALYSIS

Q43. The following forecast are made about a proposal, which is being evaluated by a firm.
Initial Outflow Rs. 12, 000 Cash Inflows Rs. 4, 500 (annual)
Life 4 years Ke 14%
PVAF (14%, 4Y) = 2.9137
Analysis the sensitivity of different variables with respect to the NPV.

Q.No 70 A Company is considering investing a new manufacturing project with the following characteristics :

(A) Initial investment Rs. 350 lakhs –Scrap value nil
(B) Expected life 10 years
(C) Sales volume 20,000 unit per year
(D) Selling price Rs. 2,000 per unit
(E) Variable direct cost Rs. 1,500 per unit
(F) Fixed cost excluding depreciation Rs. 25,00,000 per year

The project shows an internal rate of return (IRR) of 17% .The managing Director is concerned about the validity of the investment as the return is close company's threshold rate of 15% .He has requested a sensitivity analysis .

You are required to :

(a) Re-calculate internal rate of return assuming each of the characteristics A to F above in isolation varies by 10% .

(b) Advice the managing Director of the most vulnerable area likely to prevent the project meeting the company's hurdle rate .

(b) Explain what further work might be undertaken to improve the value of the sensitivity analysis under in (a) above .

(c) Re-valuate the situation if another company already manufacturing a similar product , offered to supply the unit at Rs. 1,800 each this would reduce the investment to Rs. 25 lakhs and the fixed costs to Rs. 10 lakhs .

Giving that 1 Rupee received at the end of each year will be cumulated as following with relevant interest rate :

Interest Rate (%)	Year	Cumulative Value	Year	Cumulative Value
16	10	4.83	9	4.60
15	10	5.02	9	4.77
14	10	5.22	9	4.95
13	10	5.40	9	5.13
5	10	7.77	9	7.10

Q.No 71 [CS Final Dec. 2012] The initial investment outlay for a capital investment Project consist of Rs. 100 lakhs for Plant and Machinery and Rs. 40 lakhs for Working Capital .Other details are summarized below :

Selling unit	: 1 lakhs unit of output per year for years 1 to 5
Selling price	: Rs. 120 per unit of output
Variable cost	: Rs. 60 per unit
Fixed Overheads (excluding Depreciation)	: Rs. 15 lakhs per year for years 1 to 5
Rate of depreciation on Plant & Machinery	: 25% on WDV method
Scrape value.	: Equal to the WDV at the end of years 5
Applicable Tax Rate	: 40%
Time Horison	: 5 years
Post –tax cut off rate	: 12%

Required :

(a) Indicate the Financial viability of the project by calculating the Net Present Value

(b) Determine the Sensitivity of the Project's NPV under each of the following conditions:

(i) Decrease in selling Price by 5%

(ii) Increase in Variable Cost by 10%

(iii) Increase in cost of Plant & Machinery by 10%

RISK ADJUSTED DISOCUNT FACTOR

Q-44 Determine the risk adjusted net present value of the following projects: -

	A	B	C	
Net cash outlays (Rs.)	1, 00, 000		1, 20, 000	2, 10, 000
Project life	5 years	5 years	5 years	
Annual cash inflows (Rs.)	30, 000	42, 000	70, 000	
Coeffecient of variation	0.4		0.8	1.2

The company selects the risk – adjusted rate of discount on the basis of the coefficient of variation:

Coefficient of Variation	Risk adjusted rate of discount	Present value factor 1 to 5 years at risk adjusted rate
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

CERTAINTY EQUIVALENT

Q45. The Globe Manufacturing Company Ltd. is considering on investment in one of the two mutually exclusive proposals – Project X and Project Y, which require cash outlays of Rs. 3, 40, 000 and Rs. 3, 30, 000 respectively. The certainly – equivalent (C.E.) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bond is 8% and this be used as the riskless rate. The expected net cash flows and their certainty – equivalents are as follows:

Project X Year–end	Cash Flow	C.E.	Project Y Cash Flow	C.E.
1	Rs. 1, 80, 000	.8	Rs. 1, 80, 000	.9
2	Rs. 2, 00, 000	.7	Rs. 1, 80, 000	.8
3	Rs. 2, 00, 000	.5	Rs. 2, 00, 000	.7

Present value factors of Re. 1 discounted at 8% at the end of year 1, 2 and 3 are .926, .857 and .794 respectively.

PREVIOUS YEAR C.S. FINAL QUESTIONS

Q-46. [June 2000] P. Securities Ltd., Chennai, is engaged in the business of leasing and hire purchase. The company also functions as a merchant banker, equity researcher, corporate financer, portfolio manager etc. The company provides fund based as well as non – fund based financial solutions to both wholesale and retail segments.

P Securities Ltd. has been approached by AA Ltd., Mumbai, for financial help. AA Ltd. manufacturers process system for food processing, pharmaceuticals, engineering, dairy and chemical industries. A wide range of centrifugal separators, plate, spray drugers, custom fabricated equipment for exotic metals, refrigeration compressors, etc., are also manufactured by the company. One of the major strengths of the company is project management.

AA Ltd. has a well equipped R & D center. It has pilot plant facilities and a modern laboratory for chemical, metallurgical and mechanical analyzer. The company has also set up a technology center with advanced testing facilities. Recently, the manager of the technology center has requisitioned for the acquisition of a computerized sophisticated equipment for conducting important tests.

The equipment is likely to have the useful life of three years. The cost of the equipment is Rs. 10 crore. The scrap value of the equipment at the end of its useful life will be zero for the company. The finance manager of AA Ltd. has suggested that the company should take a loan for three

years from a commercial bank. Repayment of the loan would be made at the end of each year in three equal instalments. The repayments would comprise of the (i) principal; and (ii) interest at 10% per annum (on the outstanding amount in the beginning of the year). AA Ltd. uses a cost of capital of 15% to evaluate the investments of this type. The equipment will be depreciated # $33^1/_3$% per annum (WDV).

P. Securities Ltd. has agreed to give the equipment to the company on a three year lease. The annual rental for the lease, payable in the beginning of each year, would be Rs. 4 crore. P. Securities Ltd. discounts its cash flows @ 14%. The equipment is depreciable at $33^1/_3$% per annum (straight line method). The lessee may exercise its ption to purchase the equipment for Rs. 4 crore at the termination of the lease.

AA Ltd. would bear all maintenance, insurance and other charges in both the alternatives. Both the companies pay tax @ 35%.

You are a company secretary in practice. You are approached by the managing director of AA Ltd. to help the company in evaluating the proposal. Prepare a report for the managing director of AA Ltd. showing the effect of the lease alternative on the wealth of its shareholders. Support your answer with appropriate calculations.

NOTE: Present value of Re. 1 is -----

Year	**6%**	**7%**	**10%**	**14%**	**15%**
1	0.943	0.935	0.909	0.877	0.870
2	0.890	0.873	0.826	0.769	0.756
3	0.840	0.816	0.751	0.675	0.658
4	0.792	0.763	0.683	0.592	0.572

Present value of an annuity of Re. 1 is ------

Year	**6%**	**7%**	**10%**	**14%**	**15%**
1	0.943	0.935	0.909	0.877	0.870
2	1.833	1.808	1.736	1.647	1.626
3	2.673	2.624	2.487	2.322	2.283
4	3.465	3.387	3.170	2.914	2.855

Ans. Loan 6.66, Lease 7.307

Q-47 [June 2000] Software Enterprises is considering the purchase of a new computer system for its research and development division, which would cost Rs. 35,00,000. The operation and maintenance costs (excluding depreciation) are expected to be Rs. 7,00,000 per annum. It is estimated that the useful life of the system would be 6 years, at the end of which the disposal value is expected to be Rs. 1,00,000.

The tangible benefits expected from the system in the form of reduction in design and draftsmanship costs would be Rs. 12,00,000 per annum. The disposal of used drawing, office equipment and furniture initially is anticipated to net Rs. 9,00,000.

As a capital expenditure in research and development, the proposal would attract a 100% write – off for tax purpose. The gain arising from disposal of used assets may be considered tax – free. The corporate tax rate is 35%. The required rate of return of the company is 12%.

After appropriate analysis of cash flows, advise the company of the financial viability of the proposal. Ignore tax on salvage value.

Note:

(i) The PV of an annuity of Re. 1 at 12% rate of discount for 6 years is Rs. 4,111.

(ii) The PV of Re. 1 at 12% rate of discount for year one is Re. 0.893 and for year 6 is Re. 0.507.

Ans. 1.193

Q-48 [Dec 2001]

(d) Xpert Engineering Ltd. is considering buying one of the following two mutually exclusive investment projects:

Project –

(e) Buy a machine that requires an initial investment outlay of Rs. 1,00,000 and will generate the cash flows after tax (CFAT) of Rs. 30,000 per year for 5 years.

Project –

(B) Buy a machine that requires an initial investment outlay of Rs. 1,25,000 and will generate the cash flows after tax (CFAT) of Rs. 27,000 per year for 8 years.

Which project should be undertaken ? The company uses 10% cost of capital to evaluate the projects.

Note: Present value of Re. 1 for eight year @ 10% - 0.9091, 0.8264, 0.7513, 0.6830, 0.6209, 0.5645, 0.5132 and 0.4665.

Ans. (A) EANPV 3621.74, (B) 3569.82

(f) [Dec 2001] Fast – run Automobiles Spares Ltd. (FASL) is considering investment in one of three mutually exclusive projects Zeta – 10, Meta – 10, and Neta – 10. The company's cost of capital is 15% and the risk – free rate of return is 10%. The income – tax rate for the company is 40%. FASL has gathered the followed basic cash – flow and risk index data for each project:

	PROJECT		
	Zeta – 10	Meta – 10	Neta – 10
	Rs.	Rs.	Rs.
Initial Investment	15,00,000	11,00,000	19,00,000
Cash inflows after – tax for year:			
1	6,00,000	6,00,000	4,00,000
2	6,00,000	4,00,000	6,00,000
3	6,00,000	5,00,000	8,00,000
4	6,00,000	2,00,000	12,00,000
Risk Index	1.80	1.00	0.60

Using the risk adjusted discount rate, determine the risk adjusted NPV for each of the projects. Which project should be accepted by the company ? Give reasons.

Q49.[Dec 2001] Alfa Ltd. is thinking of installing a computer. Decide whether the computer is to be purchased outright (through 15% borrowing) or to be acquired on lease rental basis. The rate of income – tax may be taken at 40%. The other data available are as under ------

Purchase of Computer:	
Purchase price	Rs. 20,00,000
Annual maintenance (to be paid in advance)	Rs. 50,000 per year
Expected economic useful life	6 years
Depreciation (for tax purpose)	Straight line method
Salvage value	Rs. 2,00,000
Leasing of Computer:	
Lease charges to be paid in advance	Rs. 4,50,000

Maintenance expenses to be borne by the lessor.

Payment of loan: 6 year – end equal instalments of Rs. 5,28,474.

Ans. Lease 1238096, Loan 1342425

Q50: [June 2003] Sell – Well Ltd. is considering to install a large stamping machine. Two machines being considered are as follows:
Machine A: It costs Rs. 50,000 and will require cash running expenses of Rs.15,000 per annum. It has a useful life of 6 years and, thereafter, it is expected to yield Rs. 2,000 as salvage value.
Machine B: It costs Rs. 65,000 and its running expenses are Rs. 12,000 per annum. It has useful life of 10 years and, thereafter, salvage value of Rs. 5,000. Both machines would be depreciated on straight line basis. Corporate tax rate is 50%. Cost of capital is 10%.
Which machine should be bought by the Sell – Well Ltd. ?

Ans. (A) 14722.04 (B) 1363.63

Q-51 [June 2003] Delta Corporation is considering an investment in one of the two mutually exclusive proposals -----

Project – A: It involves initial outlay of Rs. 1,70,000.
Project – B: It requires initial outlay of Rs. 1,50,000.

The certainty – equivalent approach is employed in evaluating risky investments. The current yield on treasury bills is 5% and the company uses this as riskless rate. Expected values of net cash inflow with their respective certainty – equivalents are:

Project A		**Project B**	
Year	Cash inflow	Certainty equivalent (Rs.)	Cash Inflow	Certainty equivalent (Rs.)
1	90,000	0.8	90,000	0.9
2	1,00,000	0.7	90,000	0.8
3	1,10,000	0.5	1,00,000	0.6

Answer the following with reasons:
(i) Which project should be acceptable to the company ?
(ii) Which project is riskier and why ? Explain.
(iii) If the company was to use the risk – adjusted discount rate method, which project would be analysed with higher rate ?

Q-52 [Dec 2004] Venkatesh Ltd. is always discarding old lines and introducing new lines of products and is considering at present three alternative promotional plans for ushering in new products. Various combinations of prices, development expenditure and promotional outlay are involved in these plans. High, medium and low forecast of revenues under each plan have been formulated and their respective probabilities of occurrence have been estimated. Their budgeted revenues and probabilities along with other relevant data are summarized as under:

(Rupees in lakhs)

Particulars	Plan – I	Plan – II	Plan – III
Budgeted revenue with probability:			
High	30 (0.3)	24 (0.2)	50 (0.2)
Medium	20 (0.3)	20 (0.7)	25 (0.5)
Low	5 (0.4)	15 (0.1)	0 (0.3)
Variable cost as percentage of revenue	60%	75%	70%
Initial investment	25	20	24

Life in years	8	8	8

The company's cost of capital is 12% and the income – tax is 40%. Investment in promotional programmes will be amortised by the straight – line method. The company will have net taxable income each year regardless of the success or failure of the new products.

(i) Substantiating with figures, make a delighted analysis and find out which of the promotional plans is expected to be the most profitable?

(ii) In the worst event, which of the plans would result in maximizing the profits ?

Q-53 [June 2004] Prudent Ltd., manufacturers of LPG cylinders, requires 10 Indica Cars for use of its officers. Two alternative options are under consideration

(a) Option – I: Outright purchase financed by Tata Finance Ltd. @ 6% p.a. – interest to be repaid in three equal year – end instalments.

(b) Option – II: To acquire them on operating lease bass at an annual beginning of the year charges of Rs. 1,50,000 per year for 3 years. Petrol cost of Rs. 3 per k.m. is to be borne by Prudent Ltd. itself.

The following further information has been gathered in respect of one car:

--- Finance required will amount to Rs. 3,59,120 of which Rs. 3,42,500 is cost of the car, Rs. 5,000 as processing charges and Rs. 11,620 as registration car. All these costs are to be capitalized.

--- Beginning of the year insurance charges will amount to Rs. 10,000; Rs. 8,000 and Rs. 6,000 respectively over the 3 year's useful life.

--- Each car will run 36, 500 kms. Annually.

--- In case the company opts for Option – I, the year – end maintenance cost will amount to Rs. 5,000, Rs. 7,000 and Rs. 9,000 for first, second and third year respectively.

--- At the end of the third year, each car will have a residual value of Rs. 89,120. The company follows straight line method (SLM) of depreciation.

--- In case the company decides to own the cars, it will have to hire the services of one driver for each car on contract basis from an agency @ Rs. 50,000 for the first year, Rs. 70,000 for the second year, and Rs. 90,000 for the third year to be paid in the beginning of each year.

--- The finance of Rs. 3,59,120 from Tata Finance Ltd. will be re – paid by Prudent Ltd. in 3 equal instalments comprised of principal and interest.

Income – tax rate may be assumed to be 35%.

You are required to compute the following:

(i) Yearly instalment of loan repayment.

(ii) Break – up of instalment into principal and interest.

(iii) Yearly expenses for tax shield over t_0 to t_3 period under both the options.

(iv) Tax shield per year under both options.

(v) Cash outflow over t_0 to t_3 period under both the options.

(vi) Effective cash outflow after tax shield.

(vii) Present value of cash outflows over the period of 3 years under both the options.

(viii) Annual cost / burden under both options and your recommendation on whether to lease or buy the car.

Q-54 [Dec 2004] The management of Urmila Ltd. is considering an investment project costing Rs. 1,50,000 and it will have a scrap value of Rs. 10,000 at the end of its 5 years life. Transportation charges and installation charges are expected to be Rs. 5,000 and Rs. 25,000 respectively. If the project is accepted, a spare part inventory of Rs. 10,000 must also be maintained. It is estimated that the spare part inventory of Rs. 10,000 must also be maintained. It is estimated that the spare parts will have an estimated scrap value of 60% of their initial cost after 5 years. Annual revenue from the project is expected to Rs. 1,70,000; and annual labour,

material and maintenance expenses are estimated to be Rs. 15,000. Rs. 50,000 and Rs. 5,000 respectively. The depreciation and taxes for 5 years will be -----

Year	Depreciation (Rs.)	Tax (Rs.)
1	72,000	11,200
2	43,200	22,720
3	32,400	27,040
4	21,600	31,460
5	800	39,680

Calculate the net cash flows for each year and cost of the project. Evaluate the project at 12% rate of interest.

Q-55. [Dec 2005] Madhuri Ltd. is evaluating a project for which the initial investment required is Rs. 50 lakh to be met by internally generated funds of Rs. 10 lakh, from a rights issue of Rs. 15 lakh and the rest from a term loan @ 12% per annum. Rights issue will involve flotation cost of 5% and the term loan processing will cost 1%. Corporate tax rate is 40%. The risk – free rate of interest is 6.5%, market return is 15% and the relevant asset beta for the investment is estimated to be 1.5. Net operating cash inflows after tax from the project are:

Year – 1: Rs. 15 lakh; Year – 2: Rs. 35 lakhs; and
Year – 3: Rs. 15 lakh.

Besides these cash inflows, residual value of Rs. 5 lakh (net of taxes) is also expected at the end of third year. Should the project be taken up ?

BLOCK OF ASSETS

Q56. ABC Ltd. manufactures toys and other short – lived fad items. The research and development department has come up with an item that would make a good promotional gift for office equipment dealers. As a result of efforts by the sales personnel, the firm has commitments for this product.

To produce the quantity demanded, ABC Ltd. will need to buy additional machinery and rent additional space. It appears that about 25,000 sq.ft will be needed; 12,500 sq.ft of presently unused space, but leased at the rate of Rs. 3 per sq.ft. per year, is available There is another 12,500 sq.ft. adjoining the facility available at the annual rent of Rs. 4 per sq.ft.

The equipment will be purchased for Rs. 9,00,000. It will require Rs. 30,000 in modifications and Rs. 1,50,000 for installation. The equipment will have a salvage value of about Rs. 2,80, 000 at the end of the third year. It is subject to 25 per cent depreciation on reducing balance basis. The firm has no other assets in this block. No additional general overhead costs are expected to be incurred.

The estimates of revenues and costs for this product for the 3 years have been developed as follows:

Particulars	Year 1	Year 2	Year 3
Sales	Rs. 10,00,000	Rs. 20,00,000	Rs. 8,00,000
Less costs:			
Material, labour And overhead incurred	4,00,000	7,50,000	3,50,000
Overheads allocated	40,000	75,000	35,000
Rent	50,000	50,000	50,000
Depreciation	2,70,000	2,02,000	Nil
Total costs	7,60,000	10,70,000	4,35,000
Earnings before taxes	2,40,000	9,22,500	3,65,000

Less taxes	84,000	3,22,875	1,27,750
Earnings before taxes	1,56,000	5,99,625	2,37,250

If the company sets a required rate of return of 20 per cent after taxes, should this project be accepted ?

Q-57. New Delhi Manufacturers Ltd. is producing and selling 5,000 units per year. Costs and profit data for the current capacity are as follows:

Selling price per unit			Rs. 400
Variable cost per unit:			
Materials	Rs. 150		
Labour	60		
Factory overhead	30		Rs. 240
Fixed costs per unit:			
Manufacturing	50		
Selling and administrative	70	120	360
Price per unit			40

There is little competition for the product, and demand exceeds supply. A market survey at a cost of Rs. 20,000 was conducted. It indicates that an additional 1,000 units could be sold each year for the next 4 years.

The machinery and equipment to produce the additional units would require an initial investment of Rs.2,00,000 and working capital of Rs.20,000. Fixed costs, excluding depreciation of new equipment, would increase as follows:

Indirect manufacturing cost – Rs. 30, 000 per year

Selling and administrative costs - Rs. 5,000 per year.

Any changes that might occur in the unit variable costs would be covered by adjustments in the selling price of the product. The tax relevant depreciation on the block of assets to which the machine belongs is 25 percent. No scrap value of expected. The income tax and the required rate of return are 35 and 20 per cent respectively.

The directors are reluctant to authorize the increase in capacity since they doubt whether the additional profits promised over a short period justify investment in new machinery and equipment, and they have asked you to supply quantitative data to help them reach a decision.

You are required to evaluate the proposal and prepare a repot for submission to the directors together with your recommendations.

Q-59. Excel Ltd. Manufactures a special chemical for sale at Rs. 30 per kg. The

Variable cost of manufacture is Rs. 15 per kg. Fixed cost excluding depreciation is Rs. 250000. Excel Ltd. Is currently perating at 50% capacity. It can produce a maximum of 100000 kgs. At full capacity.

The production Manager suggests that if the existing machines are fully replaced the company can achieve maximum capacity in the next five years gradually increasing the production by 10% per year.

The Finance Manager estimates that for each 10% increase in capacity the additional increase in fixed cost will be Rs. 50000. The existing machine with current book value of Rs. 10lacs & Remaining useful life of 5 years can be disposed off for Rs. 500000 The Vice president (finance) is willing to replace the existing machines provided the NPV on replacement is about Rs. 453000 at 15% cost of capital after tax.

(g) You are required to compute the total value of machines necessary for replacement

For your exerice you may assume the following :

(a) The company follows the block assests concept and all the assets are
In the same block. Depreciation will be on straight line basis and the same basis is allowed for tax purposes.
(b) There will be no salvage value for the machines newly purchased. The either cost of the assests will be depreciated over five year period.
(c) Tax rate is at 40%
(d) Cash inflows will arise at the end of the year.
(e) Replacement outflow will be at the beginning of the year (year 0).

(f) **Year**	**0**	**1**	**2**	**3**	**4**	**5**
Discount Factor at 15%	1	0.87	0.76	0.66	0.57	0.49

(ii) On the basis of data given above, the managing director feels that the replacement, if carried out, would at least yield post tax return of 15% in the three years provided the capacity build up is 60%, 80% and 100% respectively. Do you agree?

Q-60. S Electronics is considering a proposal to replace one of its machines.
In this connection, the following information is available.
The existing machine was brought 3 years ago for Rs. 10 lakhs. It was
Depreciated at 25% p.a. on reducing balance bases. It has remaining life of 5 years, but its maintenance cost is expected to increase by Rs. 50000 p.a. from the 6^{th} year of its installation. Its present realizable value is Rs. 6 lakhs.
The new machine costs Rs. 15 lakhs and is subject to the same rate of depreciation. On sale after 5 years, it is expected to net Rs. 9 lakhs. With the new machine operating costs (excluding deprecation) are expected to decrease by lakh p.a. In addition, the speed of the new machine would increase y Rs. 1.5 lakhs p.a.
The tax rate applicable is 50% and the cost of capital 10% The present value factors at 10% rate of discount for years 1 to 5 are respectively 0.909, 0.826, 0.751, 0.683, and 0.620.
Is the proposal financially viable ? Please advice the firm on the basis of Net Present Value of the proposal. Apply block of assets concept.

Q-61: The total outlay on a project being considered by a firm is expected to be Rs. 320 lakhs, consisting of Rs. 240 lakhs of fixed assets and Rs. 80 lakhs of current assets.
The project will be financed as: Rs. 80 lakhs of equity, Rs. 150 lakhs on term loans, Rs. 50 lakhs of non – convertible debentures, and Rs. 40 lakhs of short – term bank finance.
The term loan has to be repaid in three equal installments of Rs. 50 lakhs each at the end of the 3^{rd}, 4^{th} and 5^{th} years. The interest on the outstanding amount will be 20 percent. The non – convertible debentures carry an interest rate of 15 percent and will be redeemed at the end of the 5^{th} year. The level of short – term bank finance will remain at Rs. 40 lakhs and will be paid back at the end of 5^{th} year. The interest rate on short – term bank finance will be 18 percent.
The project will have a life of 5 years. The expected sales from the project will be Rs. 240 lakhs per year. The operating costs excluding depreciation will be Rs. 100 lakhs per year. The depreciation rate on fixed assets will be 25 percent as per the written down value method.
The net salvage value of fixed and current assets will be equal to their book values. The corporate income tax is 55 percent. The cost of equity may be assumed to be 25 percent.
Required:
(a) Compute the annual cash flows of the project
(i) From total funds point of view
(ii) From equity point of view.
(iii) Calculate the NPV of the project from long – term funds point of view.

Q.No 62 Prudential Ltd. is considering whether or not to invest Rs. 1,20,000 is an investment proposal to ass a new product to its existing product lines .The management forecasts that the

new product will generate incremental net cash flows , each of which is assumed to be normally distributed random variable with the following parameters.

Year	Expected vale (Rs.)	Standard Deviation (Rs.)
1	44,000	8,800
2	40,000	7,600
3	40,000	8,000
4	35,000	6,000
5	30,000	5,000

Discount rate applicable to the company is 10% .

Required :

(a) The mean of the present value distribution and its standard deviation .

(b) The probability that the project will have a negative NPV .

(c) The chances that NPV would be least Rs. 20,000

(d) Whether the project should be undertaken if the top management has laid sown that no project be undertaken unless it has a 75% chance of giving an NPV equal to Rs. 25,000.

Q.No 63 ABC Ltd. is a faced with several possible investment projects .For each the total cash outflow required will occur in the initial period .The cash outflows ,expected net present values and standard deviations are as follows (All projects have been discounted at a risk –free rate of 8% and it is assumed that the distributions of their possible net present values are normal

PROJECT	COST (Rs.)	NET PRESENT VALUE	
		Rs.	Rs.
A	1,00,000	10,000	20,000
B	50,000	10,000	30,000
C	2,00,000	25,000	10,000
D	40,000	5,000	10,000
E	5,00,000	75,000	75,000

(h) Determine the coefficient of variation of each of these projects (Use cost plus net value in the denominator of the coefficient)

(i) Ignoring size, do you find some projects clearly denominated by others ?

May size be ignored ?

©What is the probability that each of the projects will have a net present value of greater than 0 ?

Q.No 64 The Win drop Company will invest in two of three possible proposals , the cash flows of which are normally distributed .The expected net present value (discounted at the risk –free rate) and the standard deviation for each proposal are given as follows :

	1	2	3
Expected net present value	$ 10,000	$ 8,000	$ 6,000
Standard deviation	4,000	3,000	4,000

Assuming the following correlation coefficients for each possible combination, which two proposals dominate ?

Proposals Correlation	1	2	3	1 and 2	1 and 3	2 and 3
Coefficient	1.00	1.00	1.00	.60	.40	.70

Q.No 65 Zello Creamery Company would like a new product line –puddings .The expectd value and standard deviation of the profitability distribution of possible net present values for the product lines are $ 12,000 and $ 9,000 respectively .The company's existing lines are ice –cream ,cottage cheese and yogurt .The expected values of the net present value and standard deviation for these product lines are

	NET PRESENT VALUE	
Ice Cream	$ 16,000	$ 8,000
Cottage Cheese	20,000	7,000
Yogurt	10,000	4,000

The correlation coefficients between the products are

	ICE CREAM	COTTAGE CHEESE	YOUGURT	PUDDING
Ice Cream	1.00			
Cottage Cheese	.90	1.00		
Yogurt	.80	.84	1.00	
Pudding	.40	.20	.30	1.00

(a) Compute the expected value and the standard deviation of the probability distribution of possible net present values for a combination consisting of existing products.

(b) Compute the expected value and standard deviation for a combination consisting of existing products plus pudding .Compute your result in part a and b What can you about the pudding line ?

Q.No 66 AB Corporation has two existing projects A and B with the following characteristics

	Project A	Project B
Mean NPV (Rs. in lakhs)	120	90
S.D NPV (Rs. in Lakhs)	70	40

The coefficient of correlation between the NPV of projects A and B = 0.7 AB Corporation has decided to include one more project in their portfolio of projects. The firm is considering three project proposals ;C D and E are mutually exclusive and have the following characteristics :

	Project C	Project D	Project E
Mean NPV (Rs. in lakhs)	80	83	80
S.D NPV (Rs. in Lakhs)	32	40	35

The coefficient of correlation between the net present values of the proposed projects and the existing projects are as follows :

	Project A	Project B
Project C	0.7	0.6
Project D	0.3	0.14
Project E	0.4	0.2

Required : Determine the expected net present value ,standard deviation of the present value and coefficient of variation of all possible portfolios .

Rolling Over

Q.No 78 Big Oil is wondering whether to drill for oil in Westchester Country .The prospects are as follows :

Depth of well Total Cost Cumulative Probability PV of Oil (if found)

Feet	Millions of Dollars	Finding oil	Millions of dollars
2,000	4	0.5	10
4,000	5	0.6	9
6,000	6	0.7	8

Draw a decision tree showing the successive drilling decisions to be made by Big Oil How deep should it be prepared to drill ? (Use Rollback technique)

Ans. NPV. 1.80

Q.No 79 : The scientists at spectrum have come up with an electric moped .The firm is ready for pilot production and test marketing. This will cost Rs. 20 million and take six marketing will be successfully management below that there is 70% chance that the pilot production and test marketing will be success. In case of success spectrum can build a plant costing Rs. 150 million. The plant will be generate an annual cash inflow of Rs. 30 million if the demand is low .High demand had a probability of 0.6 low demand has probability of 0.4.

Suggest the optional course of action decision tree analysis (Use Rollback technique)

Ans. NPV 10.93

Q.No 80 TSL Ltd. a highly profitable and tax paying company is planning to expand its present capacity by 100% .the estimated cost of the project is Rs.1,000 lakhs out of which Rs. 500 lakhs is to be met out of loan funds :

The company has received two offers from their bankers :

	Option I	Option II
Value of loan Interest Period	Rs. 500 lakhs 15% payable yearly 5 years	US $ 14 lakhs equal to Rs. 500 lakhs 6% payable (fixed) yearly in US $ 5 years

Repayment (in 5 installment First installment is payable 1 year after down)

Other expenses 1% of the value of the loan) 1% at US $ = Rs. 36 (Average)

Further exchange Rate End of 1st Year 1 US $ = Rs.38 thereafter to increase by Rs. 2 p.a.

The company is variable to pay income –Tax at 35% and eligible for 25% depreciation on W.D.V you may assume that the end of 5th Year the Company will be able to claim balance in WDV for tax purposes .The company following accounting charges in Foreign Exchange Rate .

(1) Compare the total outflow of cash under the above options .

(2) Using discounted cash flow techniques , evaluate the above offers .

(3) Is there any risk ,which the company should take care of ?

(4) In case TSL has large volume of exports would your advice be different

The following discounted table may be adopted

Year	1	2	3	4	5	6
P.V factors	0.892	0.797	0.711	0.635	0.567	0.506

After appropriate analysis of cash flows , please advice the company of the financial viability of the proposal .

CS Scanner Question

Q.No -94 CS Final Dec. 2006 :- Ankit Ltd. is considering to take up Project X and Project Y **.**both the project have same life ,required equal investment of Rs. 80 lakh and have almost same yield .An attempt is mode to use Probability Theory to analyze the pattern of cash flow from

either project during first year of operation .This pattern is likely to continue during life of these projects the result of analysis are as follows :

Project X		**Project Y**	
Cash flow (Rs.)	**Probability (Rs.)**	**Cash flow(Rs.)**	**Probability(Rs.)**
12,00,000	0.10	8,00,000	0.10
14,00,000	0.20	12,00,000	0.25
16,00,000	0.40	16,00,000	0.30
18,00,000	0.20	20,00,000	0.25
20,00,000	0.10	24,00,000	0.10
80,00,000	1.00	80,00,000	1.00

You are required to decide as to which project is riskier to be dropped by the company .

Ans : Project is risker then project X .So project X should be preferred .

Q.No -95 CS Final Dec. 2006 :- Karishma Ltd. is considering to manufacturing a new project which will involve use of new machine costing Rs. 1,50,000 and an existing machine, which was purchased two year ago at a cost of Rs. 80,000 ,having current book value of Rs. 60,000.There is sufficient under utilized capacity will be 5,000 units of Rs. 32 per unit with following cost composition :

	Rs.
Direct material	7
Direct labour (4 Hours per unit @ Rs. 2 per unit)	8
Fixed cost (including depreciation)	9
	24

The project would have a five year life, with residual value of Rs. 10,000 for new machine. Direct labour being continuously in short supply , the labour resources would have to be diverted from other work ,currently earning a profit of Rs.1.50 per direct lbour hour .Fixed overhead absorption rate would be Rs. 2.25 per hour and actual expenditure on fixed overheads will not change .The requirement of working capital would be Rs. 10,000 in the first year , Rs. 15,000 in the second and subsequent years till end of the project when it will be recovered .The company's cost of capital is 20% .Ignoring tax implications ,decide if the project is worth accepting .

(20 marks)

Q.No -96 CS Final June 2007 : Prithvi Ltd. is a manufacturer of variety of electrical equipment .The existing machine is based on old technology .In order to improve the quality of the product and bring down operating cost , the management is planning to replace the existing machine with a new one based on latest technology .Following are the relevant information :

Existing Machine :

Purchased	-- 5 years ago
Remaining life	-- 5 years
Salvage value	-- Rs. 20,000
Depreciation	-- Straight line basis
Current book value	-- Rs. 3,00,000
Realizable market value	-- Rs. 3,50,000
Annual depreciation	-- Rs. 28,000

New replacement machine :

Capital cost	-- Rs. 10,00,000

Estimated useful life	-- 5 years
Estimated salvage value	-- Rs. 1,00,000

The replacement machine would permit an output expansion .As a result sales is expected to increase by Rs. 1,00,000 per year , operating expenses would decline by Rs. 2,00,000 per year .It would require an additional inventory of Rs. 2,00,000 and would cause an increase in accounts payable by Rs. 50,000 .

Assuming a corporate tax rate of 30% and cost of capital of 12% , advise the company about replacement of the existing machine .

(20 marks)

Ans The company should replace existing machine as the NPV of the proposal is positive (Rs. 2,48,237)

Q.No -97 CS Final Dec. 2007 :- An existing machine is Bipasha Ltd. can be sold today for Rs. 1,00,000 net . The cash flow after tax (CFAT) for the balance life of 4 years is Rs. 30,000 per annum at the end of the 4^{th} year ,the existing machine can be sold for Rs. 20,000 net . A new machine can replace the existing machine at a net cash outflow of Rs. 1,50,000 and will generate annual CFAT of Rs. 46,000 .The scrap value at the end of its useful life will be Rs. 25,000 net . If the discount rate is 10% ,decide whether the existing machine should be replaced with a new machine .

(8 Marks)

Ans : Both continuing & buying option have 'positive' NPV But NPV of new machine is greater i.e. 12,886 than old of 8,754 .Hence old machine should be replaced .

Q.No -98 CS Final Dec. 2007 :- Electrofast Ltd. is a manufacturing organization .It is manufacturing electronics equipments in which a Component –X is used which is purchased from a local supplier at a cost of Rs. 40 each .In order to bring down the cost and improve its competitiveness , the company has a proposal to install a machine for the manufacture of Component –X. It has the following two option

Option – 1 Installation of Semi –automatic machine involving an annual fixed cost of Rs. 22 lakh and a variable cost of Rs. 18 per component manufactured .

Option – 2 Installation of automatic machine involving an annual fixed cost of Rs. 40 lakh and a variable cost of Rs. 15 per component manufactured .

You are required to –

(i) Find the annual requirement of Component –X to justify a switch over from purchase of components to manufacture of the same b installing (i) Semi –automatic machine ; and (ii) automatic machine

(ii) If the annual requirement of the Component –X is 8,00,000 units which machine would you advise the company to install ? **(10 Marks)**

Ans (i) Annual requirements = 1,00,000 units and 1,60,000 units respectively (ii) The total cost in case of automatic machine is less , it will be beneficial to install automatic machine .

Q.No -99 CS Final June 2008 : Exacta Ltd. is considering the replacement of its existing machine by a new one which is expected to cost Rs. 2,70,000 with a life of 5 years and salvage

value being Rs. 20,000 .The machine will yield annual cash revenue of Rs. 5,70,000 and annual cash expenses of Rs. 2,96,000.

The existing machine has a book value of Rs. 92,000 and can be sold for Rs. 46,000 today .It has a remaining useful life of 5 years .Cash revenue will be Rs . 4,50,000 and associated cash expenses will be Rs. 3,20,000 per annum .The existing machine will have a salvage value of Rs. 4,600 at the end of 5 years .

Exacta Ltd. is in a 35% tax bracket and writes off depreciation @ 25% per annum on written down value (WDV) method .Exacta Ltd. has a target in can now be raised at 10% Exacta Ltd. follows the dividend discount model to estimate the cost of equity capital Last year the company paid a dividend of Rs. 1.85 per share .The current market price of company's equity share is Rs. 20 per share .A growth rate of 8% per annum is anticipated (Ignore capital gain tax)

Required –

(i) Investment required on incremental basis
(ii) Incremental depreciation per year
(iii) Weighted average cost of capital
(iv) Computation of present worth factors
(v) Before tax incremental cash flows based on revenue and expenses
(vi) Incremental terminal cash flow .
(vii) Computation of NPV
(viii) Should the new machine be acquired ? Why ? **(20 marks)**

Ans: (i) Incremental investment in new machine =Rs. 2,24,000
(ii) Incremental Depreciation :- Rs. 44,500, 33,375, 25,030,18773, 14,080
(iii) Ke = 18% Kd = 6.5% Ka = 15.7%
(iv) Present worth factors = 0.864, 0.747, 0.646, 0.558, 0.482
(v) Incremental Terminal cash flow =Rs. 15,400
(vi) NPV =Rs. 1,25,870
(vii) Yes because the NPV is positive .

Q.No -100 CS Final June 2009 : An Iron ore company is considering investing in a new processing facility .The company extracts are from an open pit mine .During a year 1,00,0000 tons of ore is extracted .If the output from the extraction process is sold immediately upon removal of dirt rocks and other impurities a price of Rs. 1,000 per ton of ore can be obtained .The company ahs estimated that its extraction costs amount to 70% of the net realizable value of the ore.

An alternative to selling all the ore at Rs. 1,000 per ton , it is possible to process further 25% of the output .the additional cash cost of further processing would be Rs. 100 per ton .The processed ore of further processing would yield 80% final output and can be sold at Rs. 1,350 per ton .

For additional processing the company would have to install equipments costing Rs. 100 lakh .The equipments costing Rs. 100 lakh.The equipment is excepted to have a useful life of 5 years with no salvage value .The company follows the straight line method of depreciation .Additional working capital requirement is estimated at Rs. 10 lakh.The company's cut off rate for such investments is 15% .Assume corporate tax rate 30% (including surcharge and education cess .

Should the company install the equipment for further processing of the iron ore ?

Ans : NPV = Rs.20,67,950, The company is advised toinstall the equipment for further processing of ore , as it promises a positive net present value .

Q.No -101 CS Final Dec 2007 : Alfa Ltd. is in the business of manufacturing bearings Some more products lines are being planned to be added to the estisting system .To manufacture the planned products lines , the firm needs a machine which if purchased outright will cost Rs. 10,00,000 .Modern Hire –purchase and leasing Co. has offered two proposals as below

Proposal –I (Hire purchase)

Rs. 2,50,000 will be payable on signing of the agreement .Three annual installments of Rs. 4,00,000 wil be payable at the end of each year starting from year first .The ownership of the machine will be transferred automatically at the end of third year .The company will be able to claim depreciation on straight line basis with zero salvage value .

Proposal –II (Lease)

Rs. 20,000 will payable towards initial service fee upon signing of the agreement which is tax deductible expense . Annual lease rental of Rs. 4,32,000 is payable at the end of each year starting fro the first year for a period of three years .

Evaluate the above two proposals and advice the company as to which proposal implies lesser cost given that tax rate is 35% and discount rate is 20% .

(Calculations may be rounded off to Rupee) **(20 marks)**

Ans :- Th present value of cash outflow in case of hire purchase is Rs. 7,29,543 and in case of lease is Rs. 6,04,478 .So the lease option (Proposal II) implies lesser cost and the firm should procure the machine on lease basis .

Q.No -101 CS Final June 2010 : Surya Manufactures is planning to start a new manufacturing process .Following are the estimated net cash flows and probabilities of the new manufacturing process

Year	**Net cash flows (Rs.)**		
	P=0.2	**P= 0.6**	**P=0.2**
0	(-) 2,00,000	(-) 2,00,000	(-) 2,00,000
1	40,000	60,000	80,000
2	40,000	60,000	80,000
3	40,000	60,000	80,000
4	40,000	60,000	80,000
5	40,000	60,000	80,000
5 salvage	0	40,000	60,000

Surya Manufactures cost of capital for an average risk project is 10% .

(a) The project has average risk .Find the project's NPV .

(b) Find the best case and worst case NPV's What is the probability of occurrence of the worst case if the cash flows are perfectly dependent (Perfectly positively correlated) over time and if they are independent over time ?

(c) Assume that all the cash flows are perfectly positively correlated , that is three are only three possible cash flows streams over time :

(I) The worst case

(II) The most likely or base case and (III) The best case with probabilities 0.2,0.6 and 0.2 respectively .These cases are represented by each of the columns in the given table .Find the expected NPV , the standard deviation and co-efficient or variation.

7. Lease and Hire Purchase

Q. 1. **[Dec 2007/ 2009]** Distinguish between financial lease & operating lease? **Or**
[Dec 2010] Distinguish between leasing hire purchase? **Or**
[Dec 2004/ 2006] Leveraged lease?

Ans. **Meaning**

Lease can be defined as a right to use equipment or capital goods on payment of periodical amount.

Parties to a Lease Agreement

There are two principal parties to any lease transaction as under:-

1) **Lessor :-** Who is actual owner of equipment permitting use to the other party on payment of periodical amount.
2) **Lessee :-** Who acquires the right to use the equipment on payment of periodical amount.

Type of Leasing

The difference leasing option may however, be grouped in by two board categories as under **Finance Lease** and **Operating Lease.**

S No.	Basis	Finance Lease	Operating Lease
1	Life of Contract	Approximates the economic life of the asset.	Shorter than the economic life of the asset.
2	Maintenance	The burden of the costs of maintenance repairs, taxes insurance etc are borne by the lessee.	The burdens of all these expenses are borne by the lessor.
3	Cancellation	It is a non revocable contract i.e. it cannot be cancelled by the lessee prior to its expiration date.	It is a revocable one i.e. can be cancelled by the lessee prior to its expiration date.
4	Duration	In this case the lease period is usually related to the useful life of the asset.	It is usually of a shorter duration & bears no relation to the economic life of the asset.
5	Risk of Obsolescence	The lessee has to take the risk of obsolescence in the case of financial lease.	The lease is protected against risk of obsolescence.
6	Cost of Asset	The lease rental would cover the lessor's original investment cost plus return on investment.	The lease rental is generally not sufficient to fully amortize the cost of the asset.
7	Risk & Reward	The risk and reward incident to ownership are passed on the lease .The lessor only remains the legal owner of the asset.	The lease is only provided the use of the asset for a certain time, risk incident to ownership belong wholly to the lessor.
8	Full Payout	The lease is usually full pay out that is the single lease the cost of the asset together with the interest.	The lease is usually non payout, since the Lesser expects to lease the same asset over and over again to several users.

Difference between Lease Finance and Hire Purchase

S No.	Basis	Lease Finance	Hire Purchase
1	Meaning	A transaction is a commercial arrangement, where by an equipment owner or manufacturer conveys to the equipment user the right to use the equipment in return for a rental.	Hire-purchase is a type of installments credit under which the hire - purchase agrees to take the goods on hire at a stated rental, which is inclusive of the repayment of principal as well interest, with an option to purchase.
2	Option of User	No option is provided to the lessee (user) to purchase the goods.	Option is provided to the hirer (user).
3	Nature of expenditure	Lease rental paid by the lessee is entirely revenue expenditure of the lessee.	Only interest element included in the HP installments is revenue expenditure by nature.
4	Components	Lease rentals comprise of 2 elements:- 1) Finance charge & 2) Capital recovery	HP installments comprise of 3 element:- 1) Normal trading profit 2) Finance charge and 3) Recovery of cost of goods/assets

Q. 2. **[CA Nov 2008]** Cross border leasing?

Ans. Cross border is a leasing agreement where lessor and lessee are situated in different countries. This raises significant additional issues relating to tax avoidance and tax shelters. It has been widely used in some European countries, to arbitrage the difference in the laws of different countries.

Cross border leasing have been in practice as a means of financing infrastructure development in emerging nations. Cross- border leasing may have significant applications in financing infrastructure development in emerging nations-such as rail &air transport equipment, telephone & telecommunications, equipment & assets incorporated into power generation and distribution system and other projects that have predictable revenue streams.

A major projective of cross- border leases is to reduce the overall cost of financing through utilization by the lessor of tax depreciation allowances to reduce its taxable income. The tax savings are passed through to the lessee as a lower cost of finance .The basic prerequisites are relatively high tax rate in the lessor's country, liberal depreciation rules and either very formalistic rules governing tax ownership

Q. 3. **[CS Dec 2005]** "For the lessor, lease decision is akin to a capital budgeting exercise."Examine the statement and explain its implication.

Ans.

- When a proposal of lease is evaluated from the point of lessor the same is in the form of capital budgeting problem.
- Just like capital budgeting, the lessor will provide the asset on lease only when the cash inflows (lease rentals) are more than the cash outflows.
- Capital budgeting techniques are deployed by the lessor to evaluate the lease
- Lease rentals, residual value, initial cash investments, period for which lease is to be granted constitutes valid basis for evaluating lease proposal.
- Thus, it can truly be regarded that for the lessor, lease decision is akin to a capital budgeting exercise.

Practical Questions

Q. 1. ABC Ltd. is considering a proposal to acquire a machine costing `2,00,000 under borrow to purchase option. The payment under this alternative will be as follows:

Year end	Principal	Interest	Total
1	`60,000	`24,000	`84,000
2	`50,000	`20,000	`70,000
3	`40,000	`16,000	`56,000
4	`30,000	`12,000	`42,000
5	`20,000	` 8,000	`28,000

The installments are payable at the end of each year. Another option before it is to acquire the asset on a lease rental of `50,000 per annum payable at the beginning of each year for 5 years.

The following information is also available:

(a) Terminal Scrap value of the asset is Nil.

(b) The company provides 20% depreciation on straight – line method on the original cost.

(c) Income tax rate is 40%.

Which alternative do you recommend ? (Use post – tax discount rate 10% p.a.).

Ans. (a) Loan option 136259.6 Lease Option 132650

Q.2. Engineers Ltd. is in the business of manufacturing nut bolts. Some more product lines are being planned to be added to the existing system. The machinery required may be bought or may be taken on lease. The cost of machine is `20,00,000 having a useful life of 5 years with the salvage value of `4,00,000 (consider short term capital loss/gain for the Income – tax). The full purchase value of machine can be financed by bank loan at the rate of 20% interest repayable in five equal installments falling due at the end of each year. Alternatively, the machine can be procured on a 5 years lease, year – end lease rentals being `6,00,000 per annum. The Company follows the written down value method of depreciation at the rate of 25 percent. Company's tax rate is 35 percent.

(i) Advise the company which option it should choose – lease or borrow.

(ii) Assess the proposal from the lessor's point of view examining whether leasing the machine is financially viable at 14 percent cost of capital

Ans. (i) Lease 1371630 Loan 1367082 (ii) -46682

Q. 3. Elite Builders, a leading construction company have been approached by a Foreign Embassy to build for them block if six flats to be used as guest houses. As per the terms of contract the Foreign Embassy would provide Elite Builders the plans and the land costing `25 lakhs. Elite Builders would build the flats at their own cost and lease them out to the Foreign Embassy for 15 years at the end of which the flats will be transferred to the Foreign Embassy for a nominal value of `8 lakhs.

Elite Builders estimates the cost of construction as follows:

Area per flat	1, 000 sq. ft.
Construction cost	`400 per sq. ft.
Registration and other costs	2.5% of cost of construction

Elite Builders will also incur `4 lakhs each in years 14 and 15 towards repairs.

Elite Builders proposes to charge the lease rental as follows:

Year	Rentals
1 to 5	Normal
6 to 10	120% of Normal
11 to 15	150% of Normal

Elite Builder's present tax rate average at 50%. The full cost of construction and registration will be written off over 15 years and will be allowed for tax purposes. You are required. To calculate the normal lease rental per annum per flat.

For your exercise assume:

(a) Minimum desired return of 10%.
(b) Rentals & repairs will arise on the last day of the year.
(c) Construction registration and other costs will be incurred at time 'O'.
(d) The relevant discount factors are:

Year	Discount Factor	Year	Discount Factor	Year	Discount Factor
1	0.91	6	0.56	11	0.35
2	0.83	7	0.51	12	0.32
3	0.75	8	0.47	13	0.29
4	0.68	9	0.42	14	0.26
5	0.62	10	0.39	15	0.24

Ans. 69727

Q. 4. ABC Ltd. is considering to acquire an additional computer to supplement its time – share computer services to its clients. It has two options:

(i) To purchase the computer for `22, 00, 000.
(ii) To lease the computer for 3 years from a leasing company for `5, 00, 000 as annual lease rent plus 10% of gross time – share service revenue. The arrangement also requires an additional payment of `6, 00, 000 at the third year. Lease rents are payable at the year end, and the computer reverts to the lessor after the contract period.

The company estimates that the computer under review now will be worth `10 lakhs at the end of the third year.

Forecast Revenues

Year 1	`Year 2	Year 3
`22, 50, 000	`25, 00, 000	`27, 50, 000

Annual operating costs (excluding depreciation / lease rent of computer) are estimated at `9, 00, 000 with an additional `1, 00, 000 for start – up and training costs at the beginning of the first year. These costs are to be borne by the lessee. ABC Ltd. will borrow at 16% interest to finance the acquisition of the computer, repayments are to be made according to the following schedule.

Year–end	Principal	Interest	Total
1	`5, 00, 000	`3, 52, 000	` 8, 52, 000
2	`8, 50, 000	`2, 72, 000	`11, 22, 000
3	`8, 50, 000	`1, 36, 000	` 9, 86, 000

The company uses the straight – line method to depreciate its assets and pays 50% tax on its income. The management of ABC Ltd. approaches you, as a chartered accountant, for advice. Which alternative would you recommend and why ?

Note: Present value factor at 8% and 16% rate of discount.

Year	8%	16%
1	0.926	0.862
2	0.857	0.743
3	0.794	0.641

Ans. Lease 1202925, Loan 890470

Q. 5. ABC Ltd. is faced with a decision to purchase or acquire on lease a mini car. The cost of the mini car is `1, 26, 965. It has a life of 5 years. The mini car be obtained on lease by paying equal lease rentals annually. The leasing company desires a return of 10% on the gross value of the asset. ABC Ltd. can also obtain 100% finance from its regular banking channel. The rate of interest will be 15% p.a. and the loan will be paid in five annual equal installments, inclusive of interest. The effective tax rate of the company is 40%. For the purpose of taxation it is to be assumed that the asset will be written off over a period of 5 years on a straight-line basis.

(a) Advice ABC Ltd. about the method of acquiring the car.

(b) What should be annual lease rental to be charged by the leasing company to match the loan option ?

For exercise use the following discount factors:

	Years 1	**Years 2**	**Years 3**	**Years 4**	**Years 5**
Discount Rate	**1**	**2**	**3**	**4**	**5**
10%	0.91	0.83	0.75	0.68	0.62
15%	0.87	0.76	0.66	0.57	0.49
9%	0.92	0.84	0.77	0.71	0.65

Q. 6. ABC Ltd. is considering the acquisition of a personal computer costing `50, 000. The effective life of the computer is expected to be five years. The company plans to acquired the same either by borrowing `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: -

The principal amount of the loan will be paid in five annual equal installments.

(a) Interest, lease rentals, principals repayment are to be paid on the last day of each year.

(b) The full cost of the computer will be written off over the effective life of computer on a straight – line basis and the same will be allowed for tax purposes.

(c) The company's effective tax rate is 40% and the after tax cost of capital is 9%.

(d) The computer will be sold for `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 computer the annual lease rentals payable by ABC Ltd. which will result in indifference to the loan option.

The relevant discount factors are as follows:

Year	**1**	**2**	**3**	**4**	**5**
Discount Factor	0.92	0.84	0.77	0.71	0.65

Ans. 14500

Q. 7. ABC Ltd. has decided to acquire a new truck. One alternative is to lease the truck on a four year contract for a lease payment of $ 10, 000 per year, with payments to be made at the beginning of each year. The lease would include maintenance.

Alternatively, ABC Ltd. could purchase the truck outright for $ 40, 000, financing with a Bank Loan for the net purchase price and amortizing the loan over a four year period at an interest rate of 10% per year under the borrow – to – purchase arrangement i.e. Four equal interest inclusive installments. ABC Ltd. would have to maintain the truck at a cost of $ 1, 000 per year, payable at year end. Assume depreciation on trucks 1st year 33%, 2nd year 45%, 3rd year 15% and 4th year 7% on total cost. And it has a salvage value of $ 10, 000 which is the expected the market value after 4 years, at which time ABC Ltd. plans to replace the truck irrespective whether it lease or buys. ABC Ltd. has a tax rate of 34%. Advise the Management.

Q. 8. ABC Ltd. Is considering a proposal to acquire a machine costing `1,10,000 payable `10,000 down and balance payable in 10 annual equal installments at the end of each year inclusive of interest chargeable at 15% .Another option before it is acquire the asset on a lease rental of `15,000 per annum payable at the end of each year for10 years. The following information is also available :

(i) Terminal Scrap value of `20,000 is realizable , if the asset is purchased .

(ii) The company provides 10% depreciation on straight –line method on the original cost .

(iii) Income tax rate is 50%

You are required to compute and analyse cash flows and to advice as to which option is better.

Q. 9. Amada Leasing Company is considering a proposal to lease out a school bus The bus can be purchased for `5,00,000 and , in turn , be leased out `1,25,0000 per year for 8 years with payments occurring at the end of each year :

(i) Estimate the internal rate of return for the company assuming tax is ignored.

(ii) What should be yearly lease payment charged by the company in order to earn 20% annual compounded rate of return before expenses and taxes ?

(iii) Calculated the annual lease rent to be charged so as to amount to 20% after tax annual compound rate of return , based on the following assumptions

(a) Tax rate is 40

(b) Straight line depreciation

(c) Annual expenses of `50,000 and

(d) Resale value of `1,00,000 after the turn .

Q.10. The following data relate to the MGF leasing Ltd.

(1) Investment outlay/cost `100 lakh

(2) Pre-tax required rate of return , 20% per annum

(3) Primary lease period 5 years

(4) Residual value (after primary period) Nil

(5) Assumptions regarding alternative rental structures

(a) Equated /Level

(b) Stepped (15% increase per annum)

(c) Ballooned (annual rental of `10 lakh for years , 1- 4

(d) Deferred (Deferment period of 2 years)

Q.11. A company wish to acquire an asset costing `1,00,000. The company has an Offer from a bank to lend @ 18% repayable in 4 years and installments. A leasing company has also submitted a proposal to the Company to acquire the assets on lease at yearly rentals of `280 per `1,000 of the assets value for 5 years payable at year end. The rate of depreciation of the asset. Allowable for tax proposes is 20% on WDV with no extra shift allowance .The salvage value of the asset at the end of 5years period is estimated to be `1,000 .whether the company should accept the proposal of Bank of leasing company , if the effective tax rate of the company is 50% .

Q.12. A request has been received by ITC Finance Ltd. Who are engaged in leasing business for structuring a lease of machine costing `30 lakhs .The average post –tax cost of funds to ITC Finance (effective tax rate is 50%) is 10% but they wish to mark up this by 2% to cover the effects of inflation .

Calculate the annual lease rent to charged assuming that

(a) The lease period is to be 5 years .

(b) The rants will be payable on the first day of each year and

(c) The machine will be fully depreciated in 5 years

Q.13. MGF leasing Ltd. is in the process of making out a proposal to lease a certain equipment to an use –manufacturer .the cost of the equipment is expected to be `10 lakhs and the primary period of lease to be 10 years .MGF leasing is able to give you the following additional information :

(a) The machine can be depreciated fully cover the 10 years on straight line basis (assume this to be acceptable for IT purposes) .

(b) The current effective tax rate for MGF leasing is 40% and they expect to go down to 30% from the beginning of the 6^{th} Year of the lease .

(c) It is the normal objective of MGF to make a 10% post- tax return in its lease pricing.

(d) Lease management fee of 1% of the value of the asset is usually collected from the lessees upon signing of the contract of lease to cover the overhead costs relatedto processing of the proposal

(e) Annual lease rents are collected at the beginning of every year .

You are required to determine the quoted annual rent to be for the proposal

Q.14. ITC finance Ltd. is a hire –purchase and leasing company who have been approached by a local small –scale business interested in acquisition of a machine through leasing . The price quoted by the manufacturer of the machine is `3,00,000 . 10% sales tax is extra .The proposed lessee desires to have a primary lease period of 5 years .

ITC finance's target rate of return on the transaction is 8% post tax on the outlay .They wish to fix annual lease rents which are to be payable in arrears at the end of each year

Their effective income tax rate is 50% .The income –tax rate of depreciation on the machine is 25% .

Calculate the annual lease rent to be charged by ITC Finance Ltd.

Q.15. Company X needs a machine which if purchased outright will cost `10 lakhs

A Hire Purchase and Leasing Company has officered two alternatives as below :

Option A : Hire Purchase `2,50,000 will be payable on signing of the agreement 3 annual installments of `4,00,000 will payable at the end of the 3rd Year It is assumed that the company X will be able to claim depreciation on straight –line basis with zero salvage value .

Option B :- Lease **:** `20,000 will be payable towards initial service free upon signing of the agreement .Annual lease rent of `4,32,000 is payable at the end of each year starting from the first for a period of 3 years .

Company X's tax rate is s35%

Evaluate the two alternatives and advice the company as to which one imples least cost.

8. Foreign Exchange & Risk Management

Q. 1. **[CS June 2009]** Transfer Pricing.

Ans.

- It is a mechanism by which profits are transferred through an adjustment of prices on intra firm transactions.
- It can be applied to transactions between the parent firm and its subsidiaries or between strong currency and weak currency subsidiaries.
- A Parent may charge higher prices to its weak currency subsidiary, thereby increasing its own profit and reducing that of the subsidiary. The taxable income of the subsidiary comes down.
- It is likely that audit profession, exchange controls and customs duties of the host country may supervene to negate this strategy.
- So the mechanism may be applied moderately — gradually over a long period, without upsetting the environment in which the subsidies operate.

Q. 2. **[CS Dec 2003]** What type of risk exposures are faced by a firm which is dealing with foreign exchange? **Or**
[CS June 2007] Operations in forex market are exposed to a number of risks. **Or**
[CS Dec 2009] Distinguish between 'Translation risk' and 'Transaction risk' **Or**
[CS June 2009] Risks in forex market

Ans. A firm dealing with foreign exchange may be exposed to three types of risk as follows:-

Transaction Exposure

- It occurs when a value of a future transaction, through known with certainty, is denominated in some currency other than the domestic currency.
- In such cases, the monetary value is fixed in terms of foreign currency at the time of agreement, which is complete at a later date.
- Example: an Indian exporter is to receive payment in euro's in 90 days time for an export made today. His receipt in euros is fixed and certain but as far as the Re. Value is concerned; it is uncertain and will depend upon the exchange rate prevailing at the time of receipt.
- All fixed money value transactions such as receivables; payables, fixed price sale and purchase contracts etc. are subject to transaction exposure.
- Transaction exposure refers to the potential change in the value of a foreign currency denominated transaction due to changes in the exchange rate.
- It covers rate risk, credit risk and liquidity risk.

Translation Exposure

- This is also called the accounting exposure
- It refers to and deals with the probability that the firm may suffer a decrease in assets value due to devaluation of a foreign currency even if no foreign exchange transaction has occurred during the year.
- This exposure needs to be measured so that the financial statement i.e. the balance sheet and the income statement reflect the change in value of assets and liabilities.
- This occurs when the firm's foreign balances are expressed in terms of the domestic currency.
- Two related decisions involved in translation exposure management:-
  - Managing balance sheet items to minimize the net exposure.
  - Deciding how to hedge against this exposure.
- It results in exchange rate losses and gains that are reflected in the firm's accounting record and are not realized and hence have no impact on the taxable income.

Economic Exposure

- It refers to the probability that the change in foreign exchange rate will affect the value of the firm.
- The risk contained in economic exposure requires a determination of the effect of changes in exchange rates on each of the expected future cash flows.
- The translation and the transaction losses are one-time events, whereas the economic loss is a continuous one.

Q. 3. **[CS June 2005]** Discuss the various products (tools) available in the forex market to cover exchange rate risks. **Or**
[CS Dec 2005] Mention any four tools available to cover exchange rate risk.

Ans. Various products (tools) which are available in the market to cover exchange rate risk are:

- Forward exchange contracts
- Rupee roll-over forward contracts
- Futures
- Options
- Currency swaps
- Interest rate swaps
- Money-market operations

Q. 4. **[CS Dec 2007]** Write a short note on 'Arbitrage-free market'

Ans.

- The process of buying in one market and selling the same in another market is known as arbitrage.
- Arbitrage is not a method of hedging foreign exchange risk in a real sense.
- It is a method of making profits from foreign exchange transactions.
- Thus, arbitrage denotes opportunity arising as a result of discrepancies prevalent in the market.
- Types of Arbitrage:-
  - Geographical/Space Arbitrage
  - Cross-rate Arbitrage
  - Time Arbitrage
- The form of market in which no arbitrage opportunity exist is called 'arbitrage free market'

Q. 5. **[CS June 2009]** Write notes on the following:-

1. **Exchange risk administration scheme (ERAS).**
2. **East Asian countries currency crisis.**

Ans. **1.** ERAS Stands for Exchange Risk Administration Scheme.
This Scheme was given by:-
a) Industrial Development Bank of India
b) Industrial Credit and Investment Corporation of India
c) Industrial Financial Corporation of India
It was announced in the year 1989.
It is a method by which the borrower can hedge the foreign exchange risk.
For this purpose a composite cost shall be determined after every x months by committee consisting of R.B.I., G.O.I. and financial institution as its representatives.

2. East Asian countries currency crisis

- East Asian Countries Currency crisis had taken place on account of high credit expansion and accumulation of capital stock.
- It took place abruptly and it soon able to take the whole of the East Asian countries in its grip.
- Its coverage and extent was also unimaginable.

Q. 6. **[CS June 2008]** Essential elements of forex management.

Ans. It is part of management science:-

- ❖ Organization and control of Forex.
- ❖ Budgeting for Forex.
- ❖ Utilization of Forex.

It refers to generation of Forex:-

- ❖ From international trade transactions.

It pertains to use of Forex:-

- ❖ Identification of suppliers of goods and services
- ❖ Negotiation of terms and conditions of the transaction

It covers storage of Forex:-

- ❖ Deposits in foreign currency bank accounts.
- ❖ Forex reserves-gold, special drawing rights of IMF and foreign currencies.
- ❖ Foreign exchange reserves.

Q. 7. **[CS Dec 2008]** Write notes on the Exchange rate forecasting

Ans. Exchange rate forecasting

- ➢ The term 'forecasting' means 'to predicts
- ➢ Exchange rate forecasting refers to the technique of predicting the future foreign exchange rates.
- ➢ Thus, foreign exchange rate forecasting calls for anticipating changes in the various factors influencing exchange rates viz inflation rate, growth rate, economic policies & political factors.
- ➢ Appreciation /depreciation of currency is calculated on basis of these forecasted exchange rates
- ➢ Forecasted exchange rate help business enterprises to conclude several financial decisions

Q. 8. **[CS Dec 2008]** Distinguish between the 'Bilateral netting' and 'multilateral netting'.

Ans.

- ➢ The term 'netting' is used for that general protect measure employed in context of mitigating for exchange risk whereby only net amount of receipts payment between holding and subsidiary should give effect to.
- ➢ Netting may thus serve as a general protection mean to hedge against foreign exchange risk.
- ➢ Netting can be of types:-
  - Bilateral Netting
  - Multilateral Netting
- ➢ Bilateral Netting : As the name suggest, bilateral netting, refers to that netting which involves two parties I. netting between two companies, mostly between holding and its subsidiary.
- ➢ Multilateral netting: Such netting which involves more than two parties is known as multilateral netting.

Q. 9. **[CS June 2009]** Distinguish between 'Interest rate parity' and 'purchasing power parity'.

Ans. **Interest rate parity**

According to this parity the high interest rate on a currency is offset by forward discount and low interest rate is offset by forward premium.

In other words, it states that difference in interest rates between two countries is equal to the difference between the forward and spot exchange rates.

Purchasing power parity

This approach states that the exchange rate between the currencies of two countries equals the ratio between the prices of goods in these countries further the exchange rate must change to adjust in prices of goods.

Thus purchasing power parity states that exchange rate between countries will adjust to change in inflation rates.

Q.10. [CS June 2002] Discuss the structure of foreign exchange market in India since liberalisation. How is the exchange rate determined in the short-run?

Ans. The structure of foreign exchange market in India since liberalisation consists:-

- Reserve Bank of India
- Authorised Dealers, moneychangers, overseas bank and financial institutions which act as clearing houses.
- Importers and exporters; investors and tourists.

Foreign exchange rates can be determined using any of the following basis, in case of short run:-

- Demand and supply of foreign exchange.
- Interest rate parity
- Purchasing power parity
- Expected market rate, etc.

Foreign exchange risk may be defined as the risk that takes place due to the volatility in foreign exchange market.

It refers to the variation in the real value of assets and liabilities or operating income attributable to unanticipated fluctuations in the foreign exchange rates.

Thus, companies/business enterprises indulged in international trade are exposed to additional risk in form of foreign exchange risk' on account of volatility in Foreign exchange market.

To combat the so-called foreign exchange risk, exposure management programme protection measures needs to be undertaken.

The two types of protection measures are as follows:-

• General Protection measures
• Specific protection measures

General protection measures includes:-

• Matching
• Invoicing policies
• Leading and logging credit term
• Transfer pricing
• Netting

Specific protection measures being

• Transaction exposure
• Translation exposure
• Economic exposure.

Q.11. [CS Dec 2002]Describe the general measures taken to provide protection from foreign exchange risks in a corporate environment on an ongoing basis.

Ans. As the name suggests, general protection measures are those measures which are generalized in nature i.e. those measures which a business enterprise executes on an ongoing basis.

The various general protection measures are as follows-

Invoicing Policies

Proper invoicing policies serve as a general protection measure to hedge foreign exchange risk In case the business enterprise has two or more subsidiaries located outside India which are importing and exporting amongst each other, invoices should be raised in the currency of the company's subsidiary which is advantageous the business enterprise as a whole.

Leading and lagging of credit term period

The term leading' means fastening the collection procedure whereas lagging' refers to the slowing down the payment of payables. While the former is a strategy adopted in case there is an anticipation that the foreign currency is likely to increase whereas the latter is employed in such a situation where the foreign currency in which payments are to be made is expected to fall down.

Transfer pricing

Transfer pricing may be defined as that strategy whereby the holding company strives to transfer its profit to that subsidiary which is located in tax heaven or proves out to be low taxed countries.

Netting

As the very name suggests, netting is the technique whereby only the net amount i.e. net receipts or payment should be reflected. This method provides the double advantage of cost reduction as well as increased control.

Q.12. How to eliminate limitations of forward contracts?

Ans. a) Problem of liquidity
- The large number of participants that trade through the exchange eliminates the problem of liquidity.
- The original contract is thus capable of changing hands a number of times before final execution.

b) Inadequate Knowledge
- The limitation of inadequate knowledge is overcome by the pooling of knowledge of multitude of seasoned players in the exchange. The imperfections of knowledge give way to a constantly updated knowledge back up for the participants in an exchange-traded set up.

c) Problems of Counter Party Risk
- The limitation of counter party default is eliminated in a forward exchange having clearing house facilities to that all transactions are paid for.

Q.13. **[June 2011]** Distinguish between the following:
(i) 'Current account' and 'capital account' in balance of payment.
(ii) 'Foreign direct investment' arid 'portfolio investment'.
(iii) 'Ask price' and 'bid price' (5 marks each)

Ans. (i)

Current Account	Capital Account
The current account under Balance of Payment (BOP) includes trade in goods & services.	Capital account basically comprise of cross broader flow of funds that is associated with financial or other assets in trading countries.
Thus is take into account export, import and net foreign income from unilateral transfers.	It takes into account the direct and portfolio investment made by foreign investors in India, are captured by capital account balance of the GOP.

(ii)

Foreign Direct Investment	Portfolio Investment
Foreign Direct Investment mean investment by an non resident person or non resident entity outside India in the capital of Indian Company.	Portfolio Investment on the other hand mainly include FII's investment, funds raised through GDF's I ADR's by Indian companies and through off shore funds.

(iii)

Ask Price	Bid Price
Ask price is the selling rate or the offer	Bid price is the rate at which the dealer is

rate and refers to the rate at which the foreign currency can be purchased from the dealer.	ready to buy the foreign currency in exchange for the domestic currency.
'In other words, an ask price is the rate at which the market maker is ready to sell a particular currency pair.	In other words, a bid price is the rate at which the market maker is prepared to buy a specific currency pair in the foreign exchange market.

Q.14. **[Dec. 2011]** How do firms manage economic risk due tofluctuations in forex market?

Ans. Economic risk may be defined as the uncertainty and unfavourable economic conditions in the country which affect the buyer & seller. Risk can be reduced using the following tools:

- ✓ Risk Estimation
- ✓ Hedging
- ✓ Netting
- ✓ Matching
- ✓ Leading & Lagging

Q.15. **[Dec. 2009]** Comment on the foreign exchange risk can be managed both internally and externally.

Ans. There are a number of techniques that can be used for internal hedging the exchange rate risk. It is easier to hedge transaction and translation risks internally than to hedge economic risk, due to difficulties associated with quantification of economic risks and long time periods over which exposure to economic risk occurs. The main internal techniques are matching, netting, leading and lagging and invoicing in the domestic currency but the degree to which firms hedge their exposures internally is often limited.

The foreign exchange risk can also be managed by external techniques. The most important methods are forward contracts futures and borrowing and lending in money market. Now a day a number of alternatives are available in the form of derivative instruments including, swaps and options.

Foreign Exchange & Risk Management

Currency : There are two types of currency	
Home Currency	**Foreign Currency**
A Currency which is used at home land is said to be home currency For India = ` "USA = $ " UK = £ "Japan = ¥	The Currency which is used other than home land is said to be Foreign Currency for India. $ (Dollar) £ (Pound) ¥ (Yen) are Foreign Currency

Quotation Currency : There are two types of Quotation of currency	
Direct Quote	**Indirect Quote**
A Quotation is said to be Direct Quote, in which there is number of Home Currency for 1 Unit of Foreign Currency. `/$ is 50 $ 1 = `50	A Quotation is said to be Indirect Quote in which to there is number of Foreign Currency for 1 Unit of Home Currency. ¥ / ` is 2.5343 `1 = ¥ 2.5343

Q. 1. **Spot Rates**

(a) 1 USD = £ 0.6184
1 USD = DM 1.3733
1 USD = Yens 105

Derive direct quotes in UK, USA, Germany and Japan for various foreign currencies.

(b) A Mumbai banker has given the following quotes. Identify whether they are direct or indirect. For each direct quote give the corresponding indirect quote and vice versa.

Currency	**Rate**	**Quote**
SEK	5.7500	`per Kroner
Euro	0.0191	€ per Re
SGD	0.0388	SGD per Re
AED	12.1500	Rs per UAE Dirham

Quotation of bank: there are two types of quotation of bank.	
One way quote	**Two Way quote**
When bank has bid rate (buying rate) & And ask rate (selling rate) are same $ 1 = `55.63 £ 1 = `76.47	When bank has bid rate (buying rate) And ask rate (selling rate) are different **Bid rate** **Ask rate** $ 1 = `55.00 --- `55.60 £ 1 = `76.47 --- `76.50

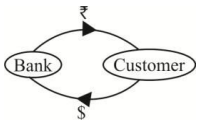
Bid rate Ask rate

2. Rule for choosing appropriate Quote in the case of two ways Quotation. $ 1 = `40.00 ----- `40.50

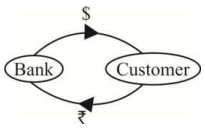
(i) Think from the point of view of **Commodity Currency** & **Bank** which is Whole Seller of C.C. (Commodity Currency).

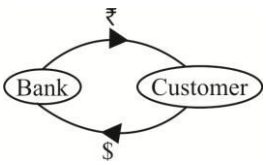
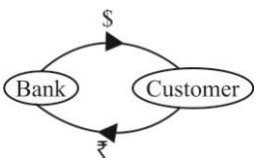
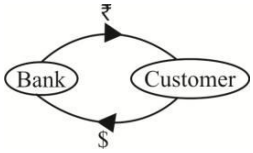
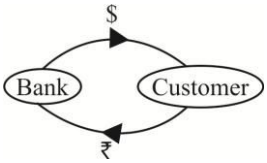
(ii) The Currency which is written in Single unit is said to be **Commodity Currency (C.C.)** in above Two Way Quote **$ is C.C.** & **`is price of commodity Currency.**

(iii) If **C.C. $** is coming to Bank it means Bank is going to buy the Commodity hence low rate (Bid rate) is applied i.e. $ 1 = `40.00



(iv) If Commodity Currency is going from Bank it means bank is going to Sale the Commodity hence high rate (**Ask rate**) is applied. i.e. $ 1 = `40.50



$ 1 = `40 – `40.50	**`1 = $ 0.023 - $ 0.025**
(i) Here **$** is Commodity Currency because **$** is written in Single Unit.  In above, Commodity Currency **$** is coming to bank it means bank is going to buy the Commodity hence low rate (**Bid rate**) is applied. **$ 1 = `40** **Here decision is taken from C.C. ($) & Bank**  In above, Commodity Currency **$** is going **from Bank** it means bank is going to sale the commodity hence high rate (**Ask rate)** is applied	`is Commodity Currency because `is written in Single Unit.  In above, Commodity Currency `is going from bank it means bank is going to sale the Commodity hence high rate (**Ask rate**) is applied **`1 = $0.025** **Here decision is taken from C.C. `& Bank**  In above, Commodity Currency `is coming to **bank** it means bank is going to buy the Commodity Currency `Hence low rate (**Bid**

$1= `40.50	**rate)** is applied	**`1 = $0.023**

Q. 2. Spot rate 40/41 `/$. Mrs. Madhuri Naine has been gifted $ 50,000 from her Father-in-law. How much `she can get if she is selling it at SBI Mumbai.

Ans. 2000000

Q. 3. Spot rate if 0.0258/0.0260 Italian Lira / `Mr. Sachin Tendulkar wants to go Italy for which he is need of Italian Lira of 50,000, how much Rupees he should pay to SBI Mumbai Branch?

Ans. 1937984.5

Q. 4. Spot rate is 1.80/1.88 $/£. Mrs. Madhuri Naine wants to go to U.K for shopping. She expects that bill of shopping will be £ 1,00,000. How much $ she should sell to USA Bank?

Ans. 188000

Q. 5. Spot rate is 0.6250/0.6253 £/$. Mrs. Madhuri Naine wants to go back to USA after shopping Air ticket cost £ 5,000. How much $ she should sell to Bank for purchasing Air Ticket?

Ans. $ 8000

Q. 6. M/s. Reliance Ltd. has sold goods worth $ 5,00,000 to M/s Johnson Inc. USA. How much Rupees M/s Reliance Ltd. will have from above export exposure.
Spot rate is 40/41 `/$.

Ans. `20000000

Q. 7. M/s. Tata Steel Limited has imported a Machine from Johnson Inc. worth $ 50,000 from USA. How much M/s. Tata Steel Ltd. is required to pay to M/s. Johnson Inc. (Spot rate 43/44 `/$).

Ans. `2200000

Q. 8. (a) Calculate how much sterling pounds exporters would receive or how much sterling pounds importers would pay, in each of the following situations:

(i) A U.K. exporter receives a payment of 80,000 guilders from a Dutch Customer.
Ans. £ 22408.963

(ii) A U.K. exporter receives a payment from a French customer of FF 1,50,000.
Ans. £ 13940.502

(iii) A U.K. importer buys goods from a Japanese supplier and pays 1 million yen.
Ans. £ 4282.6552

(iv) A U.K. importer pays a German consultancy firm DM 1,20,000 under service contract. **Ans.** £ 37825.059

Spot rate/£

Netherlands (Guilders)	3.55	3.57
France (Franc)	10.73	10.76
Japan (Yen)	233.50	235.50
Germany (DM)	3.1725	3.1775

(b) Calculate how many British pounds a London – based firm will receive or pay for its following four foreign currency transactions.

(i) The firm receives dividend amounting to FF 100000 from its French associate company.
Ans. £ 9259.2593

(ii) The firm pays interest amounting to 200000 yens for its borrowing from Japanese Bank.
Ans. £ 869.5652

(iii) The firm exported goods to USA and has just received USD 300000.

(iv) The Firm has imported goods from Germany amounting to DM 400000.
Ans. (iii) £ 185185.19 (iv) £ 125000

Spot Rates (per pound)

French Franc	10.70 / 10.80

Yen	230 / 234
USD	1.61 / 1.62
DM	3.20 / 3.21

Quotation after Appreciation or Depreciation

Quotation of Currency can be written in terms of is or =

`/ $ is 50 ⇒ `Per $ is 50

$ 1 = `50

$1 = `50×`1

`/ $ = 50 ⇒ $ 1 is equal to 50 times `1

Whenever in **Question it is written as Appreciation / Strong / or depreciation / Weak** then Quotation should be written in equal terms.

(i) The Currency which is going to appreciate or depreciate assumed to be Commodity Currency other Currency is Price **like**

$ is appreciated by 20% Here, $ is **Commodity Currency** & `is Price, it means we have to Pay 20% more `to buy **$** $/ `(1+0.20)= 50 $/ `= 50×1.20= 60 **$ 1= `60** = Quotation after 20% app^{n}. of $	`is depreciation by 20%. Here `is **Commodity Currency**, it means we have to pay 20% less **$** to buy ` (1 – 0.20) $/ `= 50 $/ ` $\frac{50}{0.80}$ = 62.50 **$ 1= `62.50** otation offer 20% depreciation `

Note : if $ is appreciate by 20% it doesn't mean `. depreciation by 20%

Q. 9. (a) Suppose that 1 French Franc could be purchased in the foreign exchange market for 20 US cents today. If the franc appreciated 10 percent tomorrow against the dollar, how many francs would a dollar buy tomorrow?

(b) Fleur du lac, French Co., has shopped goods to an American importer under a letter of credit arrangement, which calls for payment at the end of 90 days. The invoice is for $ 124000 presently the exchange rate is 5.70 French Francs to the $ if the French Franc were to strengthen by 5% by the end of 90 days what would be the transactions gain or loss in French Francs ?

If it were to weaken by 5%, What would happen ?

(Note: make calculation in francs per $)

Ans. (a) $1 = FF 4.5455 (b) (i) loss in case of strong FF 33657.146

(ii) Gain in case of Weak FF 37200

Q.10. A company operating in a country having the dollar as its unit of currency has today invoiced sales to an Indian company, the payment being due three months from the date of invoice. The invoice amount is $ 13, 750 and at today's spot rate of $ 0.0275 per Re. 1 is equivalent to `5, 00, 000.

It is anticipated that the exchange rate will decline by 5 per cent over the three – month period and in order to protect the dollar proceeds, the importer proposes to take appropriate action through foreign exchange market.

The three - month forward rate is quoted as $ 0.0273 per Re.1

You are required to calculate the expected loss and to show, how it can be hedged by forward contract.

Ans. 263157 Saving due to FR 22653

Q.11. A company operating in a country having the dollar as its unit of currency has today invoiced sales to an Indian company, the payment being due three months from the date of invoice. The invoice amount is $ 7, 500 and at today's spot rate of $ 0.025 per Re. 1, is equivalent to `3, 00, 000.

It is anticipated that the exchange rate will decline by 10% over the three months period and in order to protect the dollar proceeds, the importer proposes to take appropriate action through foreign exchange market.

The three months forward rate is quoted as $ 0. 0244 per Re.1.

You are required to calculate the expected loss and to show, how it can be hedged by forward contract.

Ans. (i) 33333(ii) 7377 (iii) Save 25936

Cross Quotation

In the case of one way quote.

Case-I

A/B is 5
B/C is 2
$\Rightarrow$ A/B × B/C is 5 × 2 $\Rightarrow$ A/C is 10

Case-II

A/B is 5 ---------- (i)
C/B is 0.5 ---------- (ii)
$\Rightarrow$ Find A/C

From (ii) B/C is $\frac{1}{0.5} \Rightarrow$ B/C is 2 ----------(iii)

From (i) & (iii) A/B × B/C is 5 × 2 $\Rightarrow$ **A/C is 10**

In the case of two way quote.

Case-III

rate	Bid rate	----	Ask rate
A/B is	4	------	5
B/B is	$\frac{1}{4}$	------	$\frac{1}{5}$
B/A is	0.25		0.20

$\Downarrow$

It is not Possible because Bid Rate is higher than Ask rate

Possible Quotation

	bid rate	-----	Ask
A/B is	4	-----	5
B/A is	$\frac{1}{5}$	-----	$\frac{1}{4}$

$\Downarrow$

B/A is	0.20	-----	0.25

Q.12. Spot rates are 40 `/$ and 1.50 $/£. What is rate for `/£.

Q.13. Spot rate are 35 ¥/`and 155 ¥/$. What is rate for `/$ and $/`?

Q.14. Forward rates are 65 `/£ and 42 `/$. Find forward rate for $/£ and £/$?

Q.15. If 40 `/ £, 3 $/£, 0.0032 £/¥. Find `/ ¥ and ¥/`

Q.16. Spot rates are 40.85/41 `/$ and 1.55/1.60 $/£. Find `/ £ and £/`

Q.17. 32.35/32.65 `/¥ and 40.65/40.85 `/$. Find ¥/$ and $/¥.

Q.18. 30.80/31.20 `/$ and 2.20/2.65 $/CAN $. Find `/CAN $ and CAN $/`

Q.19. Spot rates are 40.30/40.65 `/$ and 2.25/2.65 $/£ and 2.25/2.50 £/CAN$. Find `/CAN$ and CAN$/`

Q.20. Spot rate 40 `/$, 3 Month Forward rate is 43 `/$. Which currency is at premium ? Calculate premium.

Q.21. Spot rate 50 `/$, 3 Month Forward rate is 53 `/$. Which currency is at premium ? Calculate premium.

Q.22. Spot rate 1.5 $/£ 3 Month Forward rate is 1.55 `/$. Which currency is at premium ? Calculate premium.

Q.23. Spot rate 45 `/$ and 5 month forward rate is 43 `/$. Calculate Premium or Discount on $ currency.

Q.24. If Spot rates are 40/41. `/$ and 4 month forward rate is 42/43 `/$. Which currency it at premium ? What is Premium?

Q.25. 2/3 $/£ and after 4 month 3/4 $/£. Which currency is at premium and how much. Which currency is at discount ? Calculate discount?

Exchange Margin

It is the extra amount or Percentage charged by the bank over & above the Inter Bank Quote.

Case-I To get bid rate Margin should be deducted
Actual Buying rate = Actual Bid rate = Bid rate (1 – Exchange Margin)

Case-II To get Ask rate Margin should be Added
Actual Selling rate = Actual Ask rate = Ask rate (1 + Exchange Margin)

Bid rate	**Ask rate**
$ 1 = `40.50 – 40.60	$ 1 = `40.50 – 40.60
Bid Margin 0.06%	Ask Margin = 0.25%
Actual Bid rate	**Actual Ask rate**
$ 1 = 40.50 (1 – 0.0006)	$ 1 = 40.60 (1 + 0.0025)
= 40.4757	$ 1 = 40.4985

Q.26. **(a)** In the inter- bank market the DM is quoting `21.50 .If the bank charges 0.125% commission for TT selling and 0.15% for TT buying what rate should it quote to customer ?

(b) A customer wants to sells a bill worth $ 1,00,000 to a bank .The bill might mature any time during the second month. If the bank charges a margin of 0.5% and exchange rates are as given below , determine the rate which the bank is likely to quote

(`/$)

Spot	35.50/35.55
One month forward	15/10
Two month forward	20/15

SPOT RATE :

A Spot exchange rate is a rate at currencies are being traded for delivery on the Same day or at the Most within two days.

Forward Rate :

It is a rate decided today for future delivery of underlying assets in which one Party is willing to buy the underlying Assets & other Party is willing to Sale the underlying Assets.

Forward Premium / discount = % Change in value of currency = $\frac{\text{Charge}}{\text{Original}} \times 100$

SR, $1= `50	SR, `1 - $ 0.020
3 M FR, $ 1 = `40 ($ is discount) — 3 M FR, $ 1 = `55 ($ is Premium)	3 M FR, `1 = $ 0.018 (`is discount) — 3 M FR, `1 = $ 0.022 ($ is discount)

`is Premium	`is discount	$ is Premium	`is Premium

SR, $ 1 = `40** **FR, $1= `50

3 Months

$ is Premium = % Change in $ Value = $\frac{\text{Change}}{\text{Original}} \times 100$

$$= \frac{FR - SR}{SR} \times 100 = \frac{50-40}{40} \times 100$$

Premium of $ = 25%

`is discount = % Change in `Value = Change in $ amount = $\frac{\frac{1}{50} - \frac{1}{40}}{\frac{1}{40}} \Rightarrow \frac{\frac{1}{FR} - \frac{1}{SR}}{\frac{1}{SR}} = \frac{\frac{SR-FR}{FR \times SR}}{\frac{1}{SR}}$

$$= \frac{SR - FR}{FR} \times 100 = \frac{40-50}{50} \times 100 = -20\%$$

Discount of `= 20%

Note: If Calculated Value is +ve $\Rightarrow$ Means Premium
If Calculated Value is –ve $\Rightarrow$ Means discount

#

Forward Premium or discount can be calculated using Interest rate

$$= \frac{\text{Periodic Interest rate of other Currency} - \text{PeriodicInterest rate of same currency}}{1 + \text{Periodic Interest rate of same currency}} = \frac{1+I_0}{1+I_S}$$

Interest rate Parity theorem : As per Interest rate Parity theorem there is relationship between exchange rate & Interest rate. The Currency having high Interest rate will depreciate in Future & the Currency having low Interest rate will appreciate in Future. At Equilibrium Forward Premium / discount using Interest rate & using Currency Exchange rate is equal.

Assumptions:-

1. That there is no difference between borrowing and deposit rate.
2. That there are no transactions cost.
3. That there is no bid-ask spread.
4. That there is no taxation.
5. That information is readily and freely available.
6. That no other factors affect the forward rate except the interest rates.

Relation between Sport rate, Forward rate & Interest rate

SR = Spot rate, Is = Interest of Same Currency
FR = Forward rate Io = Interest rate of other Currency

Forward Premium or discount when other Currency is Direct Quote	Forward Premium or discount when other Currency is Indirect Quote
$= \frac{FR - SR}{SR}$ ------- (i)	$= \frac{SR - FR}{FR}$ ---- (ii)
Forward Premium or discount Using Interest rate $= \frac{I_0 - I_S}{1+I_S}$ --------- (iii)	Forward Premium or discount Using Interest rate $= \frac{I_0 - I_S}{1+I_S}$ (iii)
At Equilibrium or I.R.P.T. $\frac{FR-SR}{SR} = \frac{I_0 - I_S}{1+I_S}$	At Equilibrium or I.R.P.T. $\frac{SR-FR}{FR} = \frac{I_0 - I_S}{1+I_S}$
Adding 1 in both sides $\frac{FR-SR}{SR} + 1 = \frac{I_0 - I_S}{1+I_S} + 1$	Adding 1 in both sides $\frac{SR-FR}{FR} + 1 = \frac{I_0 - I_S}{1+I_S} + 1$
$\frac{FR-SR+SR}{SR} = \frac{I_0 - I_S + 1 + I_S}{1+I_S}$	$\frac{SR-FR+FR}{FR} = \frac{I_0 - I_S + 1 + I_S}{1+I_S}$
$\boxed{\frac{FR}{SR} = \frac{1+I_0}{1+I_S}}$	$\boxed{\frac{SR}{FR} = \frac{1+I_0}{1+I_S}}$

where I_0 is Direct Quote Currency Interest	where I_0 is Indirect Quote Currency Interest

Interest rate differentia

Interest rate differentia states that if Spot rate & Forward rate are at equilibrium then Forward Premium or discount of Currency is equal to difference of Interest rate. In this case there is no Scope of any Interest arbitrage.

Q.27. The spot Danish Krone rate is $ 0.15986 and the three months forward rate is $ 0.1590. The three months treasury bill rate in the United States is 6.25% p.a. and in the Denmark 7.50% p.a.

(i) Calculate forward premium or discount on Danish Krone.
(ii) Are the forward rates and interest rate in equilibrium ?
(iii) Also work out the forward rate if the forward premium or discount rate in equilibrium.

Ans. (i) 0.538%,-0.3067%, 0.15936

Q.28. Spot 1 $ = `42.50
Interest rate ($) = 8% p.a.
Interest rate (`) = 12% p.a.

(a) Estimate three months forward rate as per IRPT.
(b) Calculate rate of discount / premium of dollar on the basis of forward and spot rates.
(c) Calculate rate of discount / premium of dollar on the basis of interest rates.

Ans. (a) 42.9167, (b) 0.9804 (c) 0.9804

Q.29. The financial press recently listed the following information about two currencies, the Westland dollar ($W) and the Eastland mark (Em).

Spot rates:	2.0725 Em / $ W	0.4825 $W / Em
90 days rates:	2.0687 Em / $W	0.4834 $W / Em

The Westland prime interest rate on the same day was 9.5%.
Note: - Use a 365 day year.

Requirements:

(i) Explain what is implied about the Eastland interest rate.
(ii) Calculate and comment on the Eastland interest rate if the forward exchange rate was 0.4795 $W / Em.
(iii) Calculate and comment on the 90 day forward rate on Em / $W if the Eastland interest rate was 8%.

Ans. (i) 8.73% (ii) 12.09% (c) 2.065

Possibility of Interest arbitrage

Assumed $I_\$$ = USA Interest rate = 8% p.a.
$I_`$ = India Interest rate = 12% p.a.
Difference of Interest rate = 12% - 8% = 4% p.a.

(i) As per I.R.P.T. or Equilibrium there will be no Interest arbitrage when discount of `using SR & FR is equal to difference of interest rate 4%.
(ii) If discount of `is More than 4% it Means Premium of $ is More than 4% then Interest arbitrage is Possible For Gain we should borrowed `@ 12% p.a. & Invest in USA @ 8% p.a. because arbitrager will have loss of interest by 4% but gain in currency exchange rate by more than 4%.
(iii) If discount of `is less than 4% in this Case Interest arbitrage is Possible. For Interest arbitrage we should borrowed from USA @ 8% p.a. & Invest in India @ 12% p.a. because arbitrager will have gain of interest by 4% but loss in currency exchange by lower than 4%.

Q.30. `/DM ROI `16% and DM 8% you are required to :

1. Calculate 6 months forward rate based on assumption of interest rate parity
2. Calculate forward premium if forward rate given by bank is 40 R/DM
3. Is there any arbitrage opportunity available in case forward rate is 40 Rs/DM
4. Calculate arbitrage gain if any as per situation (3)

Purchase Power Parity theorem (P.P.P.T.)

Purchase Power Parity theorem is Similar to Interest rate Parity theorem. In the case of Purchase power Parity theorem the Interest rate is replaced by **Inflation rate**.

One of the oldest theory dealing with exchange rate determination.

P.P.P.T has 2 forms.

Assumptions:

1. That the goods being traded are identical in all respects.
2. That there are no transactions costs.
3. That there is no transaction costs, tariffs and duties on trade.
4. That there are no trade barriers (unlibralisation of economics)

Q.31. You are given the following information

Spot rate : DM 1.50 / $

3 – month forward rate : DM 1.51 / $

The inflation rate is Germany is 4%. Calculate the inflation rate in the USA assuming that Purchasing Power Parity holds goods even in the short run. **Ans.** 1.32%

Q.32. You are told that the spot rate is $ 1.65 / Pound

The expected inflation rates in the UK and the USA for the next three years are given below.

Year	**UK Inflation (%)**	**US Inflation (%)**
1	3.0	2.0
2	3.5	2.5
3	3.0	2.0

Calculate the expected $ / Pound spot rate after three years.

You are given the following information. **Ans.** £1 = $ 1.62

Q.33. The spot rate is `36.00 / $. Inflation rates in India and USA are expected to be 8% and 3% respectively. What is the expected rate of depreciation of the rupee ? **Ans.** 4.63%

Q.34. An American based FII is looking to invest US$ 10 million in an emerging market. After a careful analysis of future prospects, India and Malaysia are shortlisted. For the next year, which is also the holding period of the FII, expected rates of return are 20 percent and 16 percent in India and Malaysian markets respectively. Withholding tax rates applicable on the returns earned are 20 percent in India and 10 percent in Malaysia. Other information available with the FII includes:

Exchange rates:

`/ $ spot	43.50 / 43.60
MS / $ spot	3.80 / 3.82

Expected inflation for the next year:

India	4.0%
Malaysia	6.0%
US	2.0%

Assuming that the PPP holds good, where should the FII invest ?

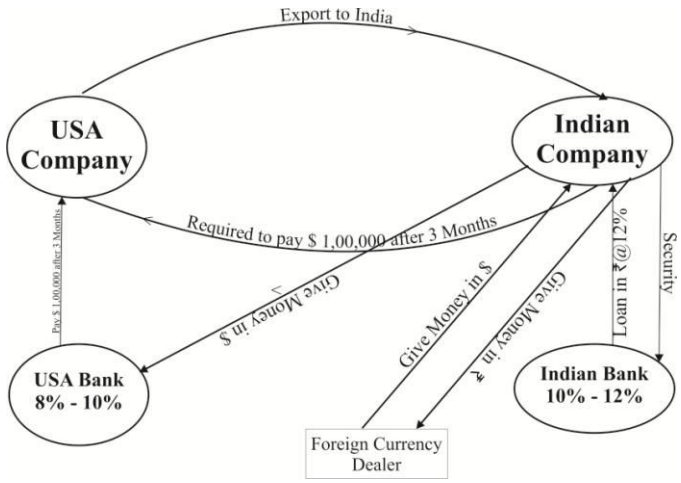
Ans. India $ 113.52 Malasia $ 109.5

MONEY MARKET OPERATION

It is a risk management tool, through which future payment or receive of foreign currency is done at spot rate with the help of bank.

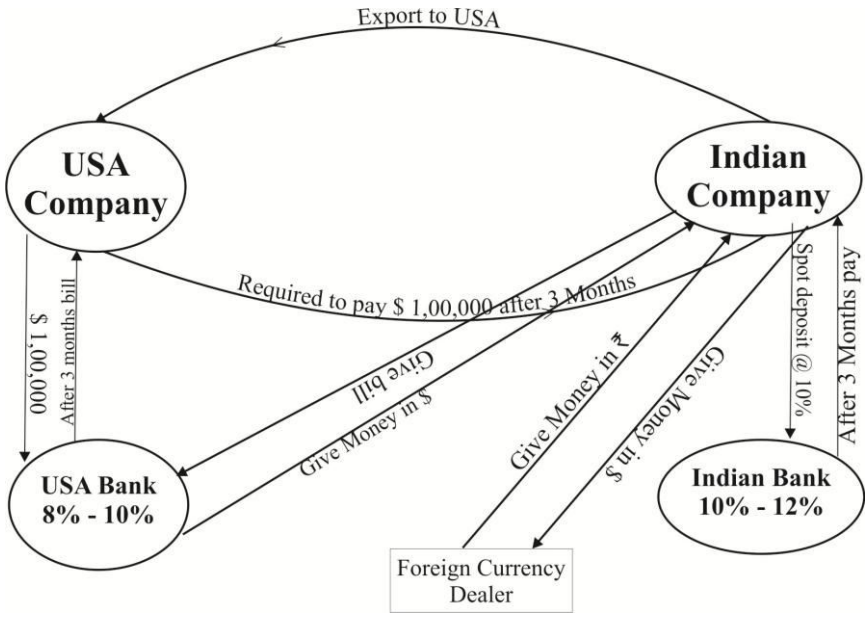
In the case of payment of foreign currency

Export to India



1. Calculate equivalent $ required to deposit today to USA Bank to get $100000 after 3 Months, Low interest rate is applied. $\text{P.V.} = \dfrac{\$1,00,000}{1+\dfrac{0.08}{12}\times 3} = \$\ 98039.21$
2. Take loan from home bank to purchase $ 98039.21 at spot rate $1 = `50 – `50.50
   $1 =`50.50
   $ 98039.21 = `50.50 × 98039.21 = `4950980
3. Pay Indian bank loan after 3 month with high interest rate : 49, $50{,}980\left(1+\dfrac{0.12}{12}\times 3\right) =$ `50,99,510

In the case of receive of foreign currency



1. Calculate P.V. of foreign currency at high Interest rate: $\text{P.V.} = \dfrac{\$1,00,000}{1+\dfrac{0.10}{12}\times 3} = \$\ 97,561$
2. Find Equivalent home currency at SR $ 1 = `50 – 50.50

$ 1 = `50
$ 97,561 = `97,561 × 50 = `48,78,049

3. Find future value of home currency at low interest rate; $`48{,}78{,}049\left(1+\frac{0.10}{12}\times 3\right)=$ `50,00,000

Q.35. XYZ Ltd. sold goods worth $ 2,06,000 to a customer in U.S.A., the receipt due in 4 months.

Exchange Rate:

Spot $ 1	= `40 – 42
Fourth month forward $ 1	= `40.50 – 42.75

Interest Rate:

U.S.A.	-----	7% - 9% P.A.
India	-----	12% - 14% P.A.

Calculate the receipt under

(i) Forward Market **Ans.** 8343000
(ii) Money Market **Ans.** 8320000

Q.36. Best of Luck Ltd., London will have to make a payment of $ 3,64,897in six month's time. It is currently 1st October. The company is considering the various choices it has in order to hedge its transaction exposure.

Exchange Rates

Spot Rate	$ 1.5617 – 1.5773
Six – month forward rate	$ 1.5455 – 1.5609

Money Market Rates:	**Borrow (%)**	**Deposit (%)**
US	6	4.5
UK	7	5.5

By making the appropriate calculations decide which of the following hedging alternatives is the most attractive to Best of Luck Ltd.

(a) Forward Market, **Ans.** 236102.88
(b) Cash (Money) Market. **Ans.** 236510.11
(c)

Q.37. Assume that a British firm will have only following cash transactions in next six months.

- Cash payment due £ 116000 in a three months.
- Cash receipt, due $ 197000 in a three months.
- Cash payment due $ 447, 000 in six months.
- Cash receipt due $ 154, 000 in six months.

Exchange rate spot 1 pound = 1.7106 – 1.7140 $

(a) Calculate the net sterling pound receipts and payments that the firm might expect for both its three and six months transactions if the company hedges foreign exchange risk on money market operations basis. You may assume the following interest rates:

	Borrowing	**Lending**
Pound	12.50% p.a.	9.50% p.a.
$	9% p.a.	6% p.a.

(b) For ward Foreign exchange Market when

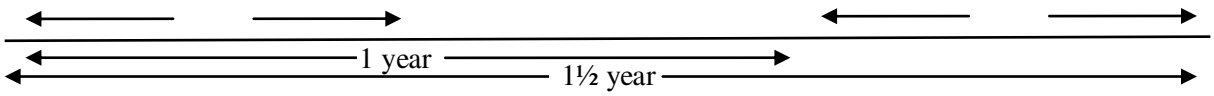
three months forward	0.82 – 0.77 cents premium
six months forward	1.39 – 1.34 cents premium

Ans. (a)

MMO	FR
£ 115077	£115455
£ 176690	£ 172688

ROLL - OVER OF FORWARD CONTRACTS

As per present **FEDAI** Rules, Indian Banks cannot enter into forward contracts of more than 6 months, However parties which have a foreign exchange exposure of a period more than 6 months in this case rupee role over contract is used to hedge the future payment or receipts.



Step 1	Step 2	Step 3
Take 6 months forward contacts	Cancel the existing forward contract as per provision of cancellation of forward contract & then taken for next 6 months forward contract.	Previous step is repeated till final due date incurred.

Q.38. A person gets an interest free loan of USD 300000 – repayment is to be done in three equal half yearly installments. Assume the following rates

A.	Today	six months forward rate `42 – `42.50
B.	At the end of six months	Spot `43 – 43. 10
	Six months forward	`43.40 – 43.50
C.	At the end of one year	Spot `44 – 44.10
	Six months forward	`44.50 – 44.60
D.	At the end of one & half year	Spot `45 – 45.10

Find the amount he has to pay in rupees in the following cases:

(i) No hedging **Ans.** `13230000

(ii) Rupee roll over forward **Ans.** `12910000

(iii) Three separate forward contracts one today, one after six months and one after one year from today (Ignore Bank Commission) **Ans.** 13060000

Q.39. An Indian corporate completes a project of value , $ 1 million in the middle east on 31/12/96 .The contract has been executed on deferred payment terms and the necessary permission for the late realization of export proceeds has been obtained from the Reserve Bank of India .The company has to bear the currency risk however till 1/1/99 when payment will be realized .when the corporate approaches its bank , it is informed that contracts of maturity greater than six months cannot be structured .It hence opts for six – month roll over cover .

The following are the spot rates (Rs/$) and six –month forward rates (Rs/$) prevailing at the end of each roll over period .Determine the cash flows compare the result with a situation when the corporate leaves the exposure uncovered .Cost of capital for the company is 20%

Date	Spot Rate(Rs/$)	Six-month Forward Rate
1/1/97	35.00	35.20
1/7/97	35.15	35.30
1/1/98	35.25	35.35
1/7/98	35.35	35.50
1/1/99	35.45	35.60

Geographical Arbitrage

Arbitrage means "**Risk Less Gain**" i.e. taking advantage of mismatching in prices of an asset in various markets.

1. If one way quote is given:- Arbitrage gain is possible from only one route i.e. gain in one route, then there must be loss in another route.

Q.40. Calculate the arbitrage gains possible on `10,00,000 from the middle rates given below. Assume there are no transaction costs:

`76.200 = £ 1 in London `46.600 = $ 1 in Delhi

$ 1.5820 = £ 1 in New York

Ans. Gain `33624

2. If two way quote is given:-

For Profit ⇒ Buying rate < Selling rate.

NOTE

Arbitrager will buy from bank & sale to bank

For profit of arbitrager.

Buying rate of arbitrager < Selling rate of arbitrager

⇩ ⇩

Selling rate of bank (Ask rate) < buying rate of bank (Bid rate)

Above is not possible in one bank therefore for Geographical arbitrage there must be bid rate one bank higher than ask rate of other bank e.g.

Bank I	$1 = `40 – `42	$1 = `40 – `42
Bank II	$1 = `41 – `43	$1 = `43 – `44
No geographical arbitrage is Possible because ask rate is Higher than corresponding bid rate		Here geographical arbitrage is possible because bid rate of Bank II (`43) is higher than ask rate (`42) of Bank I.

Q.41. Spot Rate (Frankfurt) 1 $ = 1.3579 – 1.3585 DM

Spot Rate (New York) 1 DM = .7149-.7295 $

You have 1,00,000 DM what amount of profit you can make from arbitrage ?

Q.42. **(a)** In London a dealer Quotes:

DEM / £ Spot 3.5250 / 55

¥ / £ spot 180.80 / 181.30

(i) What do you expect the ¥ DEM rate to be in Frankfurt ?

(ii) Suppose that in Frankfurt you get a quote ¥ / DEM spot 51.1530 / 51. 2550. Is then an arbitrage opportunity ?

(iii) Suppose you have £ 10, 000. What will be the gain on one side.

Ans. (iii) £ 5.562

(b) The following quotes are obtained in New York:

$ / £ = 1.5275 / 85

S Fr / $ = 1.5530 / 35

(i) What rates do you expect for SFr / £ spot in London?

(ii) If a London Bank quotes SFr / £ 2.3730 / 40, can you make arbitrage profits? If so, then how?

If a London bank quotes 2.3750 / 70, can you make arbitrage profits ? If you have £ 0,000 with you show how much profit can be generated in a single cycle?

Ans. £ 2.106

LEADING BY AN EXPORTER.

An Indian exporter has to receive foreign currency in lieu of items exported to some other country after some time (not immediately) may decide to receive lead payment/Early payment from the foreign party to save himself from expected adverse movement of foreign exchange rates.

He may have to allow cash discount to the foreign importer on account of early payment being made by him. Also he should consider the interest to be earn on funds may available to him though early payment by the foreign party.

This method of hedging will be compared with other methods and the method involving highest cash inflows will be chosen.

It may have to allow cash discount to the foreign importer on account of early payment being made by him.

LEADING BY AN IMPORTER.

An Indian importer who is to pay foreign currency in lieu of items imported from some other country after some time (and not immediately) may decide to make lead payment/early payment to the foreign party to save himself from the expected adverse movement of foreign exchange rate.

He may negotiate for a cash discount to be allowed to him on account of early payment being made by him the foreign party. Also he should consider the opportunity cost of funds made available for early payment.

This method of hedging will be compared with other methods and the method involving list cash outflows will be consider

LAGGING

An importer/exporter may make/take payment by delaying the amount payable/receivable more than the due date of paying/receiving the amount due. This method of hedging will consider the interest payable by importer on account of lagging payments and interest receivable by exporter of account of receiving late payment.

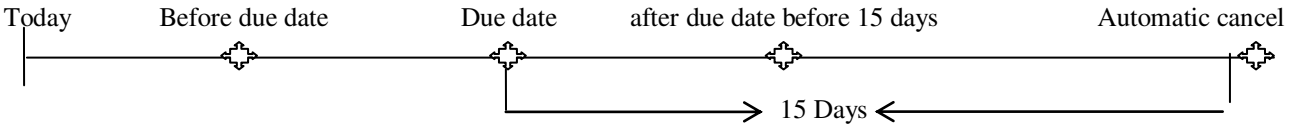
CANCELLATION OF FORWARD CONTRACT

Suppose a person enters into forward contract but due to some reason forward contract cannot be performed. In this case cancellation of forward contract is done.

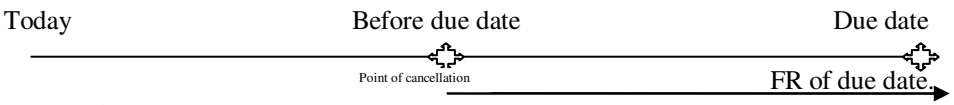
There are four different situation in which cancellation is done:

1. Cancellation before due date.
2. Cancellation at due date.
3. Cancellation after due date.
4. Automatic cancellation.

Cancellation of forward contract is done with opposite transaction i.e. if forward contract is for sale of foreign currency than it is cancelled with purchase of foreign currency &then sale.



1. Cancellation before due date:



(I) 1st transaction is done as per forward rate.

(II) Opposite transaction is done at FR of due date from the date of cancellation.

(III) If there is any profit to bank i.e. loss of customer then bank will collect such profit at the time of cancellation and cancellation is completed.

(IV) If there is any profit of customer, bank will give to customer at due date then cancelation is completed,

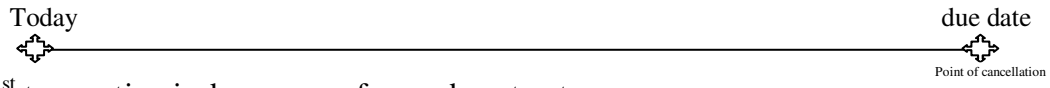
Q.43. A customer with whom the Bank had entered into 3 month's forward purchase contract for Swiss Francs 10, 000 @ `27.25 comes to bank after 2 months and requests for cancellation of the contract. On this date, the prevailing rates are:

Spot 1 Swiss Frank: `27.30 / 27.35

One month forward 1 Swiss Frank: `27.45 / 27.52

What is the loss or gain to customer on cancellation? **Ans.** Loss of Customer 2700

2. Cancellation at due date



(I) 1st transaction is done as per forward contract.

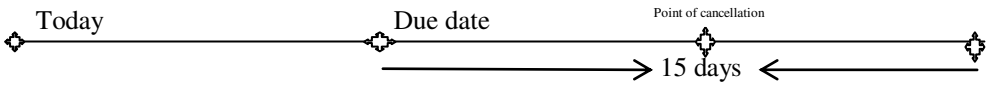
(II) Opposite transaction is done at spot rate of due date.

(III) Profit &loss are set off as same date of cancelation.

Q.44. S.B.I. has booked a forward purchase contract for USD 250000 due 14 March, 2003 @ `48.25. On maturity, the customer fails to deliver the Dollars and requests for cancellation of the contract. Spot rate on 14 March, 2003: USD = `48.6525 / `48.7325. What amount of gain / loss will be payable to / receivable from customer?

Ans. Loss of Customer 120625

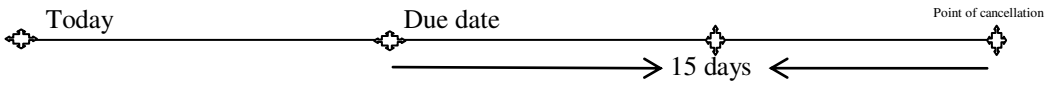
3. Cancelation after due date



(I) 1st transaction is done as per forward rate.
(II) Opposite transaction is done at SR of cancelling date.
(III) If there is any profit of bank then it is collected by bank at the time of cancellation.
(IV) If there is any profit of customer it is not paid to bank because customer has approved after due date.

Q.45. Bank of India has booked a forward sale contract for USD 100 000 @ 48.42 due on 10 March, 2003. The customer did not contact the bank on due date. However, on 14 March, 2003, the customer requests the bank to cancel the contract. On this date, spot rate is `48.5000 / `48.5700. What amount of gain / loss will be payable to / receivable from customer? **Ans.** Gain but not paid 8000

If customer doesn't approach for cancelation



In this case bank will cancelled itself the forward contract as per provision of cancellation of forward after 15days of due date.
If there is any national holiday then next working day will be the cancellation day.
If there is any profit to bank it is collected forcely but if there is any profit to customer it is not paid by bank.

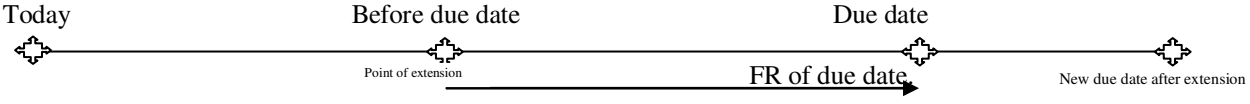
Q.46. A bank had booked a forward sale contact for USD 1,00,000 due 10 March, 2003 @ `48.42. The customer did not contact the bank on / before / after the date of maturity. Given the following spot rate, what amount of gain / loss will be payable to / receivable from customer ?

24th March, 2003 (Monday)	48.49 / 48.57
25th March, 2003	48.50 / 48.58
26th March, 2003	48.51 / 48.59

Ans. Gain but not paid 8000

Extension of Forward Contract

Existing contract is cancelled as per provision of cancelation of forward contract then new contract is made as per extension period at FR rate of extension



Q.47. PNB booked a forward sale contract for USD 250,000 due August 30 @ `48.35. On 10th August the customer request the bank to extend the forward contract for 30th September. Foreign Exchange rates on 10th August are:

Spot	48.1325 – 48.1675
Forward 30th August	47.6625 – 47.7175
Forward 30th September	47.4425 – 47.5375

At what rate the contract will be extended? What amount of loss / gain will be receivable from / payable to customer? **Ans.** Loss of Customer 171875

Early Delivery

A customer who has entered into a forward contract may approach the bank for early delivery in such case; the bank cancels the original forward contract &buy/sells to/from the customer at T.T./merchant the spot rate.

Q48. You are working for a bank. Your bank entered into a forward contract with a customer for purchase of USD 1,00,000 delivery 31st July; contract rate `48.00. On 1st June, the customer approached the bank with delivery of USD 100 000 which were delivered against the forward contract. On this date, the rates were as follows:

Spot `49.2825 – 49.3275
Forward (July 31st) `49.8025 – 49.8875

The bank's prime lending rate is 13 per cent. It accepts deposits for 2 months @ 4.50 per cent p.a. What amount of loss / gain will be receivable from / payable to customer ?

Ans. Excess Required to pay `59538

EXPOSURE NETTING

In case an importer/exporter is engaged in imports from a country and export to that country, than the person may need the receipts with the payment of foreign currency in other to hedge his position &save itself from paying any spread to bank.

e.g. ABC co. has imported from U.S.A & required to pay $100000 & exported to USA required to receive $50,000 then Netting Exposure = $100000 - $50,000 =$50,000

INTERNATIONAL CASH MANAGEMENT

Cash management involves taking care of surplus cash (if any) or deficit of cash

There are two system of international cash management namely:

1. Centralize cash management.
2. Decentralize cash management

1. Centralize cash management: Under this system, the head office or holding company takes care of surplus and deficit cash at each branch/subsidiary company itself. The surplus of one branch/subsidiary Company will be transferred to the other branch/subsidiary company having deficit and if such surplus is insufficient to meet the cash requirement balance funds will be transferred/remitted by head office/holding Company to the subsidiary requiring cash infusion.
2. Decentralize cash management: Under this system the branch/subsidiary having surplus fund will remit funds to the head office/holdings company and interred deficit will be made/remitted by holding company/head office to the subsidiary company/branch office requiring cash infusion in case of deficit.

Q.49. An American multinational Corporation has subsidies whose cash positions for the month of September, 2002 are given below :

Swiss subsidiary : Cash surplus of SF 1,50,00,000
Canadian subsidiary : Cash deficit of CAN $ 2,50,00,000
UK subsidiary : Cash deficit of 30,00,000 (UK Pound)

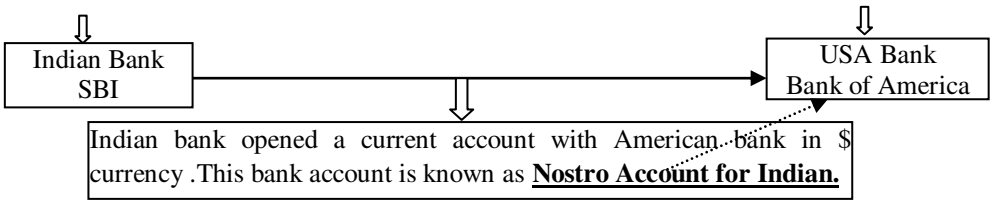
(i) Decentralized cash management is adopted ?
(ii) Centralized cash management is adopted ?
(Exchange rate : SF 1.48/$, Can $ 1.58/$, 1.5/£)

NOSTRO A\C; VOSTRO A\C & LORO A\C

1. NOSTRO A/c.
   i. It is current A\C
   ii. It is maintained by domestic bank\dealer with foreign bank in foreign currency.

OURS ACCOUNT WITH YOU

India USA

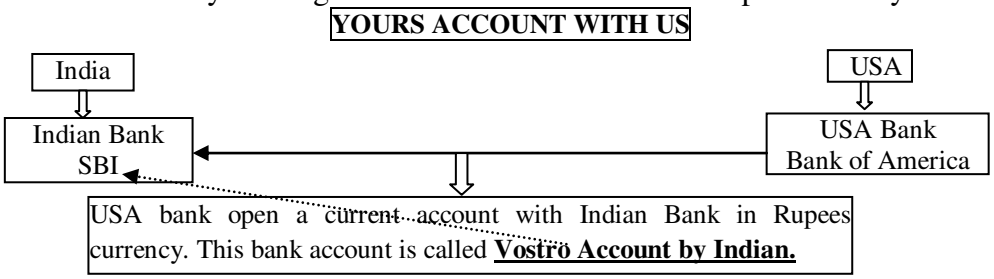


Q.50. An Indian bank wants to found their Nostro A/c with US Correspondence bank by $5,00,000 against INR when Inter bank rate is $1 = `47.20/50. The deal is struck and overseas bank's Vostro A/c That is being maintained with the Indian Bank will be credited by ……. **[CWA Dec. 2004]**

Q.51. A New York bank wants to found their Account called Vostro A/c, with an Indian bank by `10 million. What dollar amount the New York Bank would deposit in the Indian bank's account called Nostro A/C maintained in New York when Inter bank rate is 1$ = 44.50-70. **[CWA June, 2004]**

2. VOSTRO A/c.

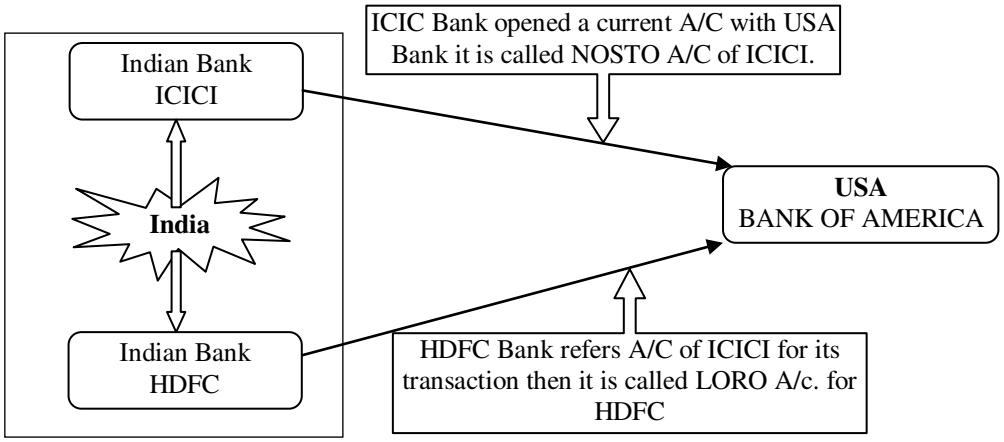
i. It is current A\C
ii. It is maintained by a foreign bank with domestic bank in rupee currency.



3. LORO A/c.

i. It is current A\C
ii. It is maintained by one domestic bank on behalf of other domestic bank in foreign bank in foreign currency.
iii. Loro A/C is Nostro A/C for one bank who opened the bank and LORO A/C for other bank who refers first one A/C

For example: - ICICI opened current A/C with bank of America. If HDFC refer that A/C of ICICI for its correspondence then it is called LORO A/C for HDFC and it is NOSTRO A/C for ICICI.



Forward spot differential / forward margin / swap point

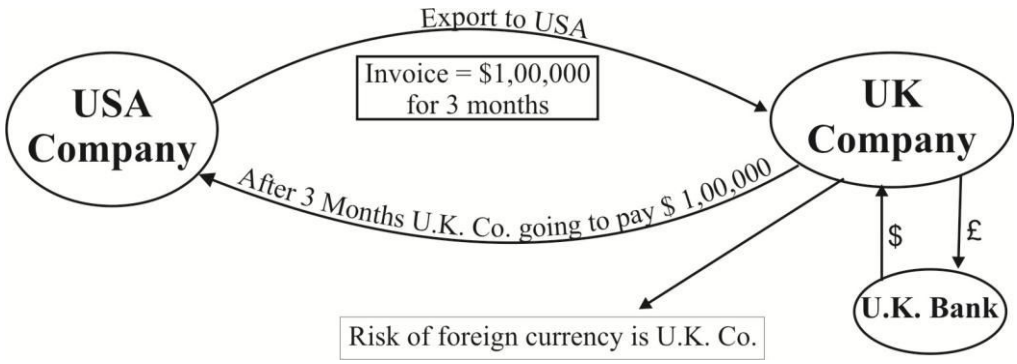
The difference between forward rate & spot rate is known as swap point. The forward rateis calculated using Swap Point.

Rule 1. When Ask Swap is greater than Bid Swap Add Swap point in SR to get FR.

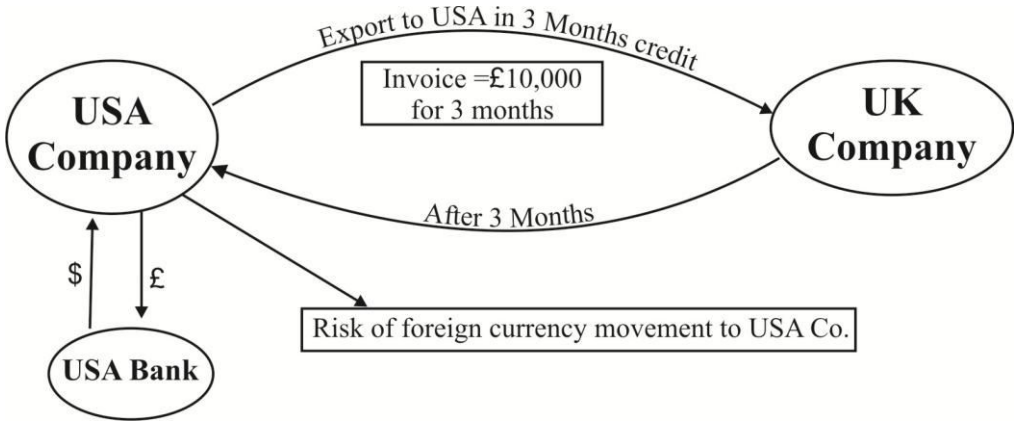
Rule 2. When Ask Swap is lower than Bid Swap less Swap point in SR to get FR.

Risk of Foreign Currency Movement

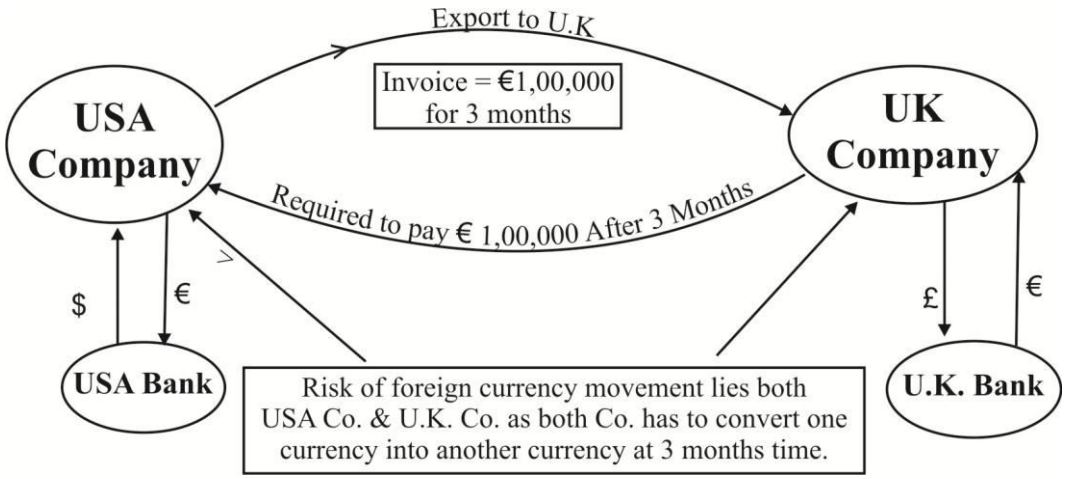
Case I.



Case II.



Case III.



THE FISHER EFFECT

Q.52. You have been engaged to evaluate an investment project overseas in a country called East Africa, which is politically stable country. The project involves an initial cost of East Africa dollar 2.5 crores (EA $) & it is expected to earn post tax cash flows as follows:

Years	**1**	**2**	**3**	**4**
Cash flows in (EA $ lacks)	**75**	**95**	**125**	**135**

Further, the following information is available:

(a) The expected inflation rate in East Africa is 3% per year.
(b) Real interest rate of India as well as East Africa is same & the expected to remain same during the currency of project.
(c) Current Spot rate is EA $ 2 Per Re. 1
(d) Risk free rate of interest in East Africa is 7% & in India is 9%.
(e) Required return from the project is 16%.

You may make suitable (generally acceptable) assumptions in order to evaluate the project.

IMPLIED DIFFERENTIAL IN INTEREST RATES (ALSO CALLED AS INTEREST RATE DIFFERENTIAL)

Q.53. Shoe Company sells to a wholesaler in Germany. The purchase price of a shipment is 50000 Duetsche marks with term of 90 days. Upon payment, Shoe company will convert the DM to dollars. The present spot rate for DM per Dollar is 1.71, whereas the 90 – day forward rate is 1.70. You are required to calculate and explain:

(i) If Shoe company were to hedge its foreign exchange risk, what would it do ? What transactions are necessary ?
(ii) Is the Duetsche mark at a forward premium or at a discount ?
(iii) What is the implied differential in interest rates between the two countries ? (use interest rate parity assumption).

Ans. (i) 0.588% (ii) 0.588%

STUDY MATERIAL QUESTIONS OF CA FINAL

Q.54. The following spot rates are observed in the foreign currency market.

CURRENCY	FOREIGN CURRENCY PER U.S. $
Britain Pound	00.62
Netherlands Guilder	01.90
Sweden Kroner	06.40
Switzerland Franc	01.50
Italy Lira	1, 300.00
Japan Yen	140.00

On the basis of this information, compute to the nearest second decimal number of:

Question:

A British pounds that can be acquired for $ 100
B $ that 50 Dutch guilders will buy
C Swedish Kroner that can be acquired be $ 40
D Dollars that 200 Swiss Francs can buy
E Italian Lira that can be acquired for $ 10
F Dollars that 1000 Japanese yen will buy

Q.55. Suppose that 1 French franc could be purchased in the foreign exchange market for 20 US cents today. If the franc appreciated 10 percent tomorrow against the dollar, how many francs would a dollar buy tomorrow?

Q.56. The following table shows interest rates and exchange rates for the United States dollar and French franc. The spot exchange rate is 7.05 francs per dollar. Complete the missing entries:

	3 months	**6 months**	**1 year**
Eurodollar interest rate (annually compounded)	11½ %	12¼%	?
Eurofranc interest rate (annually compounded)	19½ %	?	20%
Forward francs per dollar	?	?	7.52
Forward discount on franc, percent per year	?	- 6.3%	?

Q.57. In 1992 a Transistor cost $ 22.84 in New York, S$69 in Singapore, and 3240 rubbles in Moscow.

(a) If the law of one price held, what was the exchange rate between US dollars and Singapore dollar? Between US dollars and rubles?

(b) The actual exchange rates in 1992 were S$1.63 = US$1 and 250 ubles = US$1. Where would you prefer to buy your Transistor ?

Ans. $ 1 = S $ 3.02 (b) Singapor = $ 42.33
$ 1 = Ruble 141.9 Rusia $ 12.96

Q.58. U.S. Imports co., purchased 100, 000 Mark's worth of machines from a firm in Dortmund, Germany the value of the dollar in terms of the mark has been decreasing. The firm in Dortmund offers 2/10, net 90 terms. The spot rate for the mark is dollar 55; the 90 days forward rate is $56

(a) Compute the $ cost of paying the account with in the 10 days.

(b) Compute the $ cost of buying a forward contract to liquidate the account

(c) The differential between part a and part b is the result of the time value of money (the discount for prepayment) and protection from currency value fluctuation. Determine the magnitude of each of these components.

Q.59. On December 27, 1992 a customer requested a bank to remit 250, 000 to Holland in payment of import of diamonds under an irrevocable LC. However, due to bank strikes, the bank could effect the remittance only on January 3, 1993. The interbank market rates were as follows:

	December 27	**January 3**
Bombay	$ / `: 3.15 – 3.10	3.12 – 3.07
London	$ / pound 1.7250 / 60	1.7175 / 85
DG / pound	3.9575 / 90	3.9380 / 90

The bank wishes to retain an exchange margin of 0.125%. How much does the customer stand to gain or lose due to the delay ?

Ans. Loss `35000

Q.60. Exporters Plc. A UK company, is due to receive 500, 000 Northland dollars in six month's time for good supplied. The company decides to hedge its currency exposure by using the forward market. The short – term interest rate in the UK is 12% p.a. and the equivalent rate in Northland is 15%. The spot rate of exchange is 2.5 Northland dollars to the pound.

Calculate how much Exporters Plc. Actually gains or loses as a result of the hedging transaction if, at the end of the six months, the pound, in relation to the Northland dollar, has

(i) Gained 4%,

(ii) Lost 2% or

(iii) Remained stable.

You may assume that the forward rate of exchange simply reflects the interest differential in the two countries (i.e. it reflects the Interest Rate Parity analysis of forward rates).

Q.61. Following are the rates quoted at Bombay for British period:

BP / `	**52.60 / 70**	**Interest Rates**	**India**	**London**
3 m Forward	20 / 70	3 months	8%	5%
6 m Forward	50 / 75	6 months	10%	8%

Verify whether there is any scope for covered interest arbitrage if you borrow rupees.

Ans. No

Q.62. The finance director of P Ltd. has been studying exchange rates and interest rates relevant to India and USA. P Ltd. has purchased goods from the US Co. at a cost of $ 51 Lakhs payable in dollars in three months time. In order to maintain profit margins the finance director wishes to adopt, if possible, a risk free strategy that will ensure that the cost of the goods to P Ltd. is no more than `22 Crores.

Exchange rates `/ Dollar

Spot 40 – 42: 1 month forward 41 – 43 3 months forward 42 – 45

Interest rates (available to P Ltd.)

	India		**USA**	
	Deposit rate (%)	**Borrowing rate (%)**	**Deposit rate (%)**	**Borrowing rate (%)**
1 month	13.00	15.00	7.00	10.00
3 months	13.00	16.00	8.00	11.00

Calculate whether it is possible for P Ltd. to achieve a cost directly associated with this transaction of no more than `22 crores by means of a forward market hedge, or money market hedge. Transaction costs may be ignored.

Ans. FR 22.95 MMO 21.84

Q.63. On March1, 1979, the B Ltd. bought from a foreign firm electronic equipment that will require the payment of LC 900, 000 on May 31, 1979. The spot rate on March 1, 1979 is LC 10 per dollar, the expected future spot rate is LC 8 per dollar; and the ninety – days forward rate is LC 9 per dollar. The US interest rate is 12 percent, and the foreign interest rate is 8 percent. The tax rate for both countries is 40 percent. The B Ltd. is considering three alternatives to deal with the risk of exchange rate fluctuations.

a. To enter the forward market to buy LC 900, 000 at the ninety – days forward rate in effect on May 31, 1979.
b. To borrow an amount in dollars to buy the LC at the current spot rate. This money is to be invested in government securities of the foreign country; with the interest income, it will equal LC 900, 000 on May 31, 1979.
c. To wait until May 31, 1979, and buy LCs at whatever spot rate prevails at that time.

Which alternative should be the B Ltd. follow in order to minimize its cost of meeting the future payment in LCs ? Explain.

Ans. (a) $ 96000 (b) $ 90533.60 (c) $ 103500

Q.64. L.B. Inc., considering a new plant in the Netherlands the plant will cost 26 Million Guilders. Incremental cash flows are expected to be 3 Million Guilders per year for the first 3 years, 4 Million Guilders the next three, 5 Million Guilders in year through 9, and 6 Million Guilders in years 10 through 19, after which the project will terminate with no residual value. The present exchange rate is 1.90 Guilders per $. The required rate of return on repatriated $ is 16%.

a. If the exchange rate stays at 1.90, what is the project net present value?
b. If the guilder appreciates to 1.84 for years 1 – 3, to 1.78 for years 4 – 6, to 1.72 for years 7 – 9, and to 1.65 for years 10 – 19, what happens to the net present value?

Ans. (a) -$ 0.66 M (b) $ 0.51M

Q.65. The A Company's international transfer of funds amounts to about $ 2 million monthly. Presently the average transfer time is ten days. It has been proposed that the transfer of funds be turned over to one of the larger international banks, which can be reduce the transfer time to an average of two days. A charge of one – half of 1 percent of the volume of transfer has been proposed for this service. In view of the fact that the firm's opportunity cost of funds is 12 percent, should this offer be accepted?

CURRENCY SWAP

Q.66. **(a)**Mc Donnoughs Hamburger Company wishes to lend % 500, 000 to its Japanese subsidiary. At the same time, Yasufuku Heavy Industries is interested in making a medium – term loan of approximately the same amount to its U.S. subsidiary. The two parties are brought together by an investment bank for the purpose of making parallel loans. Mc Donnouhgs will lend $ 500, 000 to the U.S. subsidiary if Yasufuku for 4 years at 13 percent. Principal and interest are payable only at the end of the fourth year with interest compounding annually. Yasufuku will lend the Japanese subsidiary of Mc Donnoughs 70 million yen for 4 years at 10%.

Again the principal and interest (annual compounding) are payable at the end. The current exchange rate is 140 yen to the $. However, the dollar is expected to decline by 5 yen to the dollar per year over the next 4 years.

a. If these expectations prove to be correct, what will be the dollar equivalent of principal and interest payments to Yasufuku at the end of 4 years?
b. What total dollars will Mc Donnoughs receive at the end of 4 years from the payment of principal and interest on its loan by the U.S. subsidiary of Yasufuku?
c. Which party is better off with the parallel loan arrangement? What would happen if the yen did not change in value ?

Ans. (a) $ 854058 (b) $ 815237 (c) $ 732050

(b) A UK firm is to advance a 3 years loan of £ 1,00,000 to its Japanese subsidiary. A Japanese firm is to advance a 3 years loan of Yens 2,00,000 to its UK subsidiary. Both the firms are brought to a negotiation table by a finance corporation and a deal is negotiated. Under the deal, the UK firm will advance £ 1,00,000 to UK subsidiary of the Japanese firm at interest of 11% p.a., compounded annually payable on maturity, the Japanese firm will advance loan of Yens 2,00,000 to Japanese subsidiary of UK firm at interest of 10% p.a., compounded annually payable on maturity. The current exchange rate is 1£ = 200 Yens. However, the £ is expected to decline by 4 Yens per £ per year over three next years. Compare the £ value of receivables of each of the two firms at the end of 3 years.

PREVIOUS YEAR QUESTION (CA FINAL)

Q.67. **(CA Final 2005)** An Indian importer has to settle a bill for $ 1,35,000. The exporter has given the Indian Company two options:

(i) Pay immediately without any interest charge.
(ii) Pay after 3 months, with interest 6% p.a.

The importer's bank charges 16% p.a. on overdrafts. If the exchange rates are as follows, what should the company do?

Spot (`/$) 48.35/48.36 3 months (`/$) 48.81/48.83

Give reasons for your advice.

Ans. (a) 6789744 (b) 6690931

Q.68. **(CA Final Nov 2003)** The following rates appear in the foreign exchange market:

	Spot rate	2 Month Forward
Re./US$	`45.80/46.05	`46.50/47.00

(i) How many dollars should a firm sell to get `5 crore after 2 months ?

(ii) How many rupees is the firm required to pay to obtain US$ 2,00,000 in the spot market ?

(iii) Assume the firm has US $ 50,000. How many rupees does the firm obtain in exchange rate of US $?

Ans. (a) $ 10752.88 (b) RS. 9210000 (c) 2290000

Q.69. **(CA Final May 2004)** The United States Dollar is selling in India at `45.50. If the interest rate for a 6-months borrowing in India is 8% per annum and the corresponding rate in USA is 2%.

(i) Do you expect United States Dollar to be at a premium or at discount in the Indian Forward market ?

(ii) What is the expected 6-months forward rate for United States Dollar in India ?

(iii) What is the rate of forward premium or discount ?

Ans. (i) Premium (ii) 46.85 (ii) 5.94 % p.a

Q.70. **(CA Final May 2005)** On January 28, 2005 an importer customer requested a bank to remit Singapore Dollar (SGD) 25,00,000 under an irrevocable LC. However, due to bank strikes, the bank could effect the remittance only on February 4, 2005. The interbank market rates were as follows:

	January 28	February 4
Bombay US$1	`45.85/45.90	45.91/45.97
London Pound 1	US$1.7840/1.7850	1.7765/1.7775
Pound 1	SGD 3.1575/3.1590	3.1380/3.1390

The bank wishes to retain an exchange margin of 0.125%. How much does the customer stand to gain or lose due to the delay ? (Calculate rate in multiples of .0001)

Ans. loss of Impoter = `228250

Q.71. **(CA Final Nov 1996)** Alert Ltd. is planning to import a multi – purpose machine from Japan at a cost of 3,400 lakhs yen. The company can avail loans at 18% interest per annum with quarterly rests with which it can import the machine. However, there is an offer from Tokyo branch of an Indian – based bank extending credit of 180 days at 2% per annum against opening of an irrevocable letter of credit.

Other information:

Present exchange rate `100	=	340 yen
180 days forward rate `100	=	345 yen

Commission charges for letter of credit at 2% per 12 months. Advise whether the offer from the foreign branch should be accepted ?

Ans. loan Option 1092 lacs L. C. Option = `1006.36 lacs.

Q.72. **(CA Final Nov 2001)** Airlines Company entered into an agreement with Airbus for buying latest planes for a total value of F.F. (French Francs) 1,000 Million payable after 6 months. The current spot exchange rate is INR (Indian Rupees) 6.60/FF. The Airlines Company cannot predict the exchange rate in the future. Can the Airlines company hedge its Foreign Exchange risk ? Explain by examples.

Ans. (i) £ 1 = DM 4.50

Q.73. **(CA Final May 2002)** A customer with whom the bank entered into 3 month's forward purchase contract for Swiss Francs 10,000 at the rate of `27.25 comes to the bank after 2 months and request cancellation of the contract. On this date, the rates prevailing are:

Spot	CHF 1 = `27.30	27.35
One month forward	= `27.45	27.52

What is the loss/gain to the customer on cancellation ?

Ans. Gain of Bank `2700

Q.74. **(CA Final Nov 2002)** In International Monetary Market an international forward bid for December, 15 on pound sterling is $1.2816 at the same time that the price of IMM sterling future for delivery on December, 15 is $ 1.2806. The contract size of pound sterling is £ 62,500. How could the dealer use arbitrage in profit from this situation and how much profit is earned ?

Q.75. **(CA Final Nov. 2003)** A company operating in Japan has today effected sales to an Indian company, the payment being due 3 months from the date of invoice. The invoice amount is 108 lakhs yen. At today's spot rate, it is equivalent to `30 lakhs. It is anticipated that the exchange rate will decline by 10% over the 3 months period and in order to protect the yen payments the importer proposes to take appropriate action in the foreign exchange market. The 3-month forward rate is presently quoted as 3.3 yen per rupee. You are required to calculate the expected loss and to show it can be hedged by a forward contract.

Ans. Saving due to FR 0.6121 Lacs

Q.76. **(CA Final Nov. 2004)** A customer with whom the Bank had entered into 3 months forward purchase contract for Swiss Francs 1,00,000 at the rate of `36.25 comes to the bank after two months and requests cancellation of the contract. On this date, the rates are:

Spot	CHF 1 = `36.30	36.35
One month forward	36.45	36.52

Determine the amount of profit or loss to the customer due to cancellation of the contract.

Q.77. **(CA FINAL NOV 2006)** ABC Ltd. is considering a project in US which will involve an initial investment of US $ 1,10,00,000.The project will have 5 years of life . Current spot exchange rate is `48 per US $ .the risk free rate in US is 8% and the same in India is 12%. Cash inflow from the project are as follows :

Year	1	2	3	4	5
Cash inflow(US $)	20,00,000	25,00,000	30,00,000	40,00,000	50,00,000

Calculate the NPV of the project using foreign currency approach .Required rate of return on this project is 14%

Q.78. **(CA FINAL NOV. 2006)** A USA based company is planning to set up a software development unit in India software developed at the Indian unit will be bought back by the US parent at a transfer price of US parent at a transfer price of US $ 10 millions .The unit will remain in existence in India for one year .The software is expected to get developed within the time frame.

The US based company will be subject to corporate tax of 30 percent and a withholding tax of 10 percent in India and will not be eligible for tax credit in the US .The software developed will be sold in the US market for US $ 12.0 millions .Other estimates are as follows :

Rent for fully furnished unit with necessary hardware in India	`15,00,000
Main power cost (80 software professional will be working for 10 hours each day)	400 per man hour
Administrative and other cost	`12,00,000

Advise the US company on financial viability of the project .The rupees dollar rate is `48/$.

Q.79. **(CA FINAL NOV.2008) -** Excel Exports are holding on export bill in United States Dollor (USD) 1,00,000 due 60 days hence they are worried about the failing USD value which is currently at `45.60 per USD .The concerned export consignment has been period on an exchange rate of `45.50 per USD .The firms bankers have quoted a 60 day forward rate `45.20 .

Calculate :

(i) Rate of discount quoted by the Bank .
(ii) The probable loss of operating profit if the forward sale is agreed to :

Q.80. (CA FINAL NOV.2005) :-You sold Hong kong Dollar 1,00,00,000 value spot to your customer at `5.70 and covered your self in Landon market on the same day ,when the exchange rate were :
US $ 1 = H.K $ 7.5880 7.5920
Local Inter bank market rates for US$ were :
Spot US $ 1 = `42.70 42.85
Calculate cover rate and ascertain the profit or loss in the transaction Ignore brokerage.

Q.81. (CA FINAL NOV.2006) - Following are the details of cash inflows in foreign currency denomination of MNG Co. an Indian Export firm ,which have no foreign subsidiaries :

Currency	Inflow	Outflow	Spot rate	Forward rate
US $	4,00,00,000	2,00,00,000	48.01	48.82
French France (FFr)	2,00,00,000	80,00,000	7.45	8.12
U.K £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese yen	1,50,00,000	2,50,00,000	3.20	2.40

(i) Determine the net exposure of each foreign currency in terms of Rupees
(ii) Are any of the exposure positions of setting to some extent?

Solution

(i) Determination of Net Exposure of each Foreign Currency in terms of Rupees

(In Million)

Currency	Inflow	Outflow	Net flow	Spread	Net exposure
US $	40	20	20	0.81	16.20
FFr	20	8	12	0.67	8.04
U.K £	30	20	10	0.41	4.10
Japan yen	15	25	10	0.80	8.00

(ii) The exposure of Japanese yen position is being offset by a better forward rate

Q.82. (CA FINAL NOV.2005) - You as a dealer in foreign exchange have the following position in Swiss Frances on 31st October, 2010.

(Sw.Fcs)

Balance in the Nostro A/c credit	1,00,000
Opening position over bought	50,000
Purchased a bill on Zurich	80,000
Sold forward TT	60,000
Forward purchase contract cancelled	30,000
Remitted by TT	75,000
Draft on Zurich cancelled	30,000

That steps would you like , if you are required to maintain a credit balance of SwFcs 30,000 in the Nostro A/c and keep as overbought position on Sw.Fcs. 10,000?

Solution

Swiss Francs Currency position

Particulars	Purchase of Sw.Fcs.	Sale of Sw.Fcs
Opening position (over bought)	50,000	--
Bill Purchased on Zurich	80,000	--
Sold forward TT	--	60,000
Cancellation of forward purchase contract	--	30,000
Remitted by TT		75,000
Draft on Zurich cancelled	30,000	--
	1,60,000	1,65,000
Closing balance (over sold)	5,000	--

	1,65,000	1,65,000

Nostro A/c (cash position) **(Sw.Fcs)**

Particulars	**Debit .**	**Credit**
Opening balance	--	1,00,0000
TT sales	75,000	--
	75,000	1,00,000
Closing balance (credit)	25,000	--
	1,00,000	1,00,000

Steps to be taken :

(a) The dealer is required to buy spot TT Sw.Fcs. 5,000 this will increase the credit balance in Nostro A/c Sw.Fcs. 30,000.

(b) This will reduce the over sold position to nil.

(c) This dealer intends to keep Sw.Fcs. 10,000 overbought position .It requires to buy forward Sw.Fcs. 10,000

Q.83. (CA FINALNOV.2005)- AMK Ltd. an Indian based company has subsidiaries in U.S and U.K Forecast of surplus funds for the next 30 days from two subsidiaries are as below :-

U.S $ 12.5 million

U.K £ 6 million

Following exchange are information are obtained :

	$/`	**£/`**
Spot	0.0215	0.0149
30 days forward	0.0217	0.0150

Annual borrowing /deposit rates (simple) are available .

` 6.4% /6.2%

$ 1.6%/1.5%

£ 3.9% /3.7%

The Indian operation is forecasting a cash deficit of `500 million .

It is assume that interest rate are based on a year of360 days .

(i) Calculate the cash balance at the end of 30 days period in `For each company under each of the following scenarios ignoring transaction costs and taxes.

(a) Each company invests/finances its own cash balances/deficits in local currency independently.

(b) Cash balances are pooled immediately in India and the net balances are invested/borrowed for the 30 days period .

(ii) Which method do you think a preferable from the parent company's point of view?

Q.84. (CA FINAL MAY2006) :- Given the following information

Exchange rate	Canadian dollar 0.665 per DM (spot)
Canadian dollar	0.670 per DM (3months)
Interest rates	DM 7% p.a.
Canadian dollar	9% p.a.

When operations would be carried out to take the possible arbitrage gains?

Q.85. (CA FINAL NOV.2006)

Spot rate (1 US $) = `48.0123

180 days Forward arte for 1 US $ = `48.8190

Annualized interest rate for 6 months – Rupee = 12%
Annualized interest rate for 6 months – US $ = 8%
Is there any arbitrage possibility ? if yes how an arbitrageur can take advantage of the situation , if he is willing to borrow `40,00,000 or US $ 83,312

Q.86. **(CA FINAL NOV.2008)** Following are the spot exchange rates quoted at three different forex markets

USD/INR 48.30 in Mumbai
GBP/INR 77.52 in London
GBP/USD 1.6231 in New York

The arbitrageur has USD 1,00,00,000 Assuming that three are no transaction costs explain whether three is any arbitrage gain possible from the quoted spot exchange rates

Q.87. **(CA FINAL NOV.2007) :-**Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA , Japan and Europe on 90 days credit terms

	Japan	**USA**	**Europe**
Variable cost per unit	`225	`395	`510
Export sale price per unit	Yen 650	US $ 10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US $ 1,02,300	Euro 95,920

Foreign exchange rate information

	Yen/`	**US $ /`**	**Euro/`**
Spot market	2.417-2.437	0.0214-0.217	0.0177-0.0180
3 months forward	2.397-2.427	0.213-0216	0.0176-0.0178
3 months spot	2.423-2.459	0.02144-0.02156	0.0177-0.0179

Advice AKC Ltd. by calculating average contribution to sales ratio whether it should hedger it's foreign currency risk or not.

Q.88. **(CA Final Nov. 2008) (i)** The rate of inflation in USA in likely to be 3 % per annum and in India is likely to be 6.5% .The current spot rate of US $ in India is `43.40 .Find the expected rate of US $ in India after one year and 3 years from now using purchasing power parity theory .

(ii) On April 1, 3 months interest rate in UK £ and US $ are 7.5% and 3.5 % per annum respectively .The UK £ /US $ spot rate I 7570 what would be the forward rate for US $ for delivery on 30th June?

Ans. (i) After one year : 44.8751 After three years 47.98 (ii) £0.7645/$

Q.89. **(CA Final May 2009)** You forex dealer had entered in to a cross currency deal and had sold US $ 10,00,000 against EURO at US $ = EUR 1.4400 for spot delivery . However, later during the day , the market become volatile and the dealer in compliance with his management's guidelines had to square up the position when the question were :

Spot US $ 1 INR 31.4300/4500
1 month margin 25/20
2 months margin 45/35

Spot US $ 1 EURO 1.4400/4450
1 month margin 1.4425/4490
2 months margin 1.4460/4530

What will be gain or loss in the transaction ?

(b) On 19th April Following are the spot rates
Spot EURO/USD 1.20000 USD/INR 44.8000

Following are the quotes of European Options :

Currency Pair	**Call /Put**	**Strike Price**	**Premium**	**Expiry date**
EUR/ISD	Call	1.2000	$0.035	July 19
EUR/USD	Put	1.2000	$ 0.04	July 19

USD/INR	Call	44.8000	`0.12	Sep 19
USD/INR	Put	44.8000	`0.04	Sep. 19

(i) A trader sells an at the money spot straddle expiring at three months (July 19) Calculate gain or loss if three months later the spot rate is EUR/USD 1.2900.

(ii) Which strategy gives a profit to the dealer in five months later (Sep. 19) expected spot rate is USD/INR 45.00 .Also calculate profit for a transaction USD 1.5 million.

(c) You have following quotes from Bank A and Bank B :

	Bank A	**Bank B**
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 months	5/10	
6 months	10/15	
SPOT	GBP/USD 1.7645/60	
3 months	25/20	
6 months	35/25	

Calculate :

(i) How much minimum CHF amount you have to pay for 1 million GBP spot ?

(ii) Considering the quotes from Bank A only for GBP/CHF what are the implied swap points over 3 months?

Ans. (a) Loans `1,09,201.50

(b) (i) Net loss $0.015 per EUR (ii) Net gain INR 1,20,000

(c) (i) CHF 25,86,600 (ii) 3 months swap points are at discount of 28/12 .

Q.90. (CA Final Nov. 2009) (a) M/s Omega Electronics Ltd. exports air conditioners to Germany by importing all the components from Singapore .The company is exporting 2,400 units at a price of Euro 500 per unit .The cost of imported components in S $ 800 per unit .The fixed cost and other variable costs per per unit are `1,000 and `1,500 respectively .The cash flows in Foreign currencies are due in six months .The current exchange rates are as follows :

`/Euro	51.50/55
`/S$	27.20/25

After six months the exchange rates truns out as follows :

`/Euro	52.00/05
`/S$	27.70/75

(1) You are required to calculate loss/gain due to transaction exposure

(2) Based on the following additional information calculate the loss /gain due to transaction and operating exposure if the contracted price of air conditioners is `25,000 ;

(i) The current exchange rate charges to

`/Euro	51.75/80
`S$	27.10/15

(ii) Price elasticity of demand is estimated to be 1.5

(iii) Payments and receipts are to be settled at the end of six months

Ans. Profit `34,80,000 ; Profit after change in exchange rates `31,20,000 ; Loss due to T.E `3,60,000 ; Decline in profit due to T/E `11,52,000 ; Decline in profit due in O.E `11,46,900

Q.91. (CA Final May 2010) The rate of inflation in India is 8 % per annum and in USA it is 4% .The current spot rate of USD in India is `46 . What will be the expected rate after 1 year and 4 years applying the purchasing power parity theory.

Q.92. (CA Final May 2010) The following market data is available:

Spot USD/JPY 116.00

Deposit rates p.a. USD JYP

3 months	4.50%	0.25%
6 months	5.00%	0.25%

Forward rate agreement (FRA) for Yen is NIL

1. What should be 3 months (FRA) rate at 3 months forward?
2. The 6 & 12 months LIBORS are 5% & 6.5% respectively. A bank is quoting 6/12 USD FRA at 6.50-6.75% .Is any arbitrage opportunity available?

Calculate profit in such cases.

Q.93. **(CA Final May 2011)** A Inc. and B Inc. intend to borrow $200,000 and $200,000 in ¥ respectively for a time horizon of one year. The prevalent interest rates are as follows :

Company	¥ Loan	$ Loan
A Inc	5%	9%
B	Inc 8%	10%

The prevalent exchange rate is $1 = ¥120.

They entered in a currency swap under which it is agreed that B Inc will pay A Inc @ 1% over the ¥ Loan interest rate which the later will have to pay as a result of the agreed currency swap whereas A Inc will reimburse interest to B Inc only to the extent of 9%. Keeping the exchange rate invariant, quantify the opportunity gain or loss component of the ultimate outcome, resulting from the designed currency swap.

Q.94. **(CA Final Nov. 2011)** Using the Chop-shop approach (or Break-up value approach), assign a value for Cranberry Ltd. whose stock is currently trading at a total market price of €4 million. For Cranberry Ltd, the accounting data set forth three business segments: consumer wholesale, retail and general centers. Data for the firm's three segments are as follows:

Business Segment	Segment Sales	Segment Assets	Segment Operating Income
Wholesale	€2,25,000	€6,00,000	€75,000
Retail	€7,20,000	€5,00,000	€1,50,000
General	€25,00,000	€40,00,000	€7,00,000

Industry data for "pure-play" firms have been compiled and are summarized as follows:

Business Segment	Capitalization / Sales	Capitalization / Assets	Capitalization / Operating Income
Wholesale	0.85	0.7	9
Retail	1.2	0.7	8
General	0.8	0.7	4

Q.95. **(CA Final Nov. 2011)** Nitrogen Ltd, a UK company is in the process of negotiating an order amounting to €4 million with a large German retailer on 6 months credit. If successful, this will be the first time that Nitrogen Ltd has exported goods into the highly competitive German market. The following three alternatives are being considered for managing the transaction risk before the order finalized.

(i) Invoice the German firm in Sterling using the current exchange rate to calculate the invoice amount.

(ii) Alternative of invoicing the German firm in € and using a forward foreign exchange contract to hedge the transaction risk.

(iii) Invoice the German first in € and use sufficient 6 months sterling future contracts (to the nearly whole number) to hedge the transaction risk.

Following date is available:

Spot Rate	€1.1750 - €1.1770/£
6 months forward premium	0.60-0.55 Euro Cents
6 months further contract is currently trading at	€1.1760/£
6 months future contract size is	£ 62,500
Spot rate and 6 months future rate	€.11785/£

Required:

(a) Calculate to the nearest £ the receipt for Nitrogen Ltd, under each of the three proposals.

(b) In your opinion, which alternative would you consider to be the most appropriate and the reason therefore?

Q.95A.(CA Final May 2012) NP and Co. has imported goods for US $ 7,00,000. The amount is payable after three months. The company has also exported goods for US $ 4,50,000 and this amount is receivable in two months. For receivables amount a forward contract is already taken at `48.90.

The market rates for `and Dollar are as under:

Spot	`48.50/70
Two months	25/30 points
Three months	40/45 points

The company wants to cover the risk and it has two options as under:

(A) To cover payables in the forward market and

(B) To lag the receivables by one month and cover the risk only for the net amount. No interest for delaying the receivables is earned. Evaluate both the options if the cost of Rupee Funds is 12%. Which option is preferable?

RTP CA-FINAL

Foreign Exchange Risk Management (May 2010 Old)

Q.96. (i) The rate of inflation in USA is likely to be 3% per annum and in India it is likely to be 6.5%. The current spot rate of US $ in India is `43.40. Find the expected rate of US $ in India after one year and 3 years from now using purchasing power parity theory.

(ii) On April 1, 3 months interest rate in the UK £ and US $ are 7.5% and 3.5% per annum respectively. The UK £ / US $ spot rate is 0.7570. What would be the forward rate for US$ for delivery on 30th June?

Ans. (i) According to Purchasing Power Parity forward rate is

$$\text{Spot rate}\left[\frac{1+rH}{1+rF}\right]^t$$

So spot rate after one year

$$43.30\left[\frac{1+0.065}{1+0.03}\right] = 43.40\ (1.03399) = 44.8751$$

After 3 years

$$43.30\left[\frac{1+0.065}{1+0.03}\right]^3 = 43.40\ (1.03399)^3$$

$= 43.40\ (1.10544)$

$= `47.9762$

(ii) As per interest rate parity

$$FR = SR\ SR\left[\frac{1+I_{£}}{1+I_{\$}}\right]$$

$$S_1 = 0.7570\left[\frac{1+(0.075\times 3/12}{1+(0.035)\times 3/12}\right] = 0.7570\left[\frac{1.00875}{1.01875}\right] = 0.7570\times 1.0099 = 0.7645$$

S_1 = UK £0.7645 / US$

Q,97. Wenden Co is a Dutch-based company which has the following expected transactions.

One month: Expected receipt of £2,40,000
One month: Expected payment of £1,40,000
Three months: Expected receipts of £3,00,000
The finance manager has collected the following information:
Spot rate (£ per €): 1.7820 ± 0.0002
One month forward rate (£ per €): 1.7829 ± 0.0003
Three months forward rate (£ per €): 1.7846 ± 0.0004
Money market rates for Wenden Co:

	Borrowing	Deposit
One year Euro interest rate :	4.9%	4.6
One year Sterling interest rate :	5.4%	5.1

Assume that it is now 1 April.

Required:

(a) Calculate the expected Euro receipts in one month and in three months using the forward market.

(b) Calculate the expected Euro receipts in three months using a money-market hedge and recommend whether a forward market hedge or a money market hedge should be used.

Ans. **(a) Forward market evaluation**

Net receipt in 1 month = £2,40,000 – £1,40,000 = £1,00,000
Wenden Co needs to sell Sterlings at an exchange rate of (1.7829 + 0.0003) = £1.7832 per €
Euro value of net receipt = 1,00,000/ 1.7832 = €56,079
Receipt in 3 months = £3,00,000
Wenden Co needs to sell Sterlings at an exchange rate of 1.7846 + 0.0004 = £1.7850 per €
Euro value of receipt in 3 months = 3,00,000/ 1.7850 = €1,68,067

(b) Evaluation of money-market hedge

Expected receipt after 3 months = £300,000
Sterling interest rate over three months = 5.4/ 4 = 1.35%
Sterlings to borrow now to have £300,000 liability
after 3 months = 300,000/ 1.0135 = £296,004
Spot rate for selling Sterling = 1.7820 + 0.0002 = £1.7822 per €
Euro deposit from borrowed Sterling at spot = 296,004/ 1.7822 = €166,089
Euro interest rate over three months = 4.6/ 4 = 1.15%
Value in 3 months of Euro deposit = 166,089 x 1.0115 = €167,999
The forward market is marginally preferable to the money market hedge for the Sterling receipt expected after 3 months.

Q.98. CQS plc is a UK company that sells goods solely within UK. CQS plc has recently tried a foreign supplier in Netherland for the first time and need to pay €250,000 to the supplier in six months' time. You as financial manager are concerned that the cost of these supplies may rise in Pound Sterling terms and has decided to hedge the currency risk of this account payable. The following information has been provided by the company's bank:

Spot rate (€ per £) :	1·998 ± 0·002
Six months forward rate (€ per £) :	1·979 ± 0·004

Money market rates available to CQS plc :

	Borrowing	Deposit
One year Pound Sterling interest rates :	6·1%	5·4%
One year Euro interest rates :	4·0%	3·5%

Assuming CQS plc has no surplus cash at the present time you are required to evaluate whether a money market hedge, a forward market hedge or a lead payment should be used to hedge the foreign account payable.

Ans. Money market hedge

CQS plc should place sufficient Euros on deposit now so that, with accumulated interest, the six-month liability of € 250,000 can be met. Since the company has no surplus cash at the present time, the cost of these Euros must be met by a short-term Pound Sterling loan.

Six-month Euro deposit rate = 3·5/2	= 1·75%
Current spot selling rate = € 1·998 – 0·002	= €1·996 per £
Six-month Pound Sterling borrowing rate = 6·1/2	= 3·05%
Euros deposited now = 250,000/1·0175	= € 2,45,700
Cost of these Euros at spot = 245,700/1·996	= £ 1,23,096
Pound Sterling value of loan in six months' time = 123,096 x 1·0305	= £ 1,26,85

Forward market hedge

Six months forward selling rate =€ 1·979 – € 0·004	= € 1·975 per £
Pound Sterling cost using forward market hedge = € 2,50,000/1·975	= £ 1,26,582

Lead payment

Since the Euro is appreciating against the Pound Sterling, a lead payment may be worthwhile.

Pound Sterling cost now = € 2,50,000/1·996 = £ 1,25,251

This cost must be met by a short-term loan at a six-month interest rate of 3·05%

Pound Sterling value of loan in six months' time = £ 1,25,251 x 1·0305 = £1,29,071

Evaluation of hedges

The relative costs of the three hedges can be compared since they have been referenced to the same point in time, i.e. six months in the future. The most expensive hedge is the lead payment, while the cheapest is the forward market hedge. Using the forward market to hedge the account payable currency risk can therefore be recommended.

International Capital Budgeting

Q.99. OJ Ltd. Is a supplier of leather goods to retailers in the UK and other Western European countries? The company is considering entering into a joint venture with a manufacturer in South America. The two companies will each own 50 per cent of the limited liability company JV(SA) and will share profits equally . £ 450,000 of the initial capital is being provided by OJ Ltd. and the equivalent in South American dollars (SA$) is being provided by the foreign partner. The managers of the joint venture expect the following net operating cash flows, which are in nominal terms:

	SA$ 000	Forward Rates of exchange to the £ Sterling
Year 1	4,250	10
Year 2	6,500	15
Year 3	8,350	21

For tax reasons JV(SV) the company to be formed specifically for the joint venture, will be registered in South America.

Ignore taxation in your calculations.

Assuming you are financial adviser retained by OJ Limited to advise on the proposed joint venture.

(i) Calculate the NPV of the project under the two assumptions explained below. Use a discount rate of 18 per cent for both assumptions.

Assumption 1 : The South American country has exchange controls which prohibit the payment of dividends above 50 per cent of the annual cash flows for the first three years of the project. The accumulated balance can be repatriated at the end of the third year.

Assumption 2: The government of the South American country is considering removing exchange controls and restriction on repatriation of profits. If this happens all cash flows will be distributed as dividends to the partner companies at the end of each year.

(ii) Comment briefly on whether or not the joint venture should proceed based solely on these calculations.

Ans. **(i) (a) With Exchange Controls**

Year	Profit after Tax SA$000	OJ share SA$000	50% div SA$000	OJ Share £000	Disc Factor @ 16%	Disc Cash flow £ 000
0				(450)	1.000	(450)
1	4,250	2,125	1,062	106	0.862	91
2	6,500	3,250	1,625	108	0.743	80
3	8,350	4,175	2,088	100	0.641	64
			4,775	227	0.641	146

Net Present Value (69)

(b) Exchange controls removed and all earnings distributed as dividends

Year	Profit after Tax SA$000	OJ Share SA $000	OJ Share £000	Disc Factor @16%	Disc Cash flow £000
0			(450)	(1,000)	(450)
1	4,250	2,125	212	0.862	183
2	6,500	3,250	217	0.743	161
3	8,350	4,175	199	0.641	127
Net Present Value					21

(ii) If exchange controls exist in the South American Country the project has a negative and should not be undertaken, Investing in countries with a history of high inflation and political volatility adds to the risk of the project and OJ Ltd should proceeds with caution.

May 2010 (New)

Q.100. On 30th June 2009 when a forward contract matured for execution you are asked by an importer customer to extend the validity of the forward sale contract for US$ 10,000 for a further period of three months.

Contracted Rate US$1 = `41.87

The US Dollar quoted on 30.6.2009

Spot `40.4800/`40.4900

Premium July 0.1100/0.1300

Premium August 0.2300/0.2500

Premium September 0.3500/0.3750

Calculate the cost for your customer in respect of the extension of the forward contract. Rupee values to be rounded off to the nearest Rupee.

Margin 0.080% for Buying Rate

Margin 0.25% for Selling Rate

Ans. This extension of forward Contract involves following steps

1. Cancel the contract at TT buying rate.
2. Rebook the contract for three months at the current rate of exchange.

Accordingly

Step 1: Cancel the contract at TT buying rate on 30.6.2009

	`
Spot US$ 1	40.4800
Less: Margin 0.080%	0.0324
	40.4476

Hence TT buying rate `40.45 (Rounded off)

US$ 10,000 @ `40.45 `4,04,500/-

US$ 10,000 @ `41.87 `4,18,700/-

Difference in favour of the bank `14,200/-

Step 2: New contract to be booked at the appropriate forward rate.
Three months forward rate is as under:

US$ 1	`40.4900 Spot Selling
Add: September Premium	` 0.3750
	`40.8650
Add: Margin (0.25%)	` 0.1022
	`40.9672

Forward rate to be quoted to the customer is US$ 1 = `40.97
Thus cost to customer `14,200/-.

May 2009 (New)

Q.101. If the interest rate for the next 6 months for the US$ is 1.5% (annual compounding). The interest rate for the € is 2% (annual compounding). The spot price of the € is US $ 1.665. The forward price is expected to be US$ 1.664. Please determine correct forward price and recommend an arbitrage strategy.

Ans. The correct forward price is given by

$$F(0,T) = S_0 \frac{(1+r_{US\$})^T}{(1+r_{Euro})^T} = 1.665(1.015)/(1.02) = 1.6568$$

Because the forward price is higher than the model price, we will sell the forward contract. If transaction costs could be covered, we would buy the € in the spot market at $1.665 and sell it in the forward market at $1.664. We would earn interest at the foreign interest rate of 2 percent. By selling it forward, we could then convert back to dollars at the rate of $1.664. In other words, $1.665 would be used to buy 1 unit of the €, which would grow to 1.02 units (the 2 percent € rate). Then 1.02 € would be converted back to 1.02 ($1.664) = $1.69728. This would be a return of $1.69728/$1.665 – 1 = 0.019387 or 1.94 percent, which is better than the US rate.

Nov 2010 (Old)

Netting of Foreign Exchange Liabilities

Q.102. Trueview PLC, a group of companies controlled from the United Kingdom includes subsidiaries in India. Malaysia and the United States. As per the CFO's forecast that, at the end of the June 2010 the position of inter-company indebtedness will be as follows :

- The Indian subsidiary will be owed `1,44,38,100 by the Malaysian subsidiary and will to owe the US subsidiary US$ 1,06,007.
- The Malaysian subsidiary will be owed MYR 14,43,800 by the US subsidiary and will owe it US$ 80,000.

Suppose you are head of central treasury department of the group and you are required to net off inter-company balances as far as possible and to issue instructions for settlement of the net balances.

For this purpose, the relevant exchange rates may be assumed in terms of £ 1 are US$ 1.415; MYR 10.215; `68.10.

What are the net payments to be made in respect of the above balances?

Ans. (i)

	India	**Malaysia**	**US**
India	---	`1,44,38,100	(US$ 1,06,007)
Malaysia	(`1,44,38,100)	---	MYR 1,443,800 (US $ 80,000)
US	US $ 1,06,007	(MYR 14,43,800) Us $ 80,000	

Table showing conversion of above position into pound sterling

	India £	**Malaysia** £	**US** £	Total £
India	---	2,12,013	(74,917)	1,37,096
Malaysia	(2,12,013)	---	1,41,341 56,537	(1,27,209)

US	74,917	(1,41,341) 56,537	---	(9,887)
	(1,37,096)	1,27,209	9,887	---

Decision : Central Treasury Department will instruct the Malaysia subsidiary to pay the Indian subsidiary 1,27,209 and the US subsidiary to pay the Indian subsidiary 9,887.

Foreign Exchange Risk Management

Q.103. Somu electronics imported goods from Japan on July 1st 2009, of JP ¥1 million, to be paid on 31st, December 2009. The treasury manager collected the following exchange rates on July 1, 2009 from the bank.

Delhi `/ US $ Spot	45.86 / 88
6 months forward	46.00 / 03
Tokyo JP ¥ / US $ Spot	108 / 108.50
6 months forward	110 / 110.60

In spite of fact that the forward quotation for JP ¥ was available through cross currency rates, Mr. X, the treasury manager purchased spot US$ and converted US$ into JP ¥ in Tokyo using 6 months forward rate.

You are **required** to calculate the loss or gain in the strategy adopted by Mr. X by comparing the national cash flow involved in the forward cover for **Yen** with the actual cash flow of the transaction.

Ans. **(A) <u>Alternative</u>**

UNI Calculation of σ_M FR bet `& ¥ using Cross Quotation

`/ $ is 46.00 – 46.03 (i)

¥ / $ is 110.00 – 110.60 (ii)

$ /` is $\frac{1}{46.00} - \frac{1}{46.03}$ (iii)

From (i) ¥/$ × $/` = ¥/` is $\frac{110}{46.03} - \frac{110}{46.00} = 2,3897 - 2,4043$

Equivalent `required to Pay ¥ 10,00,000

@ ¥ 2.3897 = `1

¥ 10,00,000 = ` $\frac{1}{2,3897} \times 10,00,000 =$ `418,462.56

<u>Using Other Alternative</u>

σ_M FR $ 1 = ¥ 110 – 110.60

$ regarding to Purchase ¥ 10,00,000 @ ¥ 110 = $ 1

¥ 10,00,000 = $\frac{1}{110} \times$ 10,00,000

$ 9090.91

Spot rate at 31st December $ 1 = `46.24 – `46.26

`regarding to Purchase $ 9090.91 @

$ 1 = `46.26

$ 9091.91 = `9091.91 × 46.26

= `4,20,545.50

<u>Decision</u> The Company Pay More `418454.50 – 420545.50

= `2091 in the Strategy adopted by Mr. X.

Q.104. An automobile company in Gujarat exports its goods to Singapore at a price of SG$ 500 per unit. The company also imports components from Italy and the cost of components for each unit is € 200. The company's CEO executed an agreement for the supply of 20000 units on January 01, 2010 and on the same date paid for the imported components.

The company's variable cost of producing per unit is `1,250 and the allocable fixed costs of the company are `1,00,00,000.

The exchange rates as on 1 January 2010 were as follows :-

Spot	`/ SG $	33.00 / 33.04
	`/ €	56.49 / 56.56

Mr. A, the treasury manager of company is observing the movements of exchange rates on a day to day basis and has expected that the rupee would appreciate against SG$ and would depreciate against €.

As per his estimates the following are expected rates for 30th June, 2010.

Spot	`/ SG $	32.15 / 32.21
	`/ €	57.27 / 57.32

You are **required** to find out :

(a) The change in profitability due to transaction exposure for the contract entered into.

(b) How many units should the company increases its sales in order to maintain the current profit level for the proposed contract in the end of June 2010.

Ans. (a) Let us first calculate the Company's existing profits

	`	`
Sales – 20000 x SG$500 x ₹ 33		330,000,000
Variable Cost		
Imported Raw Material – 20000 x € 200 x ₹ 56.56	226,240,000	
Manufacturing Cost – 20000 x ₹ 1,250	25,000,000	
Fixed Cost	10,000,000	261,240,000
Profit		68,760,000

After the Rupee appreciation against SG$ and depreciation against € the company's profitability will be**,**

	`	`
Sales – 20000 x SG$500 x ₹ 32.15		321,500,000
Variable Cost		
Imported Raw material – 20000 x € 200 x ₹ 57.32	229,280,000	
Manufacturing Cost – 20000 x ₹ 1,250	25,000,000	
Fixed Cost	10,000,000	264,280,000
Profit		57,220,000

Thus profit will decrease by ₹ 11,540,000 (₹ 68,760,000 – ₹ 57,220,000)

(b) Let the number of units that need to be sold for keeping the profits at pre-appreciation level be X.

Then

`68,760,000 = [500 × `32.15 × X] – [(1250 × X) + (200 × 57.32X) + 10,000,000]

68,760,000 = [16075X – (1250X + 11464X + 10,000,000)]

68,760,000 + 10,000,000 = 16075X – 12714X

78,760,000 = 3361X

X = 23433.50 or, 23434 units.

Thus, the company should increase its existing supply from 20000 to 23434 to maintain the current profit level of `68,760,000.

RTP (May 2012)

Foreign Exchange Management

Q.105. The risk free rate of interest rate in USA is 8% p.a. and UK is 5% p.a. The spot exchange rate between US $ and UK £ is 1$ = £ 0.75.

Assuming that is interest is compounded on daily basis then at which forward rate of 2 years, there will be no opportunity for arbitrage.

Further, show how an investor could make risk-less profit, if two year forward price is 1$ = 0.85 £.

Given $e^{-0.06} = 0.9418$ & $e^{-0.16} = 0.8521$, $e^{0.16} = 1.1735$, $e^{-0.1} = 0.9408$

Arbitrage Opportunity

Ans. **Step (1)** Borrow £0.75 at Spot Amount required to Pay after 2 years @ 5%

£0.75 x $e^{0.05 \times 2}$ = £0.75 x $e^{0.10}$ = £0.75 x 1.1051 = £0.8288

Step (2) Purchase $1 & Invest @ 8% for two years

Amount after 2 years received = $1 x $e^{0.08 \times 2}$ = $1 x 1.1735 = $1.1735

Step (3) Sale $1.1735 at FR $1 = £0.85 x 1.1735 = £0.09975

Arbitrage gain = £0.9975 - £0.8288 = **£0.1686** After 2 years

Q.106. True Blue Cosmetics Ltd. Is an old line producer of cosmetics products made up of herbals. Their products are popular in India and all over the world but are more popular in Europe.

The company invoice in India Rupee when it exports to guard itself against the fluctuation in exchange rate. As the company is enjoying monopoly position, the buyer normally never objected to such invoices. However, recently, an order has been received from a whole-seller of France for FFr 80,00,000. The other conditions of the order are as follows :

(a) The delivery shall be made within 3 months.

(b) The invoice should be FFr.

Since, company is not interested in losing this contract only because of practice of invoicing in Indian Rupee. The Export Manager Mr. E approached the banker of Company seeking their guidance and further course of action.

The banker provided following information to Mr. E.

(a) Spot rate 1 FFr = `6.60

(b) Forward rate (90 days) of 1 FFr = `6.50

(c) Interest rate in India is 9% p.a. and in France 12% p.a.

Mr. E entered in forward contract with banker for 90 days to sell FFr at above mentioned rate.

When the matter came for consideration before Mr. A, Accounts Manager of company, he approaches you.

You as a Forex consultant is required to comment on :

(i) Whether an arbitrage opportunity exists or not.

(ii) Whether the action taken by Mr. E is correct and if bank agrees for negotiation of rate, then at what forward rate company should sell FFr to bank.

Ans. Invoice amount in Indian Rupee = FFr 80,00,000 x `6.60

= `5,28,00,000

(i) Interest Rate in India 9% p.a.

Interest Rate in France 12% p.a.

The interest rate differential 9% - 12% = 3% (Positive Interest Differential)

$$\text{Forward Discount} = \frac{\text{Forward rate} - \text{Spot rate}}{\text{Spot Rate}} \times \frac{12}{3} \times 100$$

$$= \frac{6.50 - 6.60}{6.60} \times \frac{12}{3} \times 100$$

$$= -6.061 \text{ (Forward Discount)}$$

Since the forward discount is greater than interest rate differential there will be arbitrage inflow into the country (India).

(ii) The decision taken by Mr. E was not correct because as per Interest Rate Parity Theory, forward rate for sale should be 1 FFr = ₹ 6.65, calculated as follows :

Let F be forward rate, then as per Interest Rate Parity theory, it should have been as follows :

$$\frac{F - 6.6}{6.6} \times \frac{12}{3} \times 100 = -3 \text{ (Interest Differential)}$$

$$\frac{F - 6.6}{6.6} \times \frac{-3}{400}$$

$400 F - 2640 = -19.8$

$400 F = 2659.80$

$F = 6.6495$ say 6.65.

Q.107. Zaz plc, a UK Company is in the process of negotiating an order amounting **€** 2.8 million with a large German retailer on 6 month's credit. If successful, this will be first time for Zaz has exported goods into the highly competitive German Market. The Zaz is considering following 3 alternatives for managing the transaction risk before the order is finalized.

(a) Mr. Peter the Marketing head has suggested that in order to remove transaction risk completely Zaz should invoice the German firm in Sterling using the current **€ / £** spot rate to calculate the invoice amount.

(b) Mr. Wilson, CE is doubtful about Mr. Peter's proposal and suggested an alternative of invoicing the German firm in **€** and using a forward exchange contract to hedge the transaction risk.

(c) Ms. Karen, CFO is agreed with the proposal of Mr. Wilson to invoice the German first in **€**, but she is of opinion that Zaz should use sufficient 6 months sterling further contracts (to the nearest whole number) to hedge the transaction risk.

Following date is available

Spot Rate	€ 1.960 – € 1.1970 / £
6 months forward premium	0.60 – 0.55 Euro Cents
6 months further contract is currently trading at	€ 1.1943 / £
6 months future contract size is	£ 62,500
Spot rate and 6 months future rate	€ 1.1873 / £

You are required to

(i) Calculate (to the nearest £) the £ receipt for Zaz plc, under each of 3 above proposals.

(ii) In your opinion which alternative you consider to be most appropriate.

Ans. Receipt under three proposals

(a) Proposal of Mr. Peter

Invoicing in £ will produce = $\frac{€\ 2.8 \text{ million}}{1.1970}$ = £ 2.399 million

(b) Proposal of Mr. Wilson

Forward Rate = € 1.1970 – 0.0055 = 1.1915

Using Forward Market hedge Sterling receipt would be = $\frac{€\ 2.8 \text{ million}}{1.1915}$ = £ 2.35 million

(c) Proposal of Ms. Karen

The equivalent sterling of the order placed based on future price (£ 1.1943) =

$\frac{€\ 2.8 \text{ million}}{1.1947} = £\ 2,344,470$ (rounded off)

Number of Contracts = $\frac{£\ 2,344,470}{62,500}$ = 37 Contracts (to the nearest whole number)

Thus, € amount hedged by future contract will be = 37 x £ 62,500 = £ 23,12,500

Buy Future at € 1.1943

Sell Future at € 1.1873
€ 0.0070

Total loss on Future Contracts = 37 x £ 62,500 x € 0.0070 = € 16,188

After 6 months

Amount Received	€ 28,00,000
Less : Loss on Future Contracts	€ 16,188
	€ 27,83,812

Sterling Receipts

On sale of € at spot $= \frac{£\ 27,83,812}{1.1873} = £\ 2.3446$ million

(ii) Proposal of opinion (b) is preferable because the option (a) & (c) produces least receipts. Further, in case of proposal (a) there must be a doubt as to whether this would be acceptable to German firm as it is described as a competitive market and Zaz is moving into it first time.

STUDY MATERIAL OF ICWA

Q.108. Direct quote for pounds sterling in New York is 1.5636.comppute direct quote in London.

Q.109. Assuming you are the calling bank and the following rates per $ is quoted against S.F

Day	Quotes
1	1.6962/78
2	1.6990/1.7005
3	1.7027/42
a	On which day is it cheaper to buy US $ with respect to S.F ?
b	How many US $ do you need to buy 1000 SF on Day 1 ?
c	What is the spread on Day 2 ?
d	If you exchanged $ 2500 for SF 4256.75 on which day you exchange ?

Q.110. ICICI Mumbai Quotes `26.45/65 for Australian Dollar .Compute Bid ,Ask and spread Also show what they would quote if it were an indirect quote .

Q.111. Given the following one, there; and six month outright forward European term bid ask quotes .Find the respective bid-ask spread in points.

Spot 1.3431-1.3436
One- Month 1.3432-1.3442
Three –Month 1.3448-1.3463
Six-Month 1.3488-1.3508

Q.112. Fill in the boxes indicated by alphabets in the following table .

Country	USD	AUD	GBP	CAD	FRF	DEM
US	------	1.5122	0.6241	1.4727	6.2657	1.8682
Australia	a	------	0.4127	0.9739	4.1435	1.2354
Britain	1.6023	2.4230	-------	2.3597	10.0395	F
Canada	0.6790	1.0268	C	-----	4.2546	1.2686
France	0.1596	b	0.0996	d	-----	0.2982
Germany	0.5353	0.8094	.0.3341	07883	e	------

Q.113. Portugal Escudo is quoted in London at 31.3.00 .Frankfurt is quoting Pd Sterling at 1.561. Compute the indirect quote Escudo/Euro .

Q.114. Assume you have a German customer who expects to London and would like to sell Pounds against Euros .The following market rates prevail :

Euro/$ 1.1875/1.1890
Pound/$ 0.6957/0.7008

If your customer wants a Cross Rate for pound /Euro in Euro terms from you, what rate will you quote assuming you want a spared of 0.0020 points .

Q.115. If the following quotes are available ,what is the Cross exchange rate ,yen/shekel ? $1=4.0828 Israeli shekel ; $1= 111.23 ?Japanese yen ;

Q.116. Given that :

	U.S. $ Equivalent	Currency per U.S.$
British pound	1.6385	0.6103
Swedish krona	0.1179	8.4818

What is the Cross quote of Kronas /pound ?

Q.117. An Indian bank sells FF 1,00,000 spot to a customer at `6.40 .At that point of time ,the following rates were being quoted .
FF/$: 5.5880/5.5920
`$: 35.50/35.60
How much profit do. You think the bank has made in the transaction?

Q.118. As a dealer in the bank ,you observed the following quotes in the market
`/$ 42.18 42.60
`/£ 68.59 69.96
`/€ 46.25 47.17
Computer the cross rates for $/£/€ and $/c .

Q.119. If the value of Malaysian Ringgit ($/MR) was 0.2632 and the value of an Indian rupee($/`) was 0.02212.Find the value of Malaysian Ringgit in terms of Indian rupee.

Q.120. From the following quotes of a bank, determine the rate at which Yen can be purchased with Rupees.
`/Pd. Sterling 75.31-33
Pd. Sterling /Dollar 1.563-65
Dollar/Yen 1.048/52[per 100Yen]

Q.121. A spot rate is DM = $o.3302-10.Another spot rate is FF=$0.1180-90.Compute direct quote of FF in Germany.

Q.122. Following spot rates are available in the London market .

Currency	Buying rate	Selling Rate
French Francs	10.24	10.30
Swedish Kroner	13.50	13.75
Japanese Yen	170	175

Since these currencies are in short supply ,you are required to operate through only sterling ,which is quoted at `75.25-35 in Mumbai .
a. Compute the quantum of French France that you can buy for `1,20,000.
b. What is the likely rate of Yen against Swedish Kroner .

Q.123. If the following rates are prevailing :
Euro/$: 1.1916/1.1925 and $ /£ : 1.42/1.47
What will be the cross rate between Euro/pound?

Q.124. Swiss exporter who sells to Denmark must sell Euros and purchase Swiss Francs
(a) what options are available to him considering the following market rates
SFr/$ 1.7654
Euro/$ 1.1918
Euro/SFr 0.6566
(b) What should he do ?

Q.125. Restate the following one ,there ; and six month outright forward European term bid-ask quotes in forward points and bid-ask spread in points .
Spot 1.3431-1.3436
One- Month 1.3432-1.3442

Three –Month 1.3448-1.3463
Six-Month 1.3488-1.3508

Q.126. You are given the following information
Spot DM/$: 1.5105/1.5130
Three-month swap : 25/35
Spot$/£ : 1.6105 /1.6120
Three-month swap : 35/25
Calculate the three-month DM/£ rate

Q.127. A bank has to submit a quote to a customer for buying DM against Rupees The customer will have the option of taking delivery of `At the end of second month Given the following spot and forward rates what rate should it quote?
`/$ Spot : 35.20/35.30
One-month forward : 15/25
Two-month forward : 20/30
DM/$ Spot : 1.51/1.52
One-month forward : 15/10
Two-month forward : 20/15

Q.128. A customer wants to sell a bill month $ 1,00,000 to a bank .The bill matures at the end of second month .If the bank charges a margin of 0.5% and exchange rates are as given bellow ,determine the rate which the bank is likely to quote .
`/$ Spot : 35.20/35.30
One-month forward : 15/10
Two-month forward : 20/15

Q.129. An Indian customer who has imported equipment from Germany has approached its bank for booking a forward DM contract. The delivery is expected at the end of six months from now .The following rates are being quote .
DM/$ Spot : 1.584/1.585
Three-month forward : 0.030/0.029
Six-month forward : 0.059/0.058
`/$ Spot : 35.60/35.70
Three -month forward : 15/25

Q.130. You are a banker .A client has approached you for a quote to purchase DM 1,00,000 .The client will be receiving the amount at the end of third month .
You collect the following information :
Bombay (`/$) spot : 42.50/43.00
2 month forward : 43.00/43.60
3 month forward : 43.60/44.20
Singapore : DM/$) spot : 1.68/1.69
2 month forward : 1.69/1.70
3 month forward : 1.71/1.72
What rate should you quote to the customer ?

Q.131. Jupiter, a hundred percent export oriented company based at Chennai exports Leather jackets to various European countries .All exports are invoiced in Euro .In April ,2000 Jupiter has sent a consignment to an import house based at Frankfurt .The receivable is likely to be realized at the end of July,2000 .Jupiter approaches its banker to sell these euro earnings .The banker has the following information :
`/$ spot 43.50/60
2-m forward 25/30
3-m forward 40/50
Euro/$ spot 1.0420/1.0430

2-m forward 1.0400/1.0415
3-m forward 1.0380/1.0400
You are required to :
Calculate the rupee inflow for Jupiter in July , if the expected Euro of one million is sold to the banker forward ?

Q.132. The following quotes are available .
Spot($/Euro) 0.8385/0.8391
3-m forward 20/30
Spot($/pound) 1.4548/1.4554
3-m swap points 35/25
Find the 3-m(€/£) outright forward rates .

Q.133. You are given the following information about current rates for Sterling spot & Forward.

	Spot	**1-month Forward**	**3-month Forward**
Canadian Dollar	1.8630-0.8640	30-20 cents premium	0.90-80 Premium
Belgian Franc	72.20-30	10-20 cents Discount	45-55 Discount
Danish Korner	13.01-02	44-45 5/8 Discount	183/8-19% Discount
German DM	3.065-075	2-15 pf premium	5.5-5.0 premium

Calculate the cost of value is sterling to
(a) customer ,who wishes to a Buy Canadian dollars 2500 spot.
(b) Buy Belgain francs 75000 three months forward.
(c) Sell Danish Kroner 20000 three months forward.
(d) Sell DM 6000 one month forward.

Q.134. An Indian customer who has imported equipment from Germany has approached a Bank for booking a forward Euro contract. The delivery is expected at the end of six months from now .The following rates are being quote .
($/Euro) Spot : 0.8453/08457
6-m swap : 15/20
`/$ Spot : 46.47/46.57
6-m swap : 20/30
What are the Bank will quote if it needs a margin of 0.5% ?

Q.135. Consider the following rates :
Spot `/$ 42.17/42.49
`/DM24.61/25.10
3-m forward `/$ 43.15/43.60
`/DM 25.36/25.90
(a) From these rates calculate the spot and forward DM/$ rates
(b) What are the upper and lower boundaries for the DM/$ quotations.

ICWA FINAL SCANNER

Q.136. (ICWA FINAL JUNE 2008):- In March 2010 Suravesh Industries makes the following assessment of the Dollar rates per British pound to Prevail as on 1-10-2010

$ Pound	1.6	1.7	1.8	1.9	1.10
Probability	0.15	0.20	0.25	0.20	0.20

(i) What is the expected spot rate for 1.10.2010?
(ii) If as of March, 2010 the 6 month forward is $ 1.80 should the firm sell forward its pound receivable due to September, 2010 ?

Q.137. (ICWA FINAL DEC 2002):- Your banks want to calculate Rupee TT selling rate of exchange for DM since a deposit of DM 1,00,000 in a FCNR A/c has matured when
EURO 1 =DM 1,95583(locked in rate)

EURO 1 = US $ 1.02348/43
US $ 1 = `48.51/53
What is the Rupee TT selling rate for DM currency ?

Q.138. (ICWA FINAL JUNE 2003):- During the year the price British Gilits (face value £ 105 to £ 110 .While paying a coupon of £ 8 .At the same time the exchange rate moved from $/£ 1.80 to 1.70.What is total return to an investor in USA who invested in this security ?

Q.139. (ICWA FINAL DEC 2002):- An Indian importer has to settle a bill for $ 1,35,000 .The exporter has given the Indian Company two options :
(i) Pay immediately without any interest charge
(ii) Pay after 3 months with interest 6% p.a.
The importer's bank charges 16% p.a. on overdrafts .If the exchange rates are as follows, what should the company do?
Spot (`/$) 48.35/48.36 3 months (`/$) 48.81/48.83
Give reasons for your advice

Q.140. (ICWA FINAL DEC 2002):- An import house in India has brought goods from Switzerland for SF 10,00,000.The exporter has given the Indian company two options:
(i) Pay immediately the bill for SF 10,00,000
(ii) Pay after three months , with interest @ 5% p.a.
The importer's bank charges 14% on overdrafts .If the exchange rates are as follows , what should the company do?
Spot (`/SF) 30.00/30.50
3 months (`/SF) 31.10/31.60

Q.141. (ICWA FINAL JUNE 2006):- Electronics Ltd. your customer has imported 5,000 cartridges at landed cost in Mumbai of US $ 20 each .The company has the choice for paying for the goods immediately or in 3 months time .It has a clean overdraft limit with you where 14% p.a. rate of interest is charged .
Calculate which of the following methods would be chapter to your customer.
(i) Pay in 3 months time with interest @ 10% and cover risk forward for 3 months .
(ii) Settle now at a current spot rate and pay interest of the overdraft for 3 months .
The rates are as follows :
Mumbai `/$ spot : 43.25- 43.55
3 months swap : 35/25

Q.142. (ICWA FINAL DEC. 2008):- In international money market (IMM) an international forward bid for December 15 on pound sterling in $ 1,2816 .At the same time , the price of IMM sterling futures for delivery on December 15 is $ 1,2806. The contract size of pound sterling is £ 62,500 .How could the dealer use arbitrage to profit from this situation and how much profit is earned ?

Q.143. (ICWA FINAL DEC. 2004):- The annual interest rate is 5% in the United States and 8% in the U.K. the spot exchange rate is £ /$ =1.50 and forward exchange rate with one year maturity is £ /$ =1.48. In view of the fact that the arbitrager can be borrow $ 10,00,000 at current spot rate ,what would be the arbitrager profit or loss ?

Q.144. (ICWA FINAL JUNE 2005):- What is " covered interest arbitrage " ?
Assuming that no transaction cost or taxes exist ,do the following data offers arbitrage profit opportunity ? If so how will the arbitrage transaction be carried out ? Assume that arbitrageur can borrow up to $ 1 million .
Three months interest rate in the United States : 8% per annum
Three months interest rate in Germany : 5% per annum
Current spot exchange rate : Euro 1.0114/$
Three months forward exchange rate : Euro 1.0101/$

Q.145. (ICWA FINAL DEC. 2004):- Given the following information

Spot rate	`46.88/$
3 months forward rate	`47.28/$
3 months interest rate in USA	7% per annum
3 months interest rate in India	9% per annum

Assuming no transaction cost or taxes exists , what operations would be carried out to take the possible arbitrage gain ?
Assume `10 million /$ 10 million borrowings (as case may be) to explain your answer.

Q.146. (ICWA FINAL DEC. 2007):- A forex trade wants to earn arbitrage gain .He receives the following data and quotes from forex and the money market

Spot rate (1 US $)	= `43.30/$
6 months Forward rate for 1 US $	= `43.70/$
Annualized interest rate for six months – Rupee	= 4%
Annualized interest rate for six months – US $	= 8%

What are the transaction the trader will execute to receive arbitrage gain if he is willing to borrow Rs43.30 million or US $ 1 million ,assuming that no transaction cost or taxes exist?

Q.147. (ICWA FINAL DEC. 2008):- On the 1st April 3 months interest rate in the US and Germany are 6.5% and 4.5% p.a. respectively .The $ /(spot rate is 0.7901.
What would be the forward rate for Euro for delivery on 30th June ?

Q.148. (ICWA FINAL DEC. 2008):- Consider the following :

Spot rate	= $0.75/ DM
Forward rate (one year)	= $0.77/DM
Interest rate (DM)	= 7% per year
Interest rate($)	= 9% per year

(i) Assuming no transaction cost or taxes exist, do covered arbitrage profits exit in the above situation? Explain.
(ii) Suppose now that transaction costs in the foreign exchange market equal 0.25% per transaction .Do unexploited covered arbitrage profit opportunities still exist?

COMPENDIUM OF ICWA FINAL

Q.149. Mr. Srinath proposes visiting U.K. He wish to carry travellers' cheques with him. Mr. Srinath go to ICICI Bank. The exchange rate quoted by the bank appear as under :
Traveler's Cheques

	Buying Rate	**Selling Rate**
GBP sterling	72.70	73.25

a) Explain the quote. b) Compute the spread c) How much would he pay for purchasing £250 in TCs? d) If on his return from London he has a balance of £ 23 in travelers cheques, how many rupees would be receive if the bank in India quotes 73.65 – 73.92?

Ans. Spot rate =`/ £ = 72.70 – 73.25

a) The quotation is direct quote in India
i.e. `– variable & £ fixed
b) Spread is the difference between Bid and Ask Rates
Spread = 73.25 – 72.20 = 0.55
c) Cost of 250£ = 250 × 73.25 = `18,312.50
d) Amount received at the time of return = 23 x 73.65 = `1,693.95

Q.150. The following rates appear in the foreign exchange market :

`/ 1 US $	Spot Rate	2 month forward
	`48.80 / 49.05	`49.50 / 50.00

a) How many dollars should a firm sell to get `49.50 million after 2 months?
b) How many rupees is the firm required to pay to obtain US $ 2,00,000 in the spot market?
c) Assume the firm has US $ 50,000. How many `does the firm obtain in exchange for the US $?
d) Are forward rates at premium or discount? Determine the percentages also.

Ans. Spot rate =`/ $ = 48.80 – 49.05. Two months forward rate (`/$) = 49.50 – 50.00

a) No. of $ to be sold to get `49.50 million
= 49.50 millions / 49.5 = $ 1 million
b) Cost of $ 200000 = 200000 × 49.05 = `98,10,000
c) Amount obtained = 50000 × 48.80 = `24,40,000
d) Forward rates are at premium as F >S
Bid Premium = [(49.50 – 48.80) / 48.80] × (12 / 2) x 100 = 8.6%
Ask Premium = [(50.00 – 49.05) / 49.05] × (12 / 2) x 100 = 11.62%

Q.151. On 1st April, 3 months interest rate in the US and Germany are 6.5% and 4.5% per annum respectively. The # / DM spot rate is 0.6560. What would be the forward rate for DM for delivery on 30th June?

Ans. Interest in US = 6.5% p.a.;
Germany = 4.5% p.a.
Spot Rate = ($ × DM) = 0.6560

3 months Forward rate = $S_0\left(\frac{1+r_n}{1+r_f}\right)$

= 0.6560 {[1+6.5 / 4)] / (1 + (4.5 / 4)]}
= 0.6560 (1.11625 / 1.01125) = 0.65924

Q.152. AA Ltd. Exports software for an invoice value $ 100 M. Spot rate is `45. Forward rate is `46. If the forward rate is an indicator of future spot rate, in which currency should AA Ltd. Invoice? What will be its approach, if the forward rate were to `44? Will the position change if it were importing, and not exporting, software for a value of $ 100 M?

Ans. (i) AA Ltd. exports software for an invoice value $ 100 M. As the exporter will receive the sale proceed from outside India AA Ltd. Should invoice in foreign currency i.e. $.

(ii) In the present case
Spot rate is `45 / $
Forward rate is `46 / $
∴ Net receivable in forward rate is = `46 × $ 100 M = `4,600 M
As the value of Rupee against $ is depreciated, forward gain will be `(46 – 45) × $ 100M = `100 M

(iii) If the forward rate is `44
The value of Rupee against $ will be appreciated and for that forward loss will be =`(45 – 45) × $ 100 M = `100M

(iv) If AA Ltd. Is the importer
Spot rate is `45 / $
Forward rate is `46 / $

Amount payable by AA Ltd. Will be – `46 × $ 100M = `4,600 M and forward loss will be `100M

In the second situation amount payable will be = `44 × $100M = `4,400M and forward gain will be `100M.

Q.153. A Indian Business House opened its subsidiaries in all over the world. The company has subsidiaries in US, UK, and Japan. As on 31.3.2011 the position of inter company indebtedness stood as follows :

Creditors	Debtors	Amount in lakhs
US	UK	US $ 500
Japan	UK	¥ 12,000
US	Japan	$ 200
UK	US	£ 75
Japan	US	¥ 12000

Indian Business house follows multi-lateral netting policy. On 31.3.2011 the forex units as follows :

1 US $ = `50; 1 UK £ = `75; 1¥ = 0.80 paisa

Show Net Position after Netting off.

Ans. **Working Note 1 :** For convince, it is necessary to convert all cash flow into common currency as follows :

Debtors	Creditors	Amount in Foreign Currency	Amount in `
UK	US	$ 500	500 x 50 = 2500
UK	Japan	¥ 12000	12,000 x 0.80 = 9600
Japan	US	$ 200	200 X 50 = 1000
US	UK	£ 75	75 X 75 = 5625
US	Japan	¥ 12000	12000 x 0.80 = 9600

Working Note 2

S. No.	Particulars	Received by			Total Payables
		US	Japan	UK	
1.	UK will pay to	---	9600	25000	34600
2.	Japan will pay to	---	---	10000	10000
3.	US will pay to	5625	9600	---	15225
4.	Receivable Total (1+2+3)	5625	19200	35000	
5.	Less : Total Payables	34600	10000	15225	
6.	Net Receivable (4 – 5)	---	9200	19775	
7.	Net Payable (4 – 5)	(28975)	---	---	

Net Receipts by Japan = `9,200; Net Receipts by US = `19,775; Net Payable by UK = `28,975

Q.154. Exporter is a UK based company, Invoice amount $ 350,000/- Credit period three months, Exchange rates in London.

$ / £ Spot 1.5865 – 1.5905; 3 months forward 1.6100 – 1.6140

Money market rates		
	Deposit	**Loan**
$	7%	9%
£	5%	8%

i) Compute and show how a money market hedge can be put in place.

ii) Identify whether it would have been advantageous to do forward cover instead?

Ans. $ / £ = 1.5865 – 1.5905

3 months forward = $ /£ = 1.6100 – 1.6140; Amount receivable = $ 350000

Money market rates :

	Deposits	**Loan**
$	7%	9%
£	5%	8%

Money market hedging :

Step 1 : Identification

FC is an Asset

Step 2 : Create a Liability → by borrowing an amount equal to Present value of $ 350000

Present value of $ 350000 = 350000 × (100 / 192,25) = $ 342298

Step 3 : convert the $ into £ by spot rate

Relevant rate is Ask rate i.e. 1 £ = 1.5905 $

→ 342298 × (1 / 1.5905) = 215214 £

Step 4 : Invest the pounds in UK for 3 months

215214 × 1.0215 = 219841 £

Step 5 : Settlement The $ Loan together with Interest equals to the invoice amount receivable which is sufficient to discharge the $ loan.

Hedging through forward contract

Amount receivable after 3 months = 216853

1.6140 % - 1 £

350000 $ - ?

Comparison	Now	After 3 months
Forward	---	216853
Money market	215214	219841

Therefore the Hedge efficiency in money market is greater than forward.

Q.155. Endalco Ltd. (EL) of India is planning to set up a subsidiary in the USA (where hitherto it was exporting) in view of the growing demand for its product and the competition from other MNCs.

The initial project cost (consisting of plant and machinery including installation) is estimated to be US dollar 400 millions; working capital requirements are estimated at US dollar 40 million.

The Indian company follows the straight line method of depreciation.

The General Manager (Finance) of EL estimated data in respect of the project as follows :

i) Variable cost of production and sales : $ 25 per unit
ii) Fixed cost per annum are estimated at $ 30 million
iii) The plant will be producing and selling 5 million units at $ 100 per unit.
iv) The expected economic useful life of the plant is 5 years will not salvage value.

The subsidiary of the Indian company is subject to 40% corporate tax rate in the USA and the required return of such a project is 12%. The current exchange rate between the two countries is `48 / US dollar and the rupee is expected to depreciate by 2% p.a. for the next 5 years.

The subsidiary will be allowed to repatriate 70% of the CFAT every year along with the accumulated arrears of blocked funds at the year-end 5. The withholding taxes are 10%. The blocked funds will be invested in the USA money market by the subsidiary, earning 4% (free of tax) per year. Advise EL regarding financial viability of having a subsidiary company in the USA, assuming no tax liability in India on earnings received by EL from the US subsidiary.

Note : Extract from the table :

i) Future value in year 5 of ₹ 1 each during 1 to 4 years invested at 4% per year = 4.246;

ii) The present value factor at 12% discount rate are

Year	0	1	2	3	4	5
P.V.	1.000	0.8929	0.7972	0.7118	0.6355	0.5674

Ans. **ENDALCO LTD.**

Analysis of financial viability : **(fig. in million)**

Cash outflows at t_0	
Cost of plant and machinery including installation	$ 400

Working capital		$ 40
		$ 440
cash out flow in rupees [440×48]		`21120
Cash inflows after taxes [CFAT]		
Sales revenue [5 million units x $ 100]		$ 500
(-) costs		
Variable costs (5 million units x $ 25)	$ 125	
Fixed cost	$ 30	
Depreciation ($ 400 millions / 5 years)	$ 80	$ 235
		$ 265
(-) taxes @ 40%		$ 106
EAT		$ 159
(+) depreciation		$ 80
Cash inflows after taxes from t_1 to t_4		$ 239
Cash inflows after tax at t_5 :		
Operating CFAT	$ 239	
(+) release of working capital	$ 40	$ 279

Determination of working capital :

(fig. in $ millions)

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Operating CFAT	239.00	239.00	239.00	239.00	239.00
(-) Retained earnings	71.70	71.70	71.70	71.70	
Repatriation made	167.30	167.30	167.30	167.30	239.00
(-) Withholding tax	16.70	16.70	16.70	16.70	23.90
Accessible funds to parent country	150.60	150.60	150.60	150.60	215.10
(+) Repatriation of blocked funds (WN)					274.00
(+) Recovery of working capital					40.00
`/$ exchange rate	48.96	49.9392	50.9380	51.9567	52.9959
`Equivalent	7373	7521	7671	7825	28040
PV Factor @ 12%	0.8929	0.7972	0.7118	0.6355	0.5674
Present value in `	6583	5996	5460	4973	15910

NPV :

Total present value of inflows = 38922

(-) Out flows = 21120

NPV `17802 millions

Working notes

Repatriation of blocked funds after withholding taxes :

Future value in t_5 of blocked funds of 71.7 million each during t_1 to t_4 , invested at 4% per annum

= 4.246 x 71.7 = $ 304.44 millions

(-) withholding tax = $ 30.44 millions = $ 274.00 millions

Q.156. A Company in UK will need to make a payment of $ 250,000 in six month's time. Following market information is available.

	Forex (indirect quote)	**FX Options**
Spot	$ 1.5617 – 1.5773	
Six months forward	$ 1.5455 – 1.5609	
Exercise price		1.70
Six months Call		$ 0.037 c per Pound
Six months Put		$ 0.096 c per Pound

Contract size		Assume : Pound 12,500
Money Market Rates		
	Deposit	**Borrow**
US $	4.50	6
UK Pounds	5.50	7

The Company is considering, forward rates, money market hedge and Options. Give your Reason and recommendations on the best alternative.

Ans. Evaluation of Hedge Efficiencies :

Calculation amount payable under forward cover after 6 months

	Bid	Ask
6 months forward rate ($ / £) =	1.5455	1.5609

Bid rate is applicable → 1.5455 $ - 1 £, 250000 $ - ?

Amount payable = (250000 / 1.5455) x 1 = £ 161760

Alternative 2 : money market :

i. Identification : Forward Cover is a liability.

ii. Create an asset by depositing an amount whose maturity value equals to $ 250000
Amount deposited = 250000 x (100 / 102.25) = $ 244499

iii. To deposit $ 244499 the pounds required to purchase the same is (24999 / 1.5617) = £ 156560

iv. After 6 months together with interest the loan becomes 156560 x 1.035 = £ 162040

v. The $ deposit matures an amount equal to $ 250000 and is sufficient to discharge dollar liability.

Alternative 3 : Option :

Strike Price = ($ / £) = 1.70

In Order to sell the Pounds and buy dollars, we have to select put option.

$ received for each contract → 1 £ - 1.7 %
12500 £ - ?
2120 $

No of contracts taken = (250000 / 21250) = 11.76

Therefore No of Contracts to be taken is 12.

Calculation of amount payable on exercise of 12 contracts:

Premium paid = (0.096 x 150000) / 100 = $ 14400

Value of 12 contracts = 12500 x 12 = 150000 £

Premium paid in £ = 9221 £ [1.56174 – 1 £, 14400 $ - ?}

£ Payable on exercise	150000 £
$ received on exercise	150000 x 1.7 = 255000 $
(-) Loan	250000 $
Remained	5000 $

Conversion value of 5000 $ = 3203 £ [1.5609 $ - 1 £, 5000 $ - ?]

Net cost :

Premium paid	9221
Amount paid	150000
	3203
	156018

Comparison :

	Now	After 6 months
Forward	---	161760
Money market	---	162040
Options	---	156018

Out of the above alternatives, cash flows under Options is Less and Payable.

INTEREST RATE SWAPS

Q.157. A treasury manager after five months will need to borrow `300,000 for months. The current rates are as follows:

Duration	Borrowing rates (per cent)	Lending rates (per cent)
3-months	9.5	10.0
6-months	9.8	10.2
8-months	10.0	10.5
9-months	10.2	10.8

The manager wants to ensure the rate that he would have to pay on his borrowings. What should he do and what is the rate he can lock in?

Ans. Since he has to borrow after 5 months for a period of 3 months, the rates that concern him are those corresponding to 5 months and 8 months.

He should borrow after 8 months at 10.5 per cent and lend this sum immediately for 5 months at 9.8 per cent. Let us say his effective rate is I.

Then,

$$\left[1.0.098\times\frac{5}{12}\right]\left[1+\frac{i}{100}\times\frac{3}{12}\right]=\left[1+0.105\times\frac{8}{12}\right]$$

Or

1 = 11.68 per cent

Thus, the treasury manager has been able to lock in an effective rate of 11.2 per cent. The interest on his borrowings would amount to :

$$300,000\times0.112\times\frac{3}{12}=\text{`}8,760$$

Q.158. A company will need to buy after 4 months a forward rate agreement (FRA) from a bank to borrow for 3 month. The 4 / 7 FRA is quoted at 6.5. What will the company do if after 4 months, the rate

a. Rises to 7 per cent
b. Falls to 6 per cent
c. Remains at 6.5 per cent

Ans. a. Since the rate has risen, the counter-party [the bank in this case] will pay the difference to the company. Say, the borrowing is planned for 1 million. Then the counter-party is to pay to the company:

$$0.07-0.06\times1,000,000\times\frac{3}{12}=2500$$

b. Since the rate has fallen to 6 per cent, the company will pay to the bank, an amount :

$$0.065-0.06\times1,000,000\times\frac{3}{12}=1250$$

c. Since there has been no change in the rate, neither the bank nor the company pays or receives.

Q.159. Two companies have the following borrowing rate applicable to them :

Company	Euro-bond Market (fixed rate)	Euro-money market Variable rate
X	T	LIBOR + 0.2
Y	T + 1.5	LIBOR + 0.75

The Co. X wants to borrow at variable rate while the Co. Y at fixed rate. However, through a bank as intermediary, the two companies reverse their choices. The bank signs two swap contracts stipulating that Co. X will pay to the bank LIBOR + 0.25 while Co. Y will pay to it T + 0.70. The bank wants to have 0.30 per cent profit. What are the costs of debt to the two companies respectively, if the bank's profit is contributed (i) equally by the two; (ii) in ratio of 2:1 from X and Y respectively?

Ans.

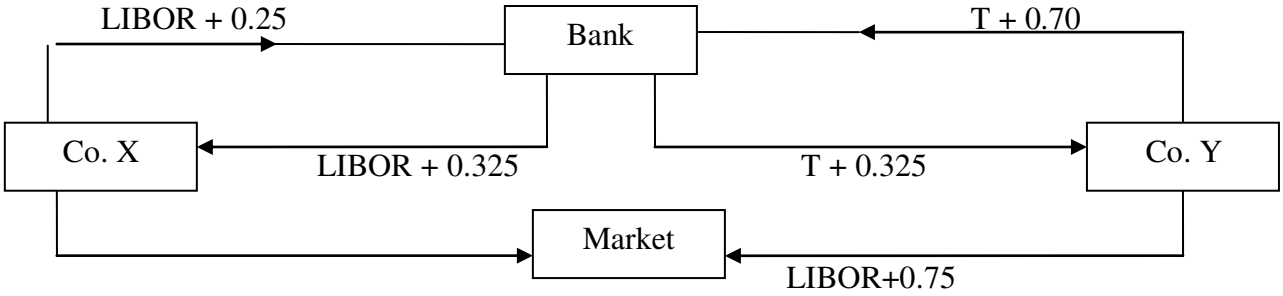
Company	Fixed Rate	Variable Rate
X	T	LIBOR + 0.20
Y	T + 1.5	LIBOR + 0.75
Difference	1.5	0.55
Net Gain		0.95
Less : Profit of Bank		0.30
Gain distributable among x and Y		0.65

If net gain is equally distributed between X and Y

Net Cost :

X = T + LIBOR + 0.20 + LIBOR + 0.25 – LIBOR – 0.325 = T + LIBOR + 0.125

Y = T + 1.5 + LIBOR + 0.75 + T + 0.70 – T – 0.325 = T + LIBOR + 2.625

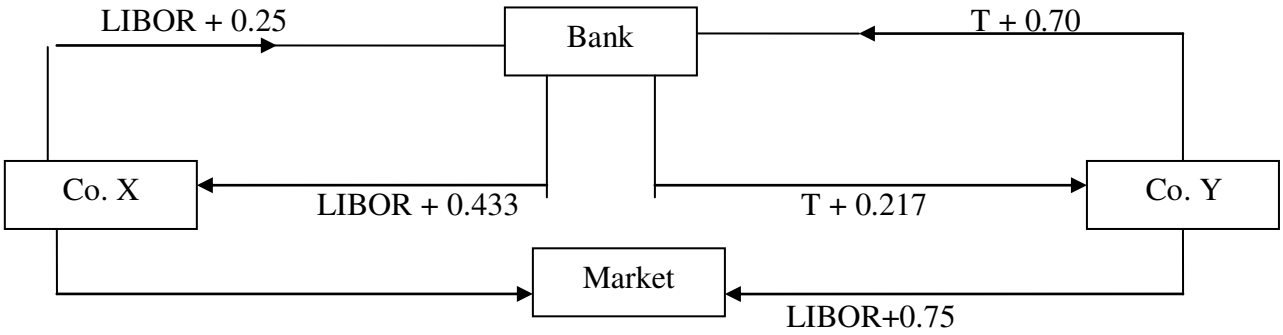


If net gain is distributed in the ratio of 2:1 between X and Y

Net Cost :

X = T + LIBOR + 0.20 + LIBOR + 0.25 – LIBOR – 0.433 = T + LIBOR + 0.017

Y = T + 1.5 + LIBOR + 0.75 + T + 0.70 – T – 0.217 = T + LIBOR + 2.733



Bank Profit :

LIBOR + 0.25 + T + 0.70 – T – LIBOR – 0.65 = 0.30

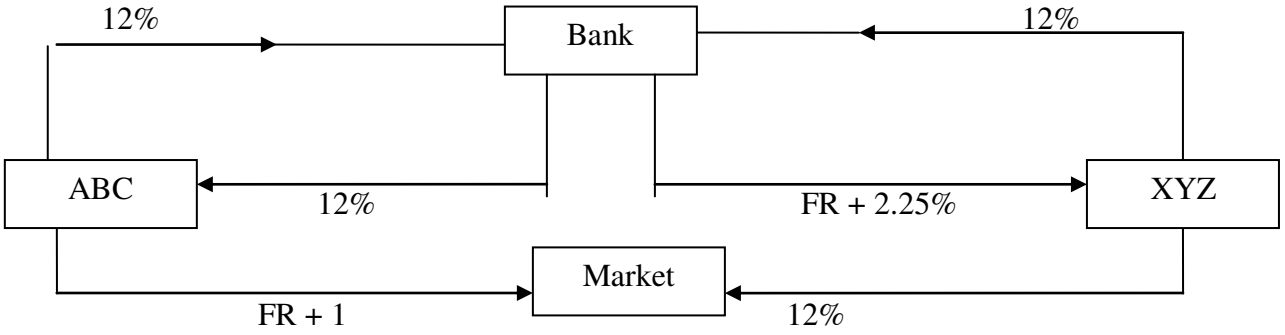
Q.160. ABC Housing Finance Ltd. Lends money to individuals @ 12% p.a. and accepts deposits from investors at FR + 1% (where FR is a floating rate). As the interest payment to investors is floating, it wants to hedge its risk, and has approached a swap dealer. Another company XYZ Ltd. Has also approached the swap dealer. XYZ Ltd. Has to pay 12% to the depositors but charges FR + 2.25% from its borrowers. You are required to devise a swap so that ABC Ltd. XYZ Ltd. And the dealer, all the three participants are benefited.

Ans. ABC Housing Finance Ltd. Wants to hedge against the floating rate liability and XYZ wants to hedge against 12% payable to the depositors. So, ABC Ltd. Would be ready to swap its 12% income against the interest liability plus some profit, say .50%. Similarly, XYZ Ltd. Would be ready to swap its floating income FR + 2.25% against the receipt of 12% from the dealer. It also wants to gain, say 40% i.e. in equal proportion out of swap. The swap arrangement can be structured as shown below :

	ABC	XYZ
Receipts	12%	FR + 2.25%

Payments	FR + 1%	12%

Net Gain = 1.25$ [assumption]



PREVIOUS YEAR QUESTION (CS PROFESSIONAL)

Q.161. **(CS Final Dec 1999)** In March, 2005 the Multinational Industries makes the following assessment of dollar rates per British pound to prevail as on 1 – 9 – 2005.

$/Pound	1.60	1.70	1.80	1.90	2.00
Probability	0.15	0.20	0.25	0.20	0.20

(i) What is the expected spot rate for 1 – 9 – 2005 ?

(ii) If, as of March 2005, the 6 – month forward rate is $ 1.80, should the firm sell forward its pound receivables due in September, 2005?

Q.162. **(CS Final Dec 2001)** On the same date that the DM spot rate was quoted at $0.40 in New York, the price of the Pound Sterling was quoted at $ 1.80:

(i) What would you expect the price of the Pound to be in the Germany?

(ii) If the Pound was quoted in Frankfurt at DM 4.40/Pound, what would you do to profit from the situation ?

Q.163. **(CS Final Dec 2003)** Calculate the arbitrage gains possible on `10,00,000 from the middle rates given below. Assume there are no transaction costs:

`76.200 = £ 1 in London

`46.600 = $ 1 in Delhi

$ 1.5820 = £ 1 in New York

Ans. Gain `33624

Q.164. **(CS Final June 2004)** The following direct quotes have been observed from the forex market :

(i) `/US $: 43.70

(ii) `/UK £ : 77.02

(iii) `/Euro : 53.50

(iv) Forward rate (60 days) for the Euro is `54.50/Euro

(v) DM/Dollar : 1,578 (overseas)

Find - (1) Indirect quotes in respect of (i) to (iii)

(2) Forward discount on the Indian Rupee

(3) Cross rates for Rupee/DM

Ans. (2) 11.37% (3) 27.69 `/DM

Q.165. **(CS Final June 2005)** Celina Ltd. wishes to borrow US Dollars at a fixed rate of interest. Priyanka Ltd. wishes to borrow Japanese Yen at a fixed rate of interest. The amounts required by the two companies are roughly the same at current exchange rate. The companies have been quoted the following interest rates:

	Yen	**Dollar**
Celina Ltd.	4.0%	8.6%

Priyanka Ltd.	5.5%	9.0%

Design a swap that will net a bank, acting as intermediary, 50 basis points per annum. Make the swap equally attractive to the companies and ensure that all foreign exchange risk is assumed by the bank.

Q.166. (CS final Dec 2005) Syntex Ltd. has to make a US$5million payment in three months' time. The required amount in dollars is available with Syntex Ltd. The management of the company decides to invest them for three months and following information is available in this context:

a. The US$ deposit rate is 9% per annum.
b. The sterling pound deposit rate is 11% per annum.
c. The spot exchange rate is $1.82/pound.
d. The three month forward rate is $1.80/pound.

Answer the following questions –

(i) Where should the company invest for better returns ?
(ii) Assuming that the interest rates and the spot exchange rate remain as above, what forward rate would yield an equilibrium situation?
(iii) Assuming that the US interest rate and the spot and forward rates remain as above, where should the company invest if the sterling pound deposit rate were 15% per annum?
(iv) With the originally stated spot and forward rates and the same dollar deposit rate, what is the equilibrium sterling pound deposit rate?

Ans. (i) USA (ii) £ 1 = $ 1.811 (iii) UK (iv) 13.54%

Q.167. (CS Final June 2006) Soni Ltd. and Toni Ltd. face the following interest rate:

	Soni Ltd.	Toni Ltd.
US Dollar (Floating rate)	LIBOR+0.25%	LIBOR+2.25%
Japanese Yen (Fixed rate)	1.75%	2%

Toni Ltd. wants to borrow US Dollars at a floating rate of interest and Soni Ltd. wants to borrow Japanese Yen at a fixed rate of interest. A financial institution is planning to arrange a swap and requires a 100 basis point spread. If the swap is equally attractive to Soni Ltd. and Toni Ltd., what rate of interest will they end up paying?

Q.168. (CS Dec 2006) Management of an Indian company is contemplating to import a machine from USA at a cost of US$15,000 at today's spot rate of $ 0.0227272 per Rupee. Finance Manager opines that in the present foreign exchange market scenario, the exchange rate may shoot up by 10% after two months and accordingly he proposes to defer import of machine. Management thinks that deferring import of machine will cause a loss of `50,000 to the company in the coming two months.

As the Company Secretary, you are asked to express your views, giving reasons, as to whether the company should go in for purchase of machine right now or defer purchase for two months.

Ans. Gain due to deter the purchase = 10,000

Q.169. (CS Final June 2008) (a) An exporter is a UK based company, Invoice amount is $3,50,000. Credit period is three months. Exchange rates in London are:

Spot rate ($/£)	1.5865 – 1.5905
3-month Forward rate ($/£)	1.6100 – 1.6140

Rates of Interest in Money Market

	Deposit	Loan
$	7%	9%
£	5%	8%

Compute and show how a money – market hedge can be put in place. Compare and contrast the outcome with a forward contract.

(b) Elite Ltd. manufactures a product from a raw material, which is purchased at `100 per kg. The company incurs a handling cost of `300 plus freight of `325 per order. The incremental carrying cost of inventory of raw material is Re.0.50 per kg. per month. In addition, the annual cost of working capital finance on the investment in inventory of raw material is `4 per kg. The annual production of the product is 1,00,000 units and 2 units are obtained from one kg. of raw material.

Required –

(i) Calculate the economic order quantity (EOQ) of raw materials.

(ii) Advise how frequently the orders for procurement of raw materials should be placed.

(iii) If the company proposes to rationalize placement of orders for procurement of raw materials on quarterly basis, what percentage of discount in the price of raw materials should be negotiated ?

Q.170. (CS Final June 2008) during a year the price of British Gilits (Face value £ 100) rose from £ 105 while paying a coupon of £ 8 .At the same time , the exchange rate moved from $/£1.70 to $/£ 1.58 what is the total return to an investor in US who invested in the above security ?

Ans. Total return = 1.9645 %?

Q.171. (CS FINAL DEC.2008) :- An Indian telecom company had approached Punjab National Bank for forward contract of £5,00,000 delivery on 31st May 2010.The bank had quoted a rate of `61.60 /£ for the purchase of pound sterling from the customer .But on 31st May 2010. The customer informed the bank that it was not table to deliver from the customer informed the bank

To extend the contract for delivery by 31st July 2010

The following are the market quotes available on 31st May 2010

Spot (`/£)	62.60/65
1-month forward premium	20/25
2-month forward premium	42/46
3-month forward premium	62/68

Flat charges for cancellation of forward contract is `500

You are required to find out the extension charges payable by the telecom company

Q.172. (CS FINAL DEC.2009) :-Silver Oak Ltd. an Indian company to mainly engaged in international trade with US and UK .It is currently 1st January .it will have to make of payment of $ 7,29,794 in the coming six months time .The company is presently considering the various alternatives in order to hedge its transactional exposure though its London office .The following information is available ;

Exchange rates:

$/£ Spot rate	:	1.5617-1.5773
6-months $ forward rate	:	1.5455- 1.5609

Money Market Rates	Borrow (%)	Deposit (%)
US/dollar	6	4.5
Sterling	7	5.5

Foreign currency option prices (cents per £ for contract size £ 12,500)

Exercise price	Call option(June)	Put option (June)
$1.70/£	3.7	9.6

Suggest which of the following hedging option is the most suitable for Silver Oak Ltd. :

(i) Forward exchange contract

(ii) Money market
(iii) Currency option

Ans. (i) £472206 (ii) £473020 (iii) £455845

Q.173. (CS FINAL DEC.2009) :-Two companies Rita and Gita Ltd. are considering to enter into a swap agreement with each other .Their corresponding borrowing rates are as follows :

Name of company	Floating Rate	Fixed Rate
Rita Ltd.	LIBOR	11%
Gita Ltd.	LIBOR +0.3%	12.5%

Rita Ltd. requires a floating rate loan of £ 8 million while Gita Ltd. requires a fixed rate loan of £ 8 million .

(i) show which company had advantage in floating rate loans and which company has a comparative advantage in fixed loans .
(ii) If Rita Ltd. and Gita Ltd. engage in a swap agreement and the benefits of the swap are equally split , at what rate will Rita Ltd. be able to obtain floating finance and Gita Ltd. be able to obtain fixed rate finance ?

Ignore bank charge.

Ans. (i) Net floating rate cost to Rita Ltd. would be =LIBOR -6%
(ii) Net fixed rate cost to Gita Ltd. would be 12.5% -6% = 11.9%

Q.174. (CS FINAL June .2010) :- The spot exchange rate is `15/€ and the three months forward exchange rate is `15.20/€ .The three months interest rate is 8% per annum in India and 5.8% per annum in Germany .Assume that you can borrow as much as `15 lakh or € 10 laklh .

(i) Determine whether the interest rate parity is currently holding
(ii) How would you carry out covered interest arbitrage? Show all steps and determine the arbitrage profit.

9. Portfolio Management

Q. 1. Explain briefly the two basic principles of effective portfolio management.

Ans. Portfolio management refers to the selection of securities and their continuous shifting in the portfolio to optimize returns to suit the objectives of the investor.

Two Basic Principles of Portfolio management are:

(i) Effective Investment planning for the investment in securities by considering the following factors:
   (a) Fiscal, financial and monetary policies of the Government of India and the Reserve Bank of India.
   (b) Industrial and economic environment and its impact on industry prospects in terms of prospective technological changes, competition in the market, capacity utilization with industry and demand prospects etc.

(ii) Constant review of investment: Portfolio managers are required to review their investment in securities on a continuous basis to identify more profitable avenues for selling and purchasing their investment. For this purpose they will have to carry the following analysis:
   (a) Assessment of quality of management of the companies in which investment has already been made or is proposed to be made.
   (b) Financial and trend analysis of companies' balance sheets / profits and loss accounts to identify sound companies with optimum capital structure and better performance and to disinvest the holding of those companies whose performance is found to be slackening.
   (c) The analysis of securities market and its trend is to be done on a continuous basis.

   The above analysis will help the portfolio manager to arrive at a conclusion as to whether the securities already in possession should be disinvested and new securities be purchased. This analysis will also reveal the timing for investment or disinvestments.

Q. 2. "Higher the return, higher will be the risk". In this context discuss the various risks associated with portfolio planning.

Ans. There are four different types of risk in portfolio planning.

1. Interest rate risk: It is due to changes in interest rates from time to time. Price of the securities move inertly with change in the rate of interest.
2. Purchasing Power risk: As inflation affects purchasing power adversely. Inflation rates vary over time and the investors are caught unaware when the rate of inflation changes abruptly.
3. Business risk: It arises from sale and purchase of securities affected by business and cycles and technological changes.
4. Financial risk: This arises due to changes in the capital structure of the company. It is expressed in terms of debt-equity ratio. Although a leveraged company's earnings are more, too much dependence on debt financing may endanger solvency and to some extent the liquidity.

Q. 3. Write short note on objectives of portfolio management.

Ans. Objectives of Portfolio management: Portfolio management refers to the selection of securities and their continuous shifting in the portfolio for optimizing the return for investor.

The following are the objectives of portfolio management

(i) *Security/safety of principal:* Security not only involves keeping the principal sum intact but also keeping intact its purchasing power.
(ii) *Stability of income:* So as to facilitate planning more accurately and systematically the reinvestment or consumption of income.
(iii) *Capital Growth:* Which can be attained by reinvesting in growth securities or through capital purchase of growth securities.
(iv) *Marketability:* The ease with which security can be bought or sold. This is essential to provide flexibility to investment portfolio.
(v) *Liquidity:* It is desirable for an investor to take advantage of attractive opportunities in the market.
(vi) *Diversification:* The basic objective of building a portfolio is to reduce the risk of loss of capital/income by investing in various types of securities and over a wide range of industries.
(vii) *Favourable tax status:* The effective yield an investor gets from his investment depends on tax to which it is subjected. By minimizing tax burden, yield can be improved effectively.

Functions of Portfolio Manager: A portfolio managers renders services to their clients in different categories, viz. Individuals, resident Indians and non-resident Indians, firms, associations of persons etc. and based on the investment policy statement from the investor containing the specifications and qualification of his objectives, the portfolio manager allocates assets, determines the appropriate portfolio strategy for each asset class and selects the securities. The performance of the portfolio is evaluated constantly to ensure attainment of the investor objectives. The main functions of the portfolio manager are as follows:

1. **Sale or Purchase of Securities**
   They carry out investment in securities or sale or purchase of securities on behalf of the clients to attain maximum return at lesser risk.
2. **Study of the Economic Environment:**
   The portfolio manager undertakes the study of economic environment affecting the capital market and clients investment. They study securities market and evaluate price trend of shares and securities in which investment is to be made.
3. **Maintain Financial Performance Data:**
   They maintain complete and updated financial performance data of blue chip and other companies so that they can evaluate the company's worth for the investment purpose whether it is sound, price quoted are reasonable for the purpose of the investment.
4. **Record of Policies and Guidelines:**
   They continuously undertake the study of the latest policies and guidelines issued by the Government of India, RBI and stock exchanges for the purpose of the compliance of the guidelines and to update their knowledge.
5. **Study the Q.No of the Industry:**
   They undertake a thorough study of problems faced by the industry, which have the effect on securities market, and the attitude of investors so that they can take the right decision about the securities in which investment to be made.
6. **Study the Financial Behaviour:**
   The portfolio manager study financial behaviour of the financial institutions and other players in the capital market to find out sentiments in the capital market, with the combination of above, they counsel the prospective investors' on share market and suggest investments in certain assured securities.
7. **Personal Service to the Client:**
   A portfolio manager acts as a personal financial consultant on investment decisions. He also offers other value added services such as tax planning, benefit collection, safe custody of securities, registration and transfers etc.

Obligations of the Portfolio Manager towards Client

1. **Consider the limit placed by the Client:**
   He shall transact in securities within the limitation placed by the client himself with regard to dealing in securities. He should also consider whether the discretionary power has been given by the client or not, if not, he should transact the deal only with the consent of the client.
2. **Don't make his own profit:**
   He shall not derive any direct or indirect benefit out of the client's funds or securities. Any transaction of purchase or sale including that between his own accounts and his client's accounts or between two client's accounts shall be at the prevailing market price.
3. **Securities to be held in clients name:**
   The securities purchased out of client's fund must be held in the client's name provided that he may hold the securities belonging to the portfolio account in his own name on behalf of his clients only if the contract so provides. In such a case, his records and his report to his client should clearly indicate that he holds such securities on behalf of his client.
4. **Not Indulging in Speculative Activities:**
   While dealing with his client's funds, he shall not indulge in speculative transactions means transaction in which settlement takes place without actual delivery or transfer of security. He may enter into such transactions on behalf of his clients for the specific purpose of meeting margin requirements only if the contract provides for the same and the client is made aware of the attendant risks of such transactions.
5. **Deployment of Fund without Delay:**
   He shall deploy the money received from his client for an investment purpose as soon as possible for that purpose. He shall pay the money due and payable to a client forthwith.
6. **Maintenance of the Professional Ethics:**
   He shall not make any exaggerate or untrue statement, oral or written, to the client about the qualification or the capability to render certain services or his achievements in regard to services rendered to other clients. He shall not disclose to any clients, or press any confidential information about his client, which has come to his knowledge.
7. **Avoidance of the Conflict with the client:**
   He should avoid any conflict of interest in his investment or disinvestments decision relation to his customers. Where there is a conflict of interest with such customers, he shall ensure fair treatment to all his customers. He shall disclose to the customers possible sources of conflict of duties and investors, while providing unbiased services.
8. **Provide other services to the client:**
   He shall, where necessary and in the interest of the client, take advantage steps for registration of the transfer of his client's securities, receiving dividends, interest payments and other rights accruing to his clients. He shall also take necessary action for conversion of securities and subscription/renunciation of/or rights in accordance with the client's instructions.

Fundamental Analysis

An investor who would like to be rational and specific in his investment activity has to evaluate a lot of information about the past performance and the expected future performance of the companies, industries and the economy as a whole before taking the investment decision.
Such evaluation/ analysis is called fundamental analysis.

(i) Economic Analysis
   It is an analysis of overall economic conditions. It helps an investor to decide as to whether it is the right time to make an investment.
   Economic analysis includes:-
   (1) Analysis of general State of economy
      → Recession

→ Normal
→ Boom

(2) Politically stability of the country
(3) Government policies which affect the stock markets.
(4) Inflation rates
(5) Interest rates
(6) Monsoon.

(ii) Industrial Analysis

It is a process whereby the industries best suited are chosen. It includes choosing the industries with a bright future and potential (banking, insurance, iron, steel, cement, real estate, textile, pharmaceutical, telecom and like).

Industries analysis includes:-

(1) Demand/ supply pattern of an industry.
(2) Age of industry
→ Infant
→ Growth
→ Maturity
→ Saturation.
(3) Particulars characteristics of an industry e.g. obsolescence risk exposure, dependence on climatic conditions.
(4) Profitability track record of industry.
(5) Future prospectus of industry.
(6) Government attitude towards industry.
(7) Labour Management Relations industry
(8) Barriers to entry in the industry.

(iii) Company Analysis

It includes:-

(1) Probability to the company
(2) Liquidity
(3) Solvency
(4) Age to company
(5) Operating & financial risk
(6) Management of the company.
(7) Modernization & Expansion Plans
(8) Promoters of the company
(9) Labour – Management Relationship in the co.
(10) Marketability of share.
(11) Future prospectus of the company
(12) Stability of market price.
(13) Availability of run materials
(14) Market share of the company in an industry.

Q. 4. **[Dec 2000]** Write short notes on Security Market Line and Capital Market Line.

Ans.

Capital Market Line	Security Market Line
a) CML depicts linear relationship between expected return and total risk, b) CML is concerned with systematic risk as well as unsystematic risk of the security, c) it uses standard deviation as a measure of risk. d) It is a graphical representation of total risk	a) SML depicts linear relationship between expected return and systematic risk. b) SML is concerned only with systematic risk of the security. c) It uses Beta factor as a measure of risk. d) A graphical representation of CAPM

e) $E(R) = R_f + \left(\frac{R_m - R_f}{\sigma_m}\right)\sigma_s$ Where $\left(\frac{R_m - R_f}{\sigma_m}\right)$ Market return risk trade-off.	is known as SML. e) $E(R) = R_f + R_f + \beta(R_m - R_f)$ Where $(R_m - R_f)$ Market risk premium

Q. 5. **[June 2001]** Write notes Traditional approach of Portfolio management.

Ans.

- The term 'portfolio' refers to the bunch/group of securities one holds.
- Portfolio management refers to the managing of the portfolio (i.e. selection and shuffling of securities) in order to accomplish the objectives.
- The twin objectives associated with portfolio management are:-
  - Maximising Returns.
  - Minimising Risks.
- The traditional approach of portfolio management involves:-
  - Study of investors.
  - Determination of portfolio objectives.
  - Deciding investment strategy.
  - Diversifying the portfolio.
  - Select an individual investment.

Q. 6. **[June 2004]** Write notes assumptions underlying technical analysis.

Ans.

- Technical analysis refers to the science of predicting the movement of share prices on the basis of past data.
- Such an analysis assumes the determination of prices of securities by intersection of demand and supply curve.
- According to this, what has happened in past will also be repeated in future.
- In other words, investor's psychology follows a definite pattern.
- Various assumptions in-built in technical analysis are as follows:-
  - Market price of shares is determined on basis of demand & supply of that security.
  - Various factors affect the demand & supply of securities
  - Such changes in demand and supply can be depicted means of charts.
  - Such movements also reflect some trends over a period of time.
  - These trends repeat themselves in future.

Q. 7. **[June 2005]** Write a note on 'Sharpe Index Model'.

Ans.

- Sharpe Index model was developed by William Sharpe. 'It expresses the relationship between return of a particular security with that of some index such as Nifty, Sensex, Nasdaq etc.
- Sharpe index model is simplified version of Markowitz model
- Alternatively, it is also known one factor model or single index model.
- Thus, this model reflects how the prices of shares get influenced by market index and the same can be used to estimate the return on securities.

Sharpe index can be given by the following equation:-

$$R = \propto + \beta I + E$$

Where:-

$\propto$ = Alpha coefficient/ Intercept of straight line.

B = Beta coefficient/ Slope of straight line.
I= Rate of Return on market index
E = Error term

Q. 8. **[June 2005]** Write short notes on Markowitz model & the Limitations of Markowitz model.

Ans.

- Markowitz Model was developed by Harry M. Markowitz.
- Harry M. Markowitz is popularly known as 'father of modern portfolio theory' as he was the first one to develop the modern portfolio management model.
- This model provides framework for analysis of risk-return options and strives to achieve maximisation of return with simultaneous emphasis on minimisation of risk.

Assumptions of Markowitz Model

- Decisions of investors are based on expected returns together with variance of return.
- Investors prefer maximum return and try to minimise their risk.
- Investors can estimate the probability distribution of returns
- Return of securities reveals the outcome of such securities
- Risk of securities is proportional to the variance of return expected by them.

Limitation of Markowitz Model

- Markowitz model is not practically possible in the modern day word when there are number of securities and not just to. So, the calculation becomes tedious and cumbersome.

Q. 9. **[June 2006]** Write notes on the Dow Theory.

Ans.

- Dow Theory was given by Charles H. Dow.
- This theory formulated by him is considered as the earliest and also has proved out to be one of the most popular theories.
- According to Dow Jones theory, share price movement can be of the following three types:-
  - Primary Movements.
  - Secondary Movements.
  - Minor Movements or Daily fluctuation.
- Primary movements reflect the long range behavior / trend of share prices (which may last for 1-3 years) and will reflect upward movement (if bullish) or downward trend (if bearish). Also, these movements indicate basic trends in the market.
- Secondary movements are the reversals of the primary movements as they move in the direction opposite to that of the primary movement; however they are in existence for a shorter time frame (probably 1-3 months).
- Minor movements indicate the irregular fluctuations which occur daily and have an indefinite trend being caused by speculative factors.

Q.10. **[Dec 2006]** Write notes on the Technical Charts.

Ans.

- Technical analysis is based on the assumption that prices of shares are based on past movement of share prices.
- Technical charts involve plotting prices of shares and quantity traded in form of charts.
- Such charts help in predicting the future share price movement.
- The three types of technical charts employed by analysts are:-
  - Line chart.
  - Bar chart.

- Point and figure chart.

Q.11. [June 2006/2008] Write notes on the Gilt-edged primary market.

Ans.

- Gilt-edged primary market refers to that primary market in which securities are issued by Reserve Bank (on behalf of Government).
- The securities are issued in accordance with the funds required by the Government.
- The price, quantum and other terms and conditions of issue are determined by RBI.
- RBI plays a crucial role in this segment of primary market,
- Also, Reserve Bank plays the role of an underwriter and subscribes for that portion of the issue which is not subscribed by the public.

Q.12. [June 2001] Most of the new economy companies' stock values have come down heavily whereas initially they were valued at a high premium despite the fact that these companies did not have any track record of profits. Comment.

Ans.

- It is true to say that most of the new economy stock values have come down heavily whereas initially they mere valued at high premium despite the fact that these companies did not have any track record of profits.
- Many times its happens that the markets get flooded with offers by a large number of companies.
- Many new companies (even with adverse rating) take advantage of increasing demand among the investors.

Q.13. [Dec 2002] Explain various new instruments in Capital Market.

Ans. Some of the new / innovative instruments in capital market are as follows:-

Deep Discount Bond

- Deep Discount Bonds are the ones which are issued at a deep discount very less price, being issued over a large time period and redeemed at face value.
- IDBI and SIDBI were the first to come up with this innovative instrument

Secured Premium Notes

- Secured Premium Notes or SPN in short are instrument issued alongwith detachable warrants.
- These warrants help the holders to procure shares after the SPN is fully paid.
- TISCO was the one who made these instruments quite popular.

Floating Rate Bonds / Notes (FRN)

- Interest of such bonds is not fixed.
- It floats/ varies as per the market conditions.
- It is used as a means to hedge the risk.

Q.14. [June 2003] State the assumptions made in 'capital asset pricing model. What are the uses and limitations of this model?

Ans. CAPM, abbreviation of Capital Asset Pricing Model was developed by Sharpe and Linter in 1960. It describes the relationship between expected return, non diversifiable risk and valuation of a security.

As per CAPM model

$$R_p = R_f + \beta (R_m - R_f)$$

Where
R_p = Return of portfolio
R_f, = Return on Risk free security
R_m = Return on market
B = Beta of security

CAPM takes systematic risk only into consideration.
CAPM when plotted on a graph paper, is known as SML (Security Market Line)

Assumption of CAPM

- Investor's objective is to get highest return for any acceptable level of risk or the lowest risk.
- Investors have full information available at their disposal.
- No transaction costs are involved.
- Absence of any tax expense.
- Investors can lend/ borrow at the risk free rate.
- CAPM assumes existence of an efficient market.

Limitations of CAPM

- Possibility of having efficient market seems dubious.
- It is difficult to estimate risk free rate & beta.

Q.15. **[June 2004]** "It is possible for an investor to construct a zero risk portfolio of two securities which are perfectly negatively correlated." State, giving brief reasons, whether the statement is true.

Ans.

- Yes, it is possible for an investor to construct a zero-risk portfolio of two securities which are perfectly negatively correlated.
- Such a portfolio can be created using Markdwitz Model.
- One needs to combine two perfectly negatively correlated securities i.e. correlation between the securities as (-1) which can lead to portfolio risk of zero

Q.16. **[Dec 2004]** "Risk and return go together and there is always a conflict between the return from a decision and the risk it brings to the firm." Discuss this statement in the light of finance function.

Ans.

- Risk is defined as the variation in return from the expected return.
- Return is the nomenclature used for indicating the compensation that one gets for not using hi liquidity at present or parting away with his liquidity.
- It is rightly said that risk and return go together and there is always a conflict between the return from a decision and the risk it brings to the firm.
- Investors want to maximise their returns at the set level of risk.
- Alternatively, they desire to minimise the level of risk at set level of returns.
- Higher the risk, higher the return' is a maxim which holds true and describes the relationship between risk and return.
- Thus, both risk and return go together, however there is always a clash between the two objectives from the point of view of the investors.

Q.17. **[Dec 2007]** Comment on the portfolio managers generally attempt to diversify risks by investing in debts and equity instruments.

Ans.

- Many-a- times it is observed that portfolio managers diversify their risks by investing in debts and equity instruments.
- Since equity instruments provide high return but also carry high risk burden [concept of higher the risk, higher the return] portfolio managers go in for equity instrument.
- Debt instrument, though carries lesser return, however face lesser risk since interest paid is a charge and not an appropriation.
- Thus, a portfolio consisting of both equity and debt instrument can help to minimise overall risk and fetch higher returns.

Q.18. **[June 2008]** Attempt the following:

1) **The risk of the portfolio which combines both a risky and a risk-free asset will be reduced to the standard deviation of the risky security, weighted for it proportionate value in the portfolio." Do you agree? Discuss.**
2) **Alpha is an indicator of the extent to which the actual return of a stock deviates from those predicted by its beta value." Discuss.**

Ans. 1) The risk of the portfolio which combines both a risky and a risk-free asset will be reduced to the standard deviation of the risky security, weighted for it proportionate value in the portfolio."

- It is rightly said that the risk of the portfolio which combines both a risky and risk free asset will be reduced to the standard deviation of the risky security weighted for its proportionate value in the portfolio.
- Since standard deviation of risk free security is zero, the risk of portfolio having combined securities will be comparatively lesser.
- Now if standard deviation of security x or y is zero, then risk of portfolio will be just calculated by multiplying the standard deviation of risky security with its weight.

2) Alpha is an indicator of the extent to which the actual return of a stock deviates from those predicted by its beta value."

- Alpha is an indicator of the extent to which the actual return of a stock deviates from those predicted by its beta value.
- Alpha measures the return above/ below the required rate of return.
- It is represented in percentage (%).
- It may be positive or negative.

Q.19. **[June 2009]** Comment on the CAPM is a tool to workout Cost of Equity.

Ans. CAPM helps to work out required rate of return required by investors in the form of equity investment. It establishes a linear relationship between the required rate of return of a security and its β.

R_s = $R_f + \beta (R_m - R_f)$
B = Beta of Security
R_f = Risk free rate of return
R_m = Market rate of return

The R_s calculated as above is the required rate of return of equity investors and it may be called as the cost of equity.

This R_s can be used to find out the price of the share which depends on Dividend and R_s, and can be calculated as follows:-

$K_e = \frac{D}{p} + g \frac{D}{p} + g$

D = Dividend expected in next year
Ke = Cost of equity
G = Growth rate in dividend

Portfolio Management is a management of selecting a group of securities for maximizing return & minimizing risk

There are two main components of Portfolio Management :

⇩

RETURN | RISK

1. when no information about proportion of investment

$$\textbf{Average return} = \frac{R_1 + R_2 + R_3 + \ldots\ldots\ldots\ldots + R_n}{n}$$

where, R is return of the Securities,

2. when information about proportion of investment is given

$$\textbf{Average return of the portfolio} = \frac{R_1W_1 + R_2W_2 + R_3W_3 + \ldots\ldots\ldots\ldots + R_nW_n}{W_1 + W_2 + W_3 + \ldots\ldots\ldots\ldots + W_n}$$

where, R is return of the security and W is proportion of the securities

3. when different possible returns are given with their corresponding probabilities

$$\textbf{Expected Return} = R_1P_1 + R_2P_2 + R_3P_3 + \ldots\ldots + R_nP_n$$

where, R is return & P is Probability

4. **Required return considering Risk factor**

⇩

Expected return as per CAPM (Capital Asset Pricing Model) ⇩ $R_f+\beta(R_M-R_F)$

Expected return as per APTM (Arbitrage Pricing Model) ⇩ Consider Several Factor ⇩ $R_F+\beta_{factor1}(R_M-R_{F)}+\beta_{factor2}(R_M-$

3. Portfolio Standard Deviation or Portfolio Risk of two Securities A & B

$$\textbf{Portfolio Standard Deviation} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)^2 (\sigma_B W_B) r_{AB}}$$

W = weight, $\mathbf{r_{AB}}$ = Coefficient of Correlation

Case A = If Sec A & Sec B are perfectly **+ve** correlation i.e. $\mathbf{r_{AB} = 1}$

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)(\sigma_B W_B)1}$$

$(a^2 + b^2 + 2ab) = (a+b)^2$

$$= \sqrt{(\sigma_A W_A + \sigma_B W_B)^2} = \sigma_A W_A + \sigma_B W_B$$

Case-B When Sec-A & Sec-B are perfectly **-ve** Correlation i.e. $\mathbf{r_{AB} = -1}$

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)(\sigma_B W_B)-1}$$

Portfolio Risk = $\sigma_A W_A - \sigma_B W_B$

Case–C If one of the Securities is Market & other Security is Risk free

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_M W_M)^2 + (\sigma_{Rf} W_{Rf})^2 + 2(\sigma_M W_M)(\sigma_{Rf} W_{Wf})^r \text{ MRF}}$$

$$= \sqrt{(\sigma_M W_M)^2 + 0 + 0} = \sigma_M W_M$$

Portfolio Risk – When Portfolio consists 3 Securities

$$\sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)(\sigma_B W_B) r_{AB} + 2(\sigma_A W_A) + (\sigma_c W_c) r_{AC} + 2(\sigma_B W_B) + (\sigma_c W_c) r_{BC}}$$

β is Market Sensitivity which represents the movement in Securities return due to movement in market return. In India, Market is represented by **Sensex** & **Nifty**

Beta of a Securities = β = Market Sensitivity Index = Beta Coefficient

Beta represents movement of particular securities due to movement of market.

$$\beta_S = \frac{Cov(SM)}{\sigma_M^2} = \frac{r_{SM} \cdot \sigma_M \sigma_S}{\sigma_M^2}$$

$$\beta_S = \frac{r_{SM} \sigma_S}{\sigma_M}$$

Portfolio $\beta = \beta_A W_A + \beta_B W_B + \ldots.$

(i) Market $\beta = \frac{Cov(MM)}{\sigma_M^2} = \frac{\sigma_M^2}{\sigma_M^2} = 1$

Type of Risk

Capital Assets Pricing Model = CAPM

It provides the expected return on a Stock on the basis of risk taken by Investor

On Security	On Portfolio
Expected Return = $R_f + \beta_{Security} (R_M - R_f)$ R_f = Risk free rate of return $\beta_S [R_M - R_f]$ = Risk Premium Security $R_M - R_f$ = Market Risk Premium	Expected Return = $R_f + \beta_{Portfolio} (R_M - R_f)$ $\beta_{Portfolio} = \beta_A W_A + \beta_B W_B + \beta_C W_C + \ldots.$ $\beta_{Portfolio} [R_M - R_f]$ = Risk Premium on Portfolio $R_M - R_f$ = Market Risk Premium

It is academic Model which guides the Investor whether Securities should purchase, hold & sale.

Under Valued & Over Valued Stocks

Case - I- Expected return as per **CAPM** < Expected / Available return. It means Investor expects lower as per Risk taken by Investor than Stock Actual gives therefore Securities should purchase. It is said to be **Undervaluation.**

Case - II- Expected return as per **CAPM** > Expected /Available return. It means Investors expects higher than stocks Actual gives therefore Securities should Sale. It is said to be Over Valuation.

Case - III- Expected return as per **CAPM** = Expected Available return. It means Investors expects equal to Stock. Therefore Securities should hold. It is said to be Correctly.

Market Line

Equation of Market Line based on two Variable & Constant like, **Y = 4x + 3** Here **x & y** are Variable, **3 & 4** are Constant. **Y** is dependent Variable **X** in Independent of Variable.

	Security Market line (SML)	**Capital Market Line (CML)**
Definition	It is Graphical representation of **CAPM**	It is efficient frontier under **Capital Market theory**
Expression	Expected Return = $R_f + [R_M - R_f]\beta_s$ Variable Constant Variable $E(R) = 8 + \beta 6$ $R_f = 8$, $[R_M - R_f] = 6$	Expected Return = $R_f + [R_M - R_f]\sigma_S$ Variable Constant Variable $E(R) = 5+7\sigma_S$ $R_f = 5$, $\frac{[R_M - R_f]}{\sigma_M} = 7$=Market's Return Risk Trade Off
Objectives	Its objective is to explain asset pricing	Its Objective is to determine optimum Portfolio
Risk	Risk is defined as un-diversifiable Market related risk.	The risk is defined as total risk.

The Characteristics Line

- → In major market moves, most securities moves in the same direction, although at different rates.
- → An analyst's view of the relationship between returns on individual securities and returns on the market portfolio can be expressed by using a characteristics line.
- → The vertical axis plots the return on the security for that period.
- → The horizontal axis plots its return on the market portfolio.
  Return on market portfolio = ER(m).
- → Characteristics line for the i assets is:-
  $ER_i = Alph_i + \beta_i \{ER(m)\}$

Scope of Characteristic line

- → Measure the relative volatility of portfolio returns in relation to returns for the aggregate markets

The higher the slope, the more sensitive is the portfolio to the market mo

Characteristic Line = Alpha + $\beta_{Security} \times R_M$

(Expected Return) = Constant Constant Variable

$E(R) = 2 + 1.3 \times R_M$

Constant

Dependent Independent Variable

RETURN = The gain or loss of a security in particular period .The return consists of the income &capital gains relative on an investment .It is usually quoted as a percentage

Holding Period Return = $\frac{P_1 - P_0 + D_1}{P_0}$

Where, P_1= market price per share after holding period, P_0= market price per share at beginning & D= Dividend during the period.

Q. 1. An asset can be purchased for `9, 00, 000 today and will have a value of `10, 00, 000 in one year. During the year, the asset will generate cash payments to the holder of `60, 000. What is the expected return on the investment ?

Ans. 17.77 %

Q. 2. A regional stock exchange on January 1st had a total market value for all stocks of `35 million. During the year, the stocks are expected to pay dividends of `2.5 million. The value of the stocks by next year is expected to be `28.5 million. What will be the market rate of return for the year?

Ans. -11.42 %

RISK

All adverse thinking is said to be risk. i.e. Risk refers to possibility that expected return May not materialize or investment may be sold for a price less than paid for it or there is no income from investment or income may be less than the expectation. Risk can not be eliminate completely it can be manage to the some extent.

Year	Company-A	Company-B	Company-C
1	196	200	0
2	204	200	1
3	200	200	2
4	194	200	3
5	206	200	994
Total Return	1000	1000	1000
Average return	$\frac{1000}{5}$	$\frac{1000}{5}$	$\frac{1000}{5}$
	200	200	200

If we have to select any one project out of three on the basis of average return then all there projects are equally likely having same Average Return = `200 but a person never invest in Project- C, because there is huge deviation of individual return from Average return. Hence Project-C has huge risk i.e. the Co. having more deviation in return from its average return is said to be riskier than lower deviation.

Therefore, deviation Measure tools is said to be risk Measurement tools i.e.

Standard deviation = σ (Sigma)

Standard deviation:- Standard deviation is a measure of total risk i.e. firm specific (unsystematic) and market risk.

1. When different possible returns are given without their probability

$$\textbf{Standard deviation} = \sigma = \sqrt{\Sigma \frac{(\text{Return - Average Return})^2}{N}}$$

2. When different possible returns are given with their probabilities

$$\textbf{Standard deviation} = \sigma = \sqrt{\Sigma \text{Prob.}(\text{Return} - \text{Average Return})^2}$$

Q. 3. You have estimated the following probability distribution of expected future return for Stocks X and Y.

Stock X		Stock Y	
Probability	**Return**	**Probability**	**Return**
0.1	- 10%	0.2	2%
0.2	10	0.2	7
0.4	15	0.3	12
0.2	20	0.2	15
0.1	40	0.1	16

(a) What are the expected rate of return for Stock X ? Stock Y?

(b) What is the standard deviation of expected returns for Stock X ? For Stock Y ?

(c) Which stock would you consider to be riskier ? Why ?

Ans. (a) X=15%, Y=10%, (b) X=11.62%, Y=4.94%

Variance of Securities ⇒ **Square of Standard deviation is said to**

Co-efficient of Variation

- → It is a relative measure of risk and return. Standard deviation is a measure of risk and states the possible deviation/ variation in return of an asset.
- → On the other hand, C.V. is a measure of risk which states the proportion of deviation in return of a stock from its expected return.
- → Coefficient of variation is a better measure since it states the relationship between the risk and the expected return.

$$\text{Coefficient of Variation (C.V.)} = \frac{\text{Standard deviation } (\sigma)}{\text{Expecte mean } (\bar{x})}$$

$$\textbf{Coefficient of Variance} = \frac{\sigma}{X} = \frac{\text{std.deviation}}{\text{mean}}$$

Co-Variance covers been two Securities = Co-Movement of two Securities

Q. 4. An investor is evaluating two securities A & B in terms of their risk and return. The expected returns and standard deviations for both the investments are as follows:

	A	**B**
Expected Return, r,	12%	20%
Standard Deviation	9	10

Advise the investor.

Ans. CV of A=75% CV of B=50%

Covariance

- → It is the co-movement of two variables together.
- → In the relation to security market, co-variance is a measure of interactive risk between return of two securities or portfolio & market.
- → Co-variance helps in determining the pattern of co-movement of two variables.
- → Covariance establishes whether two variables are moving in same direction or opposite direction or do not have a co-movement at all.
- → If covariance is +ve, it implies that the both the variables move in the same direction and hence have a +ve correlation (r).
- → If covariance is -ve , then it can be established that both the variable move in different directions i.e. correlation is –ve.

Co-Variance covers been two Securities = Co-Movement of two Securities

Co-Variance covers been two Securities = Co-Movement of two Securities

When Prob. & return is given ⇒ $\text{Cov (xy)} = \Sigma P\left[X - E(X)\right]\left[Y - E(Y)\right]$

When return without Probability is given ⇒ $\text{Cov (xy)} = \Sigma \frac{(X - \bar{X})(Y - \bar{Y})}{n}$

Using Correlation ⇒ $\text{Cov (AB)} = r_{AB}\sigma_A\sigma_B$

- → It is a relationship between return of two variables and varies (–) 1 to (+) 1.
- → Positive correlation means that return of two securities move in the same directions.
- → Negative correlation means that return of two securities move in the different directions.
- → Zero correlation means that the there is no co-movement between the return of two securities.

$$r_{AB} = \textbf{Correlation Co-efficient} = \frac{\text{Cov(AB)}}{\sqrt{V(X) \cdot V(Y)}} = \frac{\text{Cov(AB)}}{\sqrt{\sigma_A^2 \sigma_B^2}}$$

$$r_{AB}\frac{\text{Cov(AB)}}{\sigma_A\sigma_B}$$

Correlation Co-efficient (r_{AB}) ⇒ **The dimension of relationship between two securities A & B**

Q. 5. A person wants to invest in two securities out of these three securities which of these two are selected.

Returns from three securities

Year	Security A	Security B	Security C
1	15	14	11
2	11	15	20
3	18	17	12
4	17	16	19
5	19	18	18
	80	80	80

Ans. r**AB**=0.75, **r**BC=0.22, rac=0.26

Portfolio Return & Portfolio Risk

1. when information about proportion of investment is given

$$\textbf{Average return of the portfolio} = \frac{R_1W_1 + R_2W_2 + R_3W_3 + \ldots\ldots\ldots\ldots + R_nW_n}{W_1 + W_2 + W_3 + \ldots\ldots\ldots\ldots\ldots + W_n}$$

where, R is return of the security and W is proportion of the securities

3. Portfolio Standard Deviation or Portfolio Risk of two Securities A & B

$$\textbf{Portfolio Standard Deviation} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)^2 (\sigma_B W_B)^r AB}$$

W = weight, $\mathbf{r_{AB}}$ = Coefficient of Correlation

Case A = If Sec A & Sec B are perfectly **+ve** correlation i.e. $\mathbf{r_{AB} = 1}$

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)(\sigma_B W_B)1}$$

$(a^2 + b^2 + 2ab) = (a+b)^2$

$$= \sqrt{(\sigma_A W_A + \sigma_B W_B)^2} = \sigma_A W_A + \sigma_B W_B$$

Case-B When Sec-A & Sec-B are perfectly **-ve** Correlation i.e. $\mathbf{r_{AB} = -1}$

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + 2(\sigma_A W_A)(\sigma_B W_B)-1}$$

Portfolio Risk = $\mathbf{\sigma_A W_A - \sigma_B W_B}$

Case–C If one of the Securities is Market & other Security is Risk free

$$\textbf{Portfolio Risk} = \sqrt{(\sigma_M W_M)^2 + (\sigma_{Rf} W_{Rf})^2 + 2(\sigma_M W_M)(\sigma_{Rf} W_{Wf}) r_{mRf}}$$

$$= \sqrt{(\sigma_M W_M)^2 + 0 + 0} = \mathbf{\sigma_M W_M}$$

Portfolio Risk – When Portfolio consists 3 Securities

⇩

$$\sqrt{(\sigma_A W_A)^2 + (\sigma_B W_B)^2 + (\sigma_c W_c)^2 + 2(\sigma_A W_A)(\sigma_B W_B) r_{AB} + 2(\sigma_A W_A)(\sigma_c W_c) r_{AC} + 2(\sigma_B W_B)(\sigma_c W_c) r_{BC}}$$

6. The securities A and B have the expected returns and standard deviations given below. Correlation between expected returns in 0.10.

	Return	**S.D.**
A	14%	20
B	9%	30

Compute the return and risk, for each of two portfolio (i) A 60 per cent, B 40 per cent (ii) A 50 percent & B 50 percent [(i) Risk 17.8; (ii) Risk 12, Return 11.5 Return 18.84].

Q. 7. Consider the following information:

Investor	Investment Objectives
A	* Earn a return of 18% * Can assume relevant risk for 18% return
B	* Can assume a risk upto a variance in return of 250(%)^2

Further it is gathered that

Risk Free Interest Rf = 7%

Return on Market portfolio, Rm = 15%

Standard Deviation in the return on Market portfolio, m = 20%

You are required to find

(a) Risk level (Standard Deviation) of portfolio constructed by investor A.

(b) Expected level of return earned by the portfolio constructed by investor B.

Ans. (a) 27.5% (b) 13.324%

Q. 8. You are able to both borrow and lend at the risk – free rate of 9%. The market portfolio of securities has an expected return of 15% and a standard deviation of 21%.

Determine the expected return and standard deviations of the following portfolios:

(a) All wealth is invested in the risk – free asset.

(b) One third is invested in the risk – free asset and two thirds in the market portfolio.

(c) All wealth is invested in the market portfolio. Furthermore, you borrow an additional one third of your wealth to invest in market portfolio.

Ans. (a) 9%, S.D.O. (b) 13%, S.D. = 14%, (c) 17%, S.D=14%

B (BETA)

β is Market Sensitivity which represents the movement in Securities return due to movement in market return. In India, Market is represented by **Sensex** & **Nifty**

Measure of Beta (β) Coefficient:-

- → In order to measure systematic risk exposure of a capital asset, Beta coefficient (β) is used.
- → Beta shows the securities of a stock in relation to the market sensitivity
- → Beta is computed in number of times
- → Beta shows the deviation or movements of a stock or capital asset in relation to the movement or deviation in the stock market
- → Beta coefficient of a risk free asset in nil.
- → Beta of market is 1.
- → Beta coefficient of a stock can be nay amount
- → If beta of stock/portfolio is less than 1, then it can be calculated that the responsiveness or sensitivity or movement or deviation of the stock is less than the market movement.
- → If however, the beta of stock/portfolio is more than 1, then it can be calculated that the stock is more sensitive than the market.

Beta of a Securities = β = Market Sensitivity Index = Beta Coefficient

Beta represents moment of particular securities due to moment of market.

$$\beta_S = \frac{Cov(SM)}{\sigma_M^2} = \frac{r_{SM} \cdot \sigma_M \sigma_S}{\sigma_M^2}$$

$$\beta_S = \frac{r_{SM}\sigma_S}{\sigma_M}$$

Portfolio $\beta = \beta_A W_A + \beta_B W_B + \ldots.$

(ii) Market $\beta = \frac{Cov(MM)}{\sigma_M^2} = \frac{\sigma_M^2}{\sigma_M^2} = 1$

Q. 9. The following are the returns and their probabilities in respect of the security, S, and the market portfolio, M. Calculate:

Probabilities	Return %	
	S	M
.3	10	11
.4	16	20
.3	32	19

Ans. ß=1.3

OVERALL BETA

Beta Assets / Beta Company / Beta Projects / Overall Beta

Beta Equity $\left[\beta_{EQUITY}\right]$

(i) β_{Equity} is risk of equity shareholder due to investment in the Company. (ii) β_{Equity} is always greater than β_{assets}. (iii) In the case of 100% equity Company. → $\beta_{Assets} = \beta_{Equity}$

Beta Debt

(i) β_{debt} is risk of debt holder due to investment in the Co. If there is no information about $\beta_{debt.}$ It is assumed zero. Because debt holders received fix interest & it does not depend upon profit or loss (However, in real world. It is not true that β_{debt} is risk free because many Companies make default in repayment of debt & interest.)

$$\beta_{ASSETS} = \beta_{COMPANY} = \beta_{PROJECT} = \text{OVERALL}\,\beta$$

It represents overall risk of the Company related to the business operation. It is weighted average β of equity & debt .It is not effected by capital structure. i.e.

(1) When Weight of debt ↑, Risk of Equity ↑, β_{equity} ↑, but β_{assets} remains same.

(2) When Weight of Debt ↓, risk of equity ↓, β_{equity} ↓, but β_{assets} remains same.

β_{assets} of same class of business risk Industry is always same like β_{Assets} of **Vodafone** = β_{Assets} of **Idea** = β_{Assets} of **MTNL** = β_{Assets} of **BSNL . . . .** = but β_{Equity} depends of Capital Structure (Debt & Equity Proportion)

$$\beta_{ASSETS} = \beta_{EQUITY}\left[\frac{\text{Equity}}{\text{Debt}(I-\text{Tax Rate})+\text{Equity}}\right] + \beta_{DEBT}\left[\frac{\text{Debt}(I-\text{Tax Rate})}{\text{Debt}(I-\text{Tax Rate})+\text{Equity}}\right]$$

↓ Weight of Equity ↓ Weight of Debt

Case–I If there is no information about β_{Debt}. It is assumed, β_{Debt} = Zero

$$\beta_{ASSETS} = \beta_{EQUITY}\left[\frac{\text{Equity}}{\text{Equity}+\text{Debt}(I-\text{Tax Rate})}\right] + 0$$

Case – II If the information of Tax is not given then it is ignored.

$$\beta_{ASSETS} = \beta_{EQUITY}\left[\frac{\text{Equity}}{\text{Equity}+\text{Debt}}\right] + \beta_{Debt}\left[\frac{\text{Debt}}{\text{Equity}+\text{Debt}}\right]$$

Case – III If a Company has three Projects, **Project-A** (**Cement Industry**) + **Project-B** (**Iron & Steel Industry**) + **Project-C** (**Textile Industry**)

$$\beta_{ASSETS} = \beta_A W_A + \beta_A W_b + \beta_C$$

Q.10. A project had an equity beta of 1.2 and was going to be financed by a combination of 30 percent debt and 70 percent equity.

Assuming debt – beta to be zero, calculate the Project beta taking risk free rate of return to be 10 percent and return on market portfolio at 18 percent. Ignore tax.

Ans. Assets = 0.84 Ko = 16.72%

Q.11. **Given:** Equity Beta 0.90, Debt Beta 0. Tax Nil. Debt: Equity .50/.50. What will be new equity Beta is debt / equity is changed to 0.30 / .70 by issuing additional equity at Market price to redeem 40 percent of existing Debt ?

What will be your answer if tax rate is 40 percent.

Ans. BAsse = 0.45 BExuty = 0.64 Bass=0.5625, Bequity=0.7077

Q.12. If ABC Ltd. an all equity firm which pays NIL tax and having equity beta 0.70 decided to buy back 50% of its equity share by borrowing an amount through debts. If debts are risk free and its required return is 10%. What is ABC Ltd. equity beta after such buy back?

CAPITAL ASSETS PRICING MODEL

Capital Asset Pricing Model (C.A.P.M.)

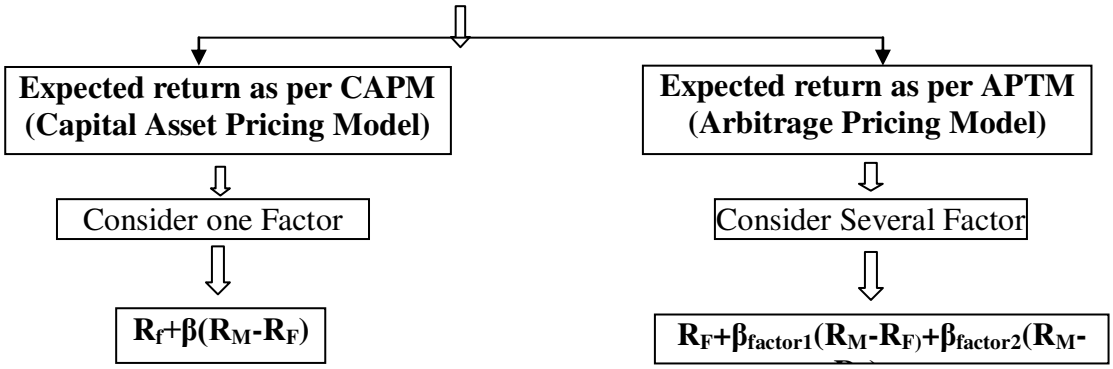
The work done by Markowitz was extended by William shape, John Linter and John Mossin independently through the development of the capital assets pricing model (CAPM).

Infect, Sharpy shared the model price for economics in 1990 with Markowitz and Miller, for his contribution to the development of CAPM. CAPM categories risk into 2 types, namely:

1. Systematic Risk
2. Unsystematic Risk

Systematic Risk	Un-Systematic Risk
1. Systematic risks are also known as market risk or non-diversiable risk	Unsystematic risk can also be called specific risk or diversiable risk.
2. These risks are beyond the control of the management entity	Such risks are within the purview and control of the management.
3. Such risk affects all companies.	Only a particular security gets hit by it.
4. Systematic risk cannot be removed by diversification.	Diversification can surely act as a means to combat unsystematic risk.
5. Taxation policies, inflation, interest rates are examples of systematic risk.	Increase in competition, industrial dispute, change in management are illustrations of unsystematic risks
Systematic Risk $= \left[\sigma_M^2 \times \beta_S^2\right]$ $= \sigma_M^2 \left(\frac{Cov \cdot (SM)}{\sigma_M \cdot \sigma_M}\right)^2 = \frac{\sigma_M^2 \cdot Cov^2(SM)}{\sigma_M^2 \cdot \sigma_M^2}$ $= \frac{r_{SM}^2 \cdot \sigma_M^2 \cdot \sigma_S^2}{\sigma_M^2} = r_{SM}^2 \cdot \sigma_M^2$ **Example of Systematic Risk** We can say that the risk of falling CS student due to the reduced **"%"** result by ICSI's Systematic risk for CS students it can not reduce by Students own efforts	Un Systematic Risk = Total Risk – Systematic Risk $= \sigma_S^2 - r_{SM}^2 \cdot \sigma_S^2$ $= \sigma_S^2 \left(1 - r_{SM}^2\right)$ **Example of Un-systematic Risk** We can say that the risk of falling CS student due to inadequate & unbalanced Preparation of all subjects is Un-Systematic Risk for CS student & it can be reduced

5. **Required return considering Risk factor**



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Arbitrage Pricing Theory (APT)

- → This theory was proposed by Richard Ross.
- → The CAPM is a single factor model.
- → The APT proposes that the relationship between risk and returns is more complex and may be due to multiple factors such as GDP growth, expected inflation and individual production.

Required Return for stock under the APT

$E(R_i)$ = Rf + b1 (Risk premium for factor 1) +
b2 (risk premium for factor 2) +…….t
bn (risk premium for factor n)
or

$E(Ri) = Rf + (r_1 – Rf)\ b_1 + (r_2 – Rf)\ b_2 + \ldots\ldots\ldots + (r_n – Rf)\ b_n$

Capital Assets Pricing Model = CAPM

It provides the expected return on a Stock on the basis of risk taken by Investor

On Security	On Portfolio
Expected Return = $R_f + \beta_{Security}\ (R_M - R_f)$ R_f = Risk free rate of return $\beta_S\ [R_M - R_f]$ = Risk Premium Security $R_M - R_f$ = Market Risk Premium	Expected Return = $R_f + \beta_{Portfolio}\ (R_M - R_f)$ $\beta_{Portfolio} = \beta_A W_A + \beta_B W_B + \beta_C W_C + \ldots.$ $\beta_{Portfolio}\ [R_M - R_f]$ = Risk Premium on Portfolio $R_M - R_f$ = Market Risk Premium

It is academic Model which guides the Investor whether Securities should purchase, hold & sale.

Under Valued & Over Valued Stocks

Case - I- Expected return as per **CAPM** < Expected / Available return. It means Investor expects lower as per Risk taken by Investor than Stock Actual gives therefore Securities should purchase. It is said to be **Undervaluation.**

Case - II- Expected return as per **CAPM** > Expected /Available return. It means Investors expects higher than stocks Actual gives therefore Securities should Sale. It is said to be Over Valuation.

Case - III- Expected return as per **CAPM** = Expected Available return. It means Investors expects equal to Stock. Therefore Securities should hold. It is said to be Correctly.

Q.13. Assume
I_{RF} = 9%
R_M = 18%
If a security has a beta factor of (a) 1.4, (b) 1.0 or (c) 2.3, find out the expected return of the security.

Ans. 21.6%, 18%, 29.7%

Q.14. Beta 1.08, RF 10 percent, RM 15 percent, dividend per share expected at the year – end `2.00. Dividend is likely to grow at 11 per cent p.a. for years to come. Market price of share ?

Ans. M.P. = `45.45

Q.15. A company's capital structure companies share capital having market value of `8 million plus `5 million loan. The debt beta coefficient may be assumed to be 0.25. The current risk – free rate is 8 percent and the market rate of return is 16 per cent. Equity Beta = 1.40, Find Ko. Ignore Tax.

Required:

(1) What is overall Beta ? **Ans.** 0.9575

(2) Estimate Ko. **Ans.** 15.66%

Performance Index

In order to measure the level of performance of various portfolio managers, a performance index may be computed for various manager as follows:

$$PI \frac{\text{Avg. Return of portfolio}}{\text{Reqd. Return as per CAPM}}$$

If PI < 1, the portfolio managers had under performed

If PI > 1, the portfolio managers performance is good at equal to 1, if is upto the mark (satisfactory)

Q.16. The results of four portfolio managers for a 5 – year period are as follows: (RF 8%, RM 14%)

Portfolio Manager	Average Return (%)	Beta
A	13	0.80
B	14	1.05
C	17	1.25
D	13	0.90

Select the manager with best performance.

Ans. Best C

Q.17. As an investment manager you are given the following information:

	Initial price (`)	Dividends (`)	Market Price at the end of the year	Beta risk factor
Cement Ltd. (E shares)	25	2	50	0.8
Steel Ltd. (E. shares)	35	2	60	0.7
Liquor Ltd. (E shares)	45	2	135	0.5
Govt. of India Bonds	1,000	140	1,005	0.99

Risk free return may be taken at 14%

You are required to calculate:

(i) Expected rate of return of investment in each using CAPM.

(ii) Average return of portfolio.

Ans. (i) 23.86%, 22.63%, 2017%, 26.21 (ii) 23.21%

Q.18. XYZ Ltd. pays no taxes and is entirely financed by equity shares. The equity share has a Beta of 0.6, and is priced to offer an expected return of 20 per cent, XYZ Ltd. now decides to buy – back half of the equity shares by borrowing an equal amount. If the debt yields a risk free return of 10 per cent, calculate:

(i) The Beta of the equity shares after the buy – back.

(ii) The required return and risk premium on the equity shares before the buy – back.

(iii) The required return and risk premium on the equity shares after the buy back.

(iv) The required return on debt.

(v) The percentage increase in expected earnings per share.

(vi) The new price – earning multiple.

Assume that the opening profit of the firm is expected to remain constant in perpetuity.

Ans. (i) 1.2, (ii) 10% (iii) 16.67%, 30% (iv) 10% (v) 10% (v) 50% (vi) 5 time 3.33 hrs.

Q.19. Security S.D. = 0.030
Market S.D. = 0.022
Coefficient of correlation for security for market = 0.80.
Find Beta of Security.

Ans. B=1.09

Q.20. The following data relate to four different portfolios:

Portfolio	**Expected Rate of Return**	**S.D. of Returns from from Portfolios**
A	11%	6.7
B	14%	7.5
C	10%	3.3
D	15%	10.8

The expected return on market portfolio is 8.50 per cent with a standard deviation of 3. The RF is 5 percent. Comment on each of these portfolios.

Q.21. A senior citizen has `500000 to invest. He wants to invest this amount in different securities. He wants that Beta of his portfolio should be 0.90. He selected 5 securities having average Beta of 1.20. How he can weight his portfolio to reach his target Beta ?

Q.22. The following data relating to two securities A and B.

	A	**B**
Expected Return	22%	17%
Beta Factor	1.5	0.7

Assume: I_{RF} = 10, and R_M = 18%
Find out whether the securities, A and b are correctly priced ?

Ans. 22%, 15.6%

Q.23. The following information is available in respect of security X and Y.

Security	**Beta**	**Expected Return**
X	1.8	22.00%
Y	1.6	20.40%

If the risk free rate is 7%, are these securities correctly priced ? What would the risk free rate has to be if they are correctly priced ?

Ans. RM = 15.3%, Rf=7.6%

Q.24. The Vantage Investment Fund as a total investment of $ 400 million in the five stocks:

Stock	**Investment (in million)**	**Stock's Beta Coefficient**
A	$120	0.5
B	100	2.0
C	60	4.0
D	80	1.0
E	40	3.0

The beta coefficient for a fund such as this can be found a weighted average of the betas of the funds' investments. The current risk – free rate is 7%, and the market return has the following estimated probability distribution for the next year.

Probability	**Market Return**
0.1	8%
0.2	10
0.4	12
0.2	14
0.1	16

Compute the required rate of return on the Vantage Investment Fund. Suppose management receives a proposal to buy a new stock. The investment needed to take a

position in the stock is $ 50 million, it will have an expected return of 16%; and its estimated beta coefficient is 2.5. Should the new stock be purchased ? At what expected rate of return would management be indifferent to purchasing the stock ?

Ans. 16%, No

Q.25. XYZ Ltd. wishes to buy `1 million of shares in each of two companies from a choice of three companies that it might wish to acquire at some future date. The companies are in different industries. Historic five-year data on the risk and return of the three companies are shown below:

	Average annual returns	**Standard deviation of**
P Ltd.	11%	17%
Q Ltd.	20%	29%
R Ltd.	14%	21%
	Correlation coefficients between returns	
P Ltd. and Q Ltd.	0.00	
Q Ltd. and R Ltd.	0.40	
P Ltd. and R Ltd.	0.62	

An adviser to XYZ Ltd. has suggested that the decision about which shares to buy should be based upon selecting the most efficient portfolio of two shares.

Required: Estimate which of the possible is the most efficient.

Ans. C.V PQ, QR & RP = 1.08, 1.24 & 1.37

Q.26. The total market value of the equity of X Ltd. is pound 6 million and the total value of its debt is pound 4 million. The beta value of the equity is estimated to be 1.5 and the expected market risk premium is 10%. The risk – free rate of interest is 8%.

(a) What is the required return on the X Ltd. equity ?
(b) What is the beta company's existing portfolio of assets ?
(c) Estimate the company's cost of capital.
(d) Estimate the discount rate for an expansion of the company's present business.
(e) Suppose that the company replaces pound 3 million debt with equity. Does the beta of the equity change ?
(f) What would the company cost of capital be now ?
(g) If the company wishes to diversify into another industry with a beta of 1.2, what would be the required rate of return ?

Ans. (a) 23%, (b) 0.9, (c) 17% (d) 17% (e) 1 (f) 17% (g) 20%

Q.27. The average equity beta value for a group of similar companies in the motor industry is 1.32; their average debt to equity ration is 0.20. The debt – to – equity ratio of Arden Motors is 0.30 while the risk – free rate of return is currently 12%. The market risk premium can be assumed to be 9%.

(a) What is the required return on the assets of Arden Motors ?
(b) What is the required return on the equity of Arden Motors ?

Ans. (a) 21.9% (b) 24.87%

Q.28. Midland Industries has three operating divisions:

Division	**Percentage of firm value**
Food	50
Chemicals	30
Machine Tools	20

The Finance Director wishes to estimate divisional costs of capital and has indemnified three companies carrying out similar activities:

	Equity Beta	**Debt / Equity**
Accumulated Foods	0.9	0.40
Studge Chemicals	1.2	0.25
Chunky Tools	1.4	0.50

(a) Estimate assets betas for each of Midland's divisions on the assumption that debt can be regarded as risk free.
(b) If Midlands' debt to equity ratio is 0.25 what is its equity beta?
(c) If the risk – free rate of return is 10% and the expected return on the market is 18%, what is the cost of capital for each of Midland's divisions?
(d) How reliable do you consider the costs of capital calculated in (c)?

Ans. (a) 0.7961 (b) 0.995 (c) 15.144%, 17.68, 17.74%

Q.29. M/s. V Steels Limited is planning for a diversification project in Automobile Sector. Its current equity beta 1.2, whereas the automobile sector has 1.6. Gearing of automobile sector is 30% debts, 70% equity. If equity expected market return is 25%, risk free debt is 10% and taxation rate is taken as 30% and also that corporate debt is assumed to be risk free, compute suitable discount rate under the following situations:

(i) Project financed by equity only,
(ii) By 30% debt and 70% equity
(iii) By 40% debt and 60% equity.

Ans. (i) 28.45% (ii) 25.9% (iii) 25.06%

Weight for Minimum Risk

Weight for Minimum risk of Portfolio A & B.

When Securities A & B has Perfectly – Ve Correlation

$$W_A = \frac{\sigma_B}{\sigma_A + \sigma_B}$$

$$W_B = \frac{\sigma_B}{\sigma_A + \sigma_B}$$

When Securities A & B has other than Perfectly - Ve Correlation

$$W_A = \frac{\sigma_B^2 - Cor(AB)}{\sigma_A^2 + \sigma_B^2 - 2Cor(AB)}$$

$$W_B = \frac{\sigma_A^2 - Cor(AB)}{\sigma_A^2 + \sigma_B^2 - 2Cor(AB)}$$

Q.30. L Ltd. and M Ltd. have the following risk and return estimates

RL = 20% RM = 22%
OL = 15% OM = 18%
(Correlation coefficient) RLM = -1

Calculate the proportion of investment in L Ltd. and M Ltd. to minimize the risk of portfolio and compute the risk and return .

Q.31. Return and risk on shares P and Q are as under :

	Expected Return	**Standard Return**
Stock P	16%	25%
Stock Q	18%	30%

What is the expected return of a portfolio is constructed to drive the standard deviation return to Zero ?

Q.32. P Ltd. and Q Ltd. have low positive correlation coefficient of +0.5 .Their respective risk and return profile is as under

Rp = 10% Rq = 15%
Op = 20% Oq = 25%

Compute the £ of P and Q to minimize risk and compute the risk and return

Q.33. An investor holds two equity shares X and Y in equal proportion with the following risk and return characteristics :

	X	**Y**
Expected Return(%)	24	19
Standard Return (%)	28	23

The returns of these securities have a positive correlation of 0.6. You are required to calculate the portfolio return and risk. Further, suppose that the investor wants to reduce the risk to 15 percent. How much should the correlation be to bring the portfolio risk to the desired level?

Proxy Beta

In case of company ventures into a new product lines or securities of which it has no past experience, then it does not have its own beta of that business and hence can not determine the required rate of return from that business.

In such case, the beta (β) of the existing companies/ industries may be used for determining the required rate of return from the said business.

Steps to determine required return on equity of proposed business.

(i) Compute β with the industry / Proxy Co. β.

(ii) the β (if it is desire to take debt), in accordance with the desired debt equity ratio (if any)

(iii) Compute Ke applying CAPM equation.

Q.56. Excellent Ltd. is a frozen food packing company and is looking to diversity its activities into the electronics business .the project it is considering has a return of 18% Excellent Ltd. is trying to decide whether the project should be accepted or not .To help it decide it is going to use the CAPM .The company has a find a proxy beta for the period and has the following information on three companies in the electronics business :

(a) Superior Ltd. Equity beta of 1.33 .Financed by 50% debt and 50% equity

(b) Admirable Ltd. Admirable Ltd. has an equity beta of 1.30 but it has just taken on a totally unrelated project accounting for 20% of the company's value ,that has an asset beta of 1.4 .the company financed by 40% debt and 60% equity.

(c) Meritorious Ltd. Equity beta of 1.05 financed by 35% debt and 65% equity

Assume tax rate 35%

Moving Average

(1) Moving average are one of the most popular easy to use tools available is the technical analyst. They make it easier to spot trends in volatile markets.

(2) The term "Moving" refers to the method of calculation which takes the average value due a fixed period of time and adds the latest period data to the calculation of the average while dropping the first period of the calculation so that the any continues to be calculated by the same number of periods but moves with each new period of data that occurs.

(3) Thus, the average "Moves" along with prices day-to-day fluctuations are reduced in importance, what remains is a stronger indication of the trend of prices over the period being analyzed.

(4) A longer moving average is smoothed more than a smaller moving average with each new days data making lees impact on the calculation of the moving average value.

(5) There are a number of different types of moving averages that have been developed by technical analysis in the study of trends:-

a. Simple Moving Average (SMA):-
SMA is calculated by adding the closing price of a security for a number of time periods and then dividing this total by the number of the time periods.
The SMA weights all past data equally.

Exponential Moving Average (EMA)

An exponential moving average gives more weight to recent price, and is calculated by applying a percentage of today's closing price to yesterday's moving average. The longer the period of EMA, the less total weight is applied to the most recent price. The advantage of EMA is its ability to pick up on price changes more quickly.

Calculation of EMA:

$$\frac{\text{EMA}}{(\text{Current})} = \left[\left(\frac{\text{Price}}{(\text{Current})} - \frac{\text{EMA}}{(\text{Previous})}\right) \times \text{Multiplier}\right] + \frac{\text{EMA}}{(\text{previous})z}$$

"Multiplier" or Exponent = $\frac{2}{(\text{Time period} + 1)}$

Linear Weighted Moving Average(LWMA)

A LWMA assigns more weight to the recent price. Generally \, this is better for together teem moving average because it allocate more weight to current price.

The LWMA is more sensitive than the SMA. It reacts to current prices quicker, similar to the EMA works.

Use of Moving Average:

1. If the moving averages is rising, the trend is considered up.
   If the moving average is declining, the trend id considered down.
   The direction of a moving average can be determined simply by looking at a plot of the moving average.
2. If the price above the m moving average, the trend is considered up.
   If the price is below the moving average, the trend is considered down.
3. If the shorter moving average is above the longer moving average, trend is considered up. If the shorter moving average is below the longer moving average the trend is considered down.
4. Another use of moving average is to identify the support and resistance levels based on historical precedent.

STUDY MATERIAL QUESTIONS OF CA FINAL

Q.34. The following information is available with respect of Jaykay Ltd.

Year	Jay Kay Limited		Market		Return on Govt. Bond
	Average Share Price (`)	DPS (`)	Average Index	Dividend Yield (%)	
2002	242	20	1812	4	6
2003	279	25	1950	5	5
2004	305	30	2258	6	4
2005	322	35	2220	7	5

Compute Beta Value of the company as at the end of 2005. What is your observation?

(i) The.

(ii) The.

Ans. Beta value of Co = 0.15.

Q.35. The following details are given for X and Y companies' stocks and the Bombay Sensex for a period of one year. Calculate the systematic and unsystematic risk for the companies' stocks. If equal amount of money is allocated for the stocks what would be the portfolio risk?

	X Stock	Y Stock	Sensex
Average return	0.15	0.25	0.06
Variance of return	6.30	5.86	2.25
β	0.71	0.685	
Correlation Co-efficient	0.424		
Co-efficient of determination (r^2)	0.18		

Ans. Company X: Sys, Risk = 1.134, Unsys Risk = 5.166; Company Y: Sys, Risk = .1640, Unsys Risk = 5.696; Portfolio risk = 3.256.

Q.36. Data for finding out the optimal portfolio are given below:

Security Number	Mean Return	Excess Return	Beta	Unsystematic Risk	Excess Return to Beta
	R_i	$Ri- R_f$	β	$\sigma^2_{\in i}$	$\frac{R_i - R_f}{\beta_i}$
1	19	14	1.0	20	14
2	23	18	1.5	30	12
3	11	6	0.5	10	12
4	25	20	2.0	40	10
5	13	8	1.0	20	8
6	9	4	0.5	50	8
7	14	9	1.5	30	6

The riskless rate of interest is 5 per cent and the market variance is 10. Determine the cut-off point.

Ans. Cut off rate 8.29

Q.37. Information about return on an investment is as follows:

(a) Risk free rate 10% (b) Market Return is 15% (c) Beta is 1.2
- (i) What would be the return from this investment?
- (ii) If the projected return is 18%, is the investment rightly valued?
- (iii) What is your strategy?

Ans. (i) Req. Ret = 16% (ii) Stock is under value (iii) Buy.

Q.38. The expected returns and Beta of three stocks are given below

Stock	**A**	**B**	**C**
Expected Return (%)	18	11	15
Beta Factor	1.7	0.6	1.2

If the risk free rate is 9% and the expected rate of return on the market portfolio is 14% which of the above stocks are over, under or correctly valued in the market? What shall be the strategy?

Ans. Over V. = stock B, Under V. = Stock A, Correctly V. = Stock C; [Strategy = Buy A, Sell B, hold C].

Q.39. A company's beta is 1.40. The market return is 14%. The risk free rate is 10% (i) What is the expected return based on CAPM (ii) If the risk premium on the market goes up by 2.5% points, what would be the revised expected return on this stock?

Ans. Expected return = 15.6%, (ii) revised R = 19.1%.

Q.40. Treasury Bills give a return of 5%. Market Return is 13% (i) What is the market risk premium (ii) Compute the β Value and required returns for the following combination of investments.

Treasury Bill	100	70	30	0
Market	0	30	70	100

Ans. Market Risk Premium = 8%, (ii) β = 0, 0.3, 0.7, 1; Required Return = 5, 7.4, 10.6, 13%.

Q.41. Pearl Ltd. expects that considering the current market prices, the equity share holders should get a return of at least 15.50% while the current return on the market is 12%. RBI has closed the latest auction for Rs 2500 crores of 182 day bills for the lowest bid of 4.3% although there were bidders at a higher rate of 4.6% also for lots of less than Rs 10 crores. What is Pearl Ltd's Beta?

Ans. Beta = 1.464.

Q.42. An investor is seeking the price to pay for a security, whose standard deviation is 3.00 per cent. The correlation coefficient for the security with the market is 0.8 and the market standard deviation is 2.2 per cent. The return from government securities is 5.2 per cent

and from the market portfolio is 9.8 per cent. The investor knows that, by calculating the required return, he can then determine the price to pay for the security. What is the required return on the security?

Ans. Required return = 10.22%.

Q.43. The following data are available to you as a portfolio manager:

Security	Expected Return	Beta	Standard Deviation
O	0.32	1.70	0.50
P	0.30	1.40	0.35
Q	0.25	1.10	0.40
R	0.22	0.95	0.24
S	0.20	1.05	0.28
T	0.14	0.70	0.18
Composite Index	0.12	1.000	0.20
T-Bills	0.80	0.00	0.00

(i) In terms of a security market line (SLL), which of the securities listed above are undervalued? Why?

(ii)) Assume that a portfolio is constructed using equal portions of the six stocks listed above.

(a) What is the expected return of such a portfolio?

(b) What would the expected return if this portfolio was increased by 40% through borrowed funds with the cost of borrowing at 12%?

Ans. (i) All the securities listed above are under valued because their expected returns plot above the SML (ii) (a) Expected (i.e. Available) return = 0.2383; (b) Expected return = 0.28562.

Q.44. Assuming that two securities X and Y are correctly priced on SML and expected return from these securities are 9.40% (Rx) and 13.40% (Ry) Respectively. The Beta of these securities are 0.80 and 1.30 respectively.

Mr. A, an investment manager states that the return on market index is 9%.

You are required to determine ,

(i) Whether the claim of Mr. A is right. If not then what is correct return on market index.

(ii) Risk Free Rate of Return.

Q.45. Two companies are identical in all respects except capital structure. One company AB Ltd. has a debt equity ratio of 1 : 4 and its equity has a β (beta) value of 1.1. The other company XY Ltd. has a debt equity ratio of 3 : 4. Income tax is 30%. Estimate β (beta) value of XY Ltd. given the above.

Ans. Beta = 1.43

Q.46. XYZ is at present engaged in production of short shoes and has a debt equity ratio of .80. its present cost of debt funds is 14% and it has a marginal tax rate of 60%. The company is proposing to diversify to a new field of adhesives which is considerably different from the present line of operations.

XYZ is not well conversant with the new field. The company is not aware of risk involved in area of adhesives but there exists another company PQR, which is a representative company in adhesives. PQR is also public limited company whose shares are traded in the market. PQR has a debt to equity ratio of .25, a beta equity of 1.15 and an effective tax rate of 40%.

(i) Calculate the risk is involved for XYZ Limited if the company enters into the business of adhesives.

(ii) In case risk free rate at present is 10% and expected return on market portfolio is 15% what return XYZ Limited should require for the new business if it uses a CAPM approach and XYZ employs same amount of leverage.

Ans. (a) Risk involve = 1, (b) 11.71%

Q.47. An Indian investor invest in a bond n America. If the price of the bond in the beginning of he period is $ 100 and it is $ 105 at the end of the period. The coupon interest during the period is $ 7. The US dollar appreciates during this period by 3%. Find the return on investment in terms of home country currency.

Ans. Return on investment = 15.36%.

Q.48. An Indian investor invest in American and British securities in the proportion of 75% and 25%. The expected return is 15% from the former and 12% from the latter. The risk manifesting in variance is 15% in US securities and 18% in UK securities. Correlation is 0.6. Determine the Portfolio Return and Portfolio Risk.

Ans. Portfolio return = 14.25%, Portfolio Risk = 14.41%

Q.49. Following information is available regarding four mutual funds:

Mutual Fund	Return	Risk (σ)	β (Beta)	Risk free rate
P	13	16	.90	9
Q	17	23	.86	9
R	23	39	1.20	9
S	15	25	1.38	9

Evaluate preference of these mutual funds using Sharp Ratio and Trevnor's Ratio. Comment on the evaluation after ranking the funds.

PREVIOUS YEAR QUESTION (CA FINAL)

Q.50. **(Nov. 2009 Old):-** A stock costing `120 pays no dividends. The possible prices that the stock might sell for that the end of the year with the respective probabilities are:

Price	Probability
115	0.1
120	0.1
125	0.2
130	0.3
135	0.2
140	0.1

Required:

(i) Calculate the expected return.

(ii) Calculate the standard deviation of returns.

Ans. (i) Expected return = 7.08%, SD = 5.908.

Q.51. **(Nov. 2008 Old):-** Consider the following information on two stocks, A and B :

Year	Return on A (%)	Return on B (%)
2006	10	12
2007	16	18

You are required to determine:

(i) The expected return on a portfolio containing A and B in the proportion of 40% and 60% respectively.

(ii) The Standard deviation of return from each of the two stocks.

(iii) The covariance of returns from the two stocks.

(iv) Correlation coefficient between the returns of the two stocks.

(v) The risk of a portfolio containing A and B in the proportion of 40% and 60%.

Ans. (i) Expected return = 14.2%; (ii) S.D: Stock A = 3%, Stock B = 3%.
(iii) Co. Var. = 9; (iv) Correlation co. = 1; (Risk portfolio = 3%

Q.52. (May. 2007 Old):- The historical rates of return of two securities over the past ten years are given. Calculate the Covariance and the Correlation coefficient of the two securities:

Years:	1	2	3	4	5	6	7	8	9	10
Security 1: (Return per cent)	12	8	7	14	16	15	18	20	16	22
Security 2: (Return per cent)	20	22	24	18	15	20	24	25	22	20

Ans. Co. Var. = -0.8, Correlation = -0.0605.

Q.53. (May. 2006 Old):- The distribution of return of security 'F' and the market portfolio 'P' is given below:

Probability	Return %	
	F	P
0.30	30	-10
0.40	20	20
0.30	0	30

You are required to calculate the expected return of security 'F' and the market portfolio 'P', the covariance between the market portfolio and security and beta for the security.

Ans. Expected R. "F" = 17%. "P" = 14%; Co. Var. = -168; Beta security = 0.636

Q.54. (Nov. 2009 Old):- A study by a Mutual fund has revealed the following data in respect of three securities:

Security	σ (%)	Correlation with Index, Pm
A	20	0.60
B	18	0.95
C	12	0.75

The standard deviation of market portfolio (BSE Sensex) is observed to be 15%.

(i) What is the sensitivity of returns of each stock with respect to the market?
(ii) What are the covariances among the various stocks?
(iii) What would be the risk of portfolio consisting of all the three stocks equally?
(iv) What is the beta of the portfolio consisting of equal investment in each stock?
(v) What is the total, systematic and unsystematic risk of the portfolio in (iv) ?

Q.55. (May 2012):- A has portfolio having following features:

Security	β	Random Error σ_{ei}	Weight
L	1.60	7	0.25
M	1.15	11	0.30
N	1.40	3	0.25
K	1.00	9	0.20

You are required to find out the risk of the portfolio if the standard deviation of the market index (σ_m) is 18%.

Q.56. (May 2010):- Ramesh wants to invest in stock market. He has got the following information about individual securities:

	Expected return	**Beta**	**σ^2_{ei}**
A	15	1.5	40
B	12	2	20
C	10	2.5	30
D	09	1	10
E	08	1.2	20
F	14	1.5	30

Market index variance is 10% and the risk free rate of return is 7%. What should be the optimum portfolio assuming no short sales?

Ans. Optimum portfolio A = 50.41%; B = 49.59%

Q.57. (Nov. 2009):- An investor holds two stocks A and B. An analyst prepared ex-ante probability distribution for the possible economic scenarios and the conditional returns for two stocks and the market index as shown below:

Economic scenario	Probability	Conditional Returns %		
		A	B	Market
Growth	0.40	25	20	18
Stagnation	0.30	10	15	13
Recession	0.30	-5	-8	-3

The risk free rate during the next year is expected to be around 11%. Determine whether the investor should liquidate his holdings in stocks A and B or on the contrary make fresh investments in them. CAPM assumptions are holding true.

Ans. Alfa A = 1.576%, Alfa B = 0.18%, Both the stocks have positive Alfa hence make fresh investment.

Q.58. (June 2009):- Mr. X owns a portfolio with the following characteristics:

	Security A	Security B	Risk Free security
Factor 1 sensitivity	0.80	1.50	0
Factor 2 sensitivity	0.60	1.20	0
Expected Return	15%	20%	10%

It is assumed that security returns are generated by a two factor model.

(i) If Mr. X has `1,00,000 to invest and sells short `50,000 of security B and purchases `1,50,000 of security A what is the sensitivity of Mr. X's portfolio to the two factors?

(ii) If Mr. X borrows `1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of `1,00,000 in security A and B in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?

(iii) What is the expected return premium of factor 2?

Ans. (i) Sensitive of portfolio: Factor 1 = 0.45, Factor 2 = 0.30

(ii) Sensitive of portfolio: Factor 1 = 0.90, Factor 2 = 0.60

(iii) Expected return premium: Factor 2 =5%

Q.59. (May 2011):- Mr. Tamarind intends to invest in equity shares of a company the value of which depends upon various parameters as mentioned below:

Factor	Beta	Expected value in %	Actual value in %
GNP	1.20	7.70	7.70
Inflation	1.75	5.50	7.00
Interest rate	1.30	7.75	9.00
Stock market index	1.70	10.00	12.0
Industrial production	1.00	7.00	7.50

If the risk free rate of interest be 9.25%, how much is the return of the share under Arbitrage Pricing Theory?

Ans. Return under APT = 17.40%.

Q.60. (May 2002 Old):- A project had an equity beta of 1.2 and was going to be financed by a combination of 30% debt and 70% equity. Assuming debt-beta to be zero, calculate the Project beta and required rate of return taking risk-free-rate of return to be 10% and return on market portfolio at 18%.

Ans. Project Beta = 0.84, required return = 16.72%.

Q.61. (Nov. 2011):- A portfolio Manager (PM) has the following four stocks in his portfolio:

Security	No. of shares	Market Price Per Share (`)	β
VSL	10,000	50	0.9
CSL	5,000	20	1.0
SML	8,000	25	1.5
APL	2,000	200	1.2

Compute the following:
(i) Portfolio beta.
(ii) If the PM seeks to reduce the beta to 0.8, how much risk free investment should he bring in?
(iii) If the PM seeks to increase the beta to 1.2, how much risk free investment should he bring in?

Q.62. During a year the price of British Gilts (face value £ 100) rose from £ 105 to £ 110, while paying a coupon of £ 8. At the same time the exchange rate moved from $/£ 1.80 to 1.70. What is the total return to an investor in USA who invested in this security?

Ans. 6.183%

Q.63. **(Nov 2010):-** Following is the historical Performance information is available of the capital market and a Tomplan Mutual fund.

Year	Tomplan Mutual Fund beta	Tomplan Mutual Fund return %	Return on market index %	Return on Govt. security %
2001	0.90	-3.00	-8.50	6.50
2002	0.95	1.50	4.00	6.50
2003	0.95	18.00	14.00	6.00
2004	1.00	22.00	18.50	6.00
2005	1.00	10.00	5.70	5.75
2006	0.90	7.00	1.20	5.75
2007	0.80	18.00	16.00	6.00
2008	0.75	24.00	18.00	5.50
2009	0.75	15.00	10.00	5.50
2010	0.70	-2.00	8.00	6.00

(a) From the above information you are required to calculate the following risk adjusted return measure for the Tomplan.
(i) Reward-to-variability ratio.
(ii) Reward-to-volatility ratio.
(b) Comment on the mutual fund's performance.

Ans. **(a)** (i) Reward to variability (Sharpe): For Tomplan Mutual fund = 0.545; for Mkt = 0.34
(ii) Reward to volatility (Treynor): For Tomplan = 5.86; for Mkt = 2.74
(b) Tomplan Mutual fund has performed better than the market on the basis of both Sharper and Treynor's ratio.

Q.64. **(RTP Nov 2009):-** Consider the following information about the return on Classic Mutual Fund, the market return and the T-bill returns:

Year	Classic Mutual Fund	Market Index	T-bills
1994	17.1	10.8	5.4
1995	-14.6	-8.5	6.7
1996	1.7	3.5	6.5
1997	8.0	14.1	4.3
1998	11.5	18.7	4.1
1999	-5.8	-14.5	7.0
2000	-15.6	-26.0	7.9
2001	38.5	36.9	5.8
2002	33.2	23.6	5.0
2003	-7.0	-7.2	5.3
2004	2.9	7.4	6.2
2005	27.4	18.2	10.0
2006	23.0	31.5	11.4
2007	-0.6	-4.9	14.1
2008	21.4	20.4	10.7

The following additional information is available regarding the comparative performance of five mutual funds:

	Return (%)	Standard Dev (%)	Beta
Alpha	1.95	20.03	0.983
Beta	11.57	18.33	0.971
Gama	8.41	22.92	1.169
Rho	9.05	24.04	1.226
Theta	7.86	15.46	0.666

From the above information, calculate all the inputs required for determining the Sharpe's Ratio, Treynor's Ratio and Jenson's ratio.

Ans. (i) Sharp ratio: Classic = 0.125; mkt = 0.053; (ii) Treynor ratio: Classic = 2.32; mkt = .907; (iii) Jensen alpha: classic = 1.248

Q.65. (Nov. 2009):- Closing values of BSE Sensex from 6th to 17th day of the month of January of the year 20000 were as follows :

Days	Date	Day	Sensex
1	6	THU	14522
2	7	FRI	14925
3	8	SAT	No Trading
4	9	SUN	No Trading
5	10	MON	15222
6	11	TUE	16000
7	12	WED	16400
8	13	THU	17000
9	14	FRI	No Trading
10	15	SAT	No Trading
11	16	SUN	No Trading
12	17	MON	18000

Calculate Exponential Moving Average (EMA) of Sensex during the above period. The 30 days simple moving average of Sensex can be assumed as 15,000. The value of exponent for 30 days EMA is 0.062.

Give detailed analysis on the basis of your calculations.

Q.66. (May 2012):- Indira has a fund of `3 lakhs which she wants to invest in share market with rebalancing target after every 10 days to start with for a period of one month from now. The present NIFTY is 5326. The minimum NIFTY within a month can at most be 4793.4. She wants to know as to how she would rebalance her portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:

(1) Immediately to start with.
(2) 10 days later-being the 1st day of rebalancing if NIFTY falls to 5122.96.
(3) 10 days further from the above date if the NIFTY touches 5539.04.

For the sake of simplicity, assume that the value of her equity component will change in tandem with that of the NIFTY and the risk free securities in which she is going to invest will have no Beta.

Q.67. (CA Final May .2000) John inherited the following securities on his uncle's death :

Type of securities	NOS	Annual Coupon (%)	Maturity Years	Yield (%)
Bond A (`1000)	10	9	3	12
Bond A (`1000)	10	10	5	12
Purchase shares C (`100)	100	11	*	13*
Purchase shares C (`100)	100	12	*	13*

***** Likelihood of being called at a premium over par .Compute the current value of his uncle's portfolio.

Q.68. (CA Final Nov.2003) : The rate of return on the security of Company X and market portfolio for 10 periods are given below :

Period	Return of security	Return on market Portfolio
1	20	22
2	22	20
3	25	18
4	21	16
5	18	20
6	-5	8
7	17	-6
8	19	5
9	-7	6
10	20	11

(i) What is the beta of security X ?

(ii) What is the characteristic line for Security X ?

Q.69. (CA Final May.2004) Following is the data regarding six securities :

	U	V	W	X	Y	Z
Return (%)	10	10	15	5	11	10
Risk (%) Standard deviation	5	6	13	5	6	7

(i) Which of these securities will be selected?

(ii) Assuming perfect correlation analysis whether it is preferable to invest 80% in security W or to invest 100% in Y.

Q.70. (CA Final Nov.2004) Given below is information of market rates of return and data from two companies A and B (%)

	Year		
	2004	2005	2006
Market	12.0	11.0	9.0
Company A	13.0	11.5	9.8
Company b	11.0	10.5	9.5

Required : Determine the beta coefficients of the shares of Company A and company B

Q.71. (CA Final May .1998) An investor is seeking the price to pay for a security whose standard deviation is 3.00 per cent .The correlation coefficient for the security with the market is 0.8 and the market standard deviation is 2.2 percent .The return from Government securities is 5.2 percent and form the market portfolio is 9.8 percent .The investor knows that by calculating the required return on the security ?

Q.72. (CA Final May .2003) Your client is holding the following securities

Particulars of securities	**Cost (`)**	**Dividends (`)**	**Market Price (`)**	**Beta**
Equity shares				
Company X	8,000	800	8,200	0.8
Company Y	10,000	800	10,500	0.7
Company Z	16,000	800	22,000	0.5
PSU Bonds	34,000	3400	32,300	1.0

Assume a risk free rate of 15% calculate :

(i) Expected rate of return in each using the capital asset pricing model (CAPM)

(ii) Average return of the portfolio .

Q.73. (C.A. Final Nov. 2006) X Co. Ltd. invested on 1-4-2008 in certain equity shares as below :

Name of Co.	No. of shares	Cost (`)
M. Ltd.	1,000 (`100 each)	2,00,000
N Ltd.	500 (`10 each)	1,50,000

In September 2008, 10% dividend was paid out by M Ltd. and in October, 2008, 30% dividend paid out by N Ltd. On 31.3.2009 market quotations showed a value of `220 and `290 per share for M Ltd. and N Ltd. respectively.

On 1-4-2009, investment advisors indicate (a) that the dividends from M Ltd. and N Ltd. for the year ending 31-3-2010 are likely to be 20% and 35%, respectively and (b) that the probabilities of market quotations on 31-3-2010 are as below :

Probability factor	Prices / share of M Ltd.	Price / share of N Ltd.
0.2	220	290
0.5	250	310
0.3	280	330

You are required to :

(i) Calculate the average return from the portfolio for the year ended 31-3-2009;

(ii) Calculate the expected average from the portfolio for the year 2009-10, and

(iii) Advise X Co. Ltd., of the comparative risk in the two investments by calculating the standard deviation in each case.

Q.74. (C.A. Final Nov. 2005) Following information is available in respect of dividend, market price and market condition after one year.

Market condition	**Probability**	**Market price (`)**	**Dividend per share (`)**
Good	0.25	115	9
Normal	0.50	107	5
Bad	0.25	97	3

The existing market price of an equity share is `106 (F.V. `1), which is cum 10% bonus debenture of `6 each per share. M/s. X Finance Company Ltd., has offered the buy-back of debentures at face value.

Find out the expected return and variability of returns of the equity shares.

And also advise whether to accept buyback offer?

Q.75. (C.A. Final Nov. 2008) Mr. A is interested to invest `1,00,000 in the securities market. He selected two securities B and D for this purpose. The risk return profile of these securities are as follows :

Security	Risk (σ)	Expected return (ER)
B	10%	12%
D	18%	20%

Coefficient of correlation between B and D is 0.15.

You are required to calculate the portfolio risk and portfolio return of the following portfolios of B and D to be considered by A for his investment.

(i) 100 per cent investment in B only
(ii) 50 per cent of the fund invested in B and D both
(iii) 75 per cent of the fund in B and the rest 25 per cent in D
(iv) 25 per cent of the fund in B and the rest 75 per cent in D and
(v) 100 per cent investment in D only.

Also indicate that which portfolio is the best for him from risk as well as return point of view?

Q.76. (C.A. Final Nov. 2004) You are analyzing the beta for ABC Computers Ltd. and have divided the company into four broad business groups, with market values and betas for each group.

Business group	Market value of equity (`billion)	Unleveraged beta
Main frames	100	1.10
Personal Computers	100	1.50
Software	50	2.00
Printers	150	1.00

ABC Computers Ltd. had `50 billion in debt outstanding.

Required :

(i) Estimate the beta for ABC Computers Ltd. as a Company. Is this beta going to be equal to the beta estimated by regressing past returns on ABC Computers stock against a market index. Why or why not?

If the treasury bond rate is 7.5%, estimate the cost of equity for ABC Computers Ltd. Estimate the cost of equity for each division. Which cost of equity would you use to value the printer division? The average market risk premium is 8.5%

Q.77. (C.A. Final Nov. 2007) XYZ Ltd. has substantial cash flow and until the surplus funds are utilized to meet the future capital expenditure, likely to happen after several months, are invested in a portfolio of s

Investment	No. of shares	Beta	Market price per share (`)	Expected dividend yield
I	60,000	1.16	4.29	19.50%
II	80,000	2.28	2.92	24.00%
III	1,00,000	0.90	2.17	17.50%
IV	1,25,000	1.50	3.14	26.00%

Short-term equity investments, details for which are given below :

The current market return is 19% and risk free rate is 11%.

Required :

(i) Calculate the risk of XYZ's short-term investment portfolio relative to that of the market;
(ii) Whether XYZ should change the composition of its portfolio.

Q.78. (C.A. Final May 2002) A Ltd. has an expected return of 22% and standard deviation of 40%. B Ltd. has an expected return of 24% and standard deviation of 35%. A Ltd. has a beta of 0.86 and B Ltd. a beta of 1.24. The correlation coefficient between the return of A Ltd. and B Ltd. is 0.72. The standard deviation of the market return is 20%. Suggest :

(i) Is investing in B Ltd. better than investing in A Ltd.?

(ii) If you invest 30% in B Ltd. and 70% in A Ltd., what is your expected rate of return and portfolio standard deviation?
(iii) What is the market portfolios expected rate of return and how much is the risk-free rate?
(iv) What is the beta of portfolio is A Ltd.'s weight is 70% and B Ltd.'s weight is 30%?

RTP CA-FINAL

Q.79. The following information is available for the share of X Ltd. and stock exchange for the last 4 years.

	X Ltd.				
	Share Price	**Dividend Yield**	**Index of Stock**	**Return from Market fund**	**Return from Govt.**
Present Year	197.00	10%	2182	16%	15%
1 year ago	164.20	12	1983	15%	15%
2 year ago	155.00	8%	1665	16%	16%
3 year ago	121.00	10%	1789	10%	14%
4 year ago	95.00	10%	1490	18%	15%

With above information available please calculate:
(i) Expected Return on X Ltd.'s share.
(ii) Expected Return on Market Index.
(iii) Risk Free Rate of Return.
(iv) Beta of X Ltd.

Ans. (i) Expected Return = 30%; (ii) Expected Return = 25%; (iii) Risk Free = 15%; (iv) Beta = 1.5 times.

Q.80. The following information is available for the share of X Ltd. and stock exchange for the last 4 years.

Security	Expected Returns	Beta	S.D. (%)
1	5	0.70	9
2	10	1.05	14
3	11	0.95	12
4	12.5	1.10	20
5	15	1.40	17.5
6	16	1.70	25

Suppose risk free rate of return is 4% and Market return is 6% and standard deviation is 10%.
You are required to compute.
(i) Which security is undervalued and which is over-valued.
(ii) Assuming that funds are equally invested these six stocks, then compute.
  a. Return of portfolio
  b. Risk of portfolio
(iii) Suppose if above portfolio is invested in with margin of 40% and cost of borrowing is 4% then what will be the position.

Q.81. Mr. Nirmal Kumar has categorized all the available stock in the market into the following types:

(i) Small cap growth stocks
(ii) Small cap value stocks
(iii) Large cap growth stocks
(iv) Large cap value stocks

Mr. Nirmal Kumar also estimated the weights of the above categories of stocks in the market index. Further more, the sensitivity of returns on these categories of stocks to the three important factor are estimated to be:

Category of Stocks	Weight in the Market Index	Factor I (Beta)	Factor II (Price Book)	Factor III (Inflation)
Small cap growth	25%	0.80	1.39	1.35
Small cap value	10%	0.90	0.75	1.25
Large cap growth	50%	1.165	2.75	8.65
Large cap value	15%	0.85	2.05	6.75
Risk Premium		6.85%	-3.5%	0.65%

The rate of return on treasury bonds is 4.5%

Required:

(a) Using Arbitrage Pricing Theory, determine the expected return on the market index.

(b) Using Capital Asset Pricing Model (CAPM), determine the expected return on the market index.

(c) Mr. Nirmal Kumar wants to construct a portfolio constituting only the 'small cap value' and 'large cap growth' stocks. If the target beta for the desired portfolio is 1, determine the composition of his portfolio.

Ans. (i) Expected Return (APTM) = 7.7526%; (ii) Expected Return (CAPM = 11.33%; (iii) Composition 1 = 62.3%,, Composition 2 = 37.7%

Q.82. (RTP Nov. 2010):- Suppose that in the universe of available risky securities contains a large number of shares two stocks, identically distributed with E(r) = 15%, or σ = 60%, and with a common correlation coefficient of ρ= 0.5.

(i) What is the expected return and standard deviation of an equally weighted risky portfolio of 25 stocks?

(ii) What is the smallest number of stocks necessary to generate an efficient portfolio with a standard deviation equal to or smaller than 43%

(iii) What is the systematic risk in this security universe?

(iv) If T-bills are available and yield 10%, what is the slope of the CAL (Capital allocation line)?

Ans. (i) E(R) = 15%, 43.27; (ii) We need 36.73 stock (37 approx); (iii) 42.43; (iv) .1178

Q.83. (RTP Nov. 2011):- The total market value of the equity share of O.R.E. Company is `60,00,000 and the total value of the expected risk premium on the market is 10 percent. The treasury bill rate is 8 per cent.

Required:

(i) What is the beta of the Company's existing portfolio of assets?

(ii) Estimate the company's cost of capital and the discount rate for an expansion of the company's present business.

Ans. (i) Beta Company = 0.9, (ii) Cost of Capital = 17%.

Q.84. (RTP May 2010):- Ms. Sunidhi is working with an MNC at Mumbai. She is well versant with the portfolio management techniques and wants to test one of the techniques on an equity fund she has constructed and compare the gains and losses from the techniques with those from a passive buy and hold strategy. The fund consists of equities only and the ending NAVs of the fund he constructed for the last 10 months are given below:

Month	**Ending NAV (`/unit)**	**Month**	**Ending NAV (`/unit)**
December 2008	40.00	May 2009	7.00
January 2009	25.00	June 2009	42.00
February 2009	36.00	July 2009	43.00
March 2009	32.00	August 2009	50.00
April 2009	38.00	September 2009	52.00

Assume Sunidhi had invest a notional amount of `2 lakhs equally in the equity fund and a conservative portfolio (of bonds) in the beginning of December 2008 and the total portfolio was being rebalanced each time the NAV of the fund increased or decreased by 15%

You are required to determine the value of the portfolio for each level of NAV following the Constant Ratio Plan.

Q.85. (RTP May 2010):- Mr. Sunil Mukharjee has estimated probable under different macroeconomic conditions for the following three stocks:

Stock	Current price (`)	Rates of return(%) during different macroeconomic scenarios		
		Recession	Moderate growth	Boom
Him Ice Ltd	12	-12	15	35
Kalahari Biotech	18	20	12	-5
Puma Softech	60	18	20	15

Mr. Sunil Mukharjee is exploring if it is possible to make any arbitrage profits from the above information.

Required

Using the above information construct an arbitrage portfolio and show the payoffs under different economic scenarios.

Q.86. (RTP May 2010):- Assume that you have half your money invested in T, the media company, and the other half invested in U, the consumer product giant. The expected returns and standard deviations on the two investments are summarized below:

	T	U
Expected Return	14%	18%
Standard Deviation	25%	40%

Estimate the variance of the portfolio as a function of the correlation coefficient (Start with –1 and increase the correlation to +1 in 0.2 increments).

Q.87. (RTP May 2010):- Suppose Mr. X in a world where there are only two assets, gold and stocks. He is interested in investing his money in one, the other or both assets. Consequently he collects the following data on the returns on the two assets over the last six years.

	Gold	Stock Market
Average return	8%	20%
Standard deviation	25%	22%
Correlation	-	0.4

a. Mr. X is constrained to pick just one, which one he would choose?
b. Mr. Y, a friend of Mr. X argues that this is wrong. He says that Mr. X is ignoring the big payoffs that he can get on gold. How would Mr. X go about alleviating his concern?
c. How would a portfolio composed of equal proportions in gold and stocks do in terms of mean and variance?
d. Mr. X came to know that GPEC (a cartel of gold-producing countries) is going to vary the amount of gold it produces with stock prices in the country. (GPEC will produce less gold when stock markets are up and more when it is down.) What effect will this have on his portfolios? Explain.

Previous year question of ICWA Final

Q.88. (ICWA June 2003):- The closing price of the stock exchange for 10 successive days was as follows:

Days	1	2	3	4	5	6	7	8	9	10
Closing price (`)	25	26	25	24	26	26	28	26	25	27

You are required to calculate a 7-days moving average of stock price of the company and comment on its short-term trend.

Q.89. (ICWA Final June 1999) The market portfolio has a historically based expected return of 0.095 and standard deviation of 0.035 risk premium is through to be constant through time .Risk less investment may now be purchased to yield 0.08 .

A security has a standard deviation of 0.07 and 0.75 correlation with the market portfolio The market portfolio is now expected to have a standard deviation of 0.035

Find out the following

(i) Market 's return –risk trade off
(ii) Security beta
(iii) Equilibrium required expected return of the security.

Q.90. (ICWA Final Dec.2000) The following information is given

Risk Free rate of return	8%
Expected rate of return on market portfolio	16%
ß of a security	0.7

(i) Find out the expected rate of return of the security.
(ii) If another security has an expected return of 20%, what must be its beta?

Q.91. (ICWA Final Dec.2001) Calculate the expected rate of return of security and interpret the same from the following information

ß of a security	0.5
Expected rate of return on market portfolio	15%
Risk Free rate of return	0.06

If another security has an expected rate of return of 18% , what would be its beta?

Q.92. (I.C.W.A. Final Dec. 2007) You are considering investment in one or both of two securities, X and Y and you are given the following information :

Security X			
Possible rates of return (%)	30	25	20
Possibility of occurrence	0.3	0.4	0.3
Security Y			
Possible rates of return (%)	50	30	10
Possibility of occurrence	0.2	0.6	0.2

You are required to :

(i) Calculate the expected return for each security separately and for a portfolio comprising 60% X and 40% Y, assuming positive correlation between the possible rates of return from the shares comprising the portfolio.
(ii) Calculate the expected risk of each security separately and of the portfolio as defined above. You may use standard deviation as the measure of risk.

Q.93. (I.C.W.A. Final Dec. 2008) The risk-free return is 6% and the return on market portfolio is 10%. If the required rate return on stock is 13%, calculate beta.

Q.94. (I.C.W.A. Final Dec. 2007) An investors is holding 1000 shares of Rishabh company. Presently, the rate of dividend being paid by the company is `2 per share and the share is being sold at `25 per share in the market. However, several factors are likely to change during the course of the year as indicated below :

Particulars	Existing	Revised
Risk-free rate	12%	10%
Market risk premium	6%	4%
Beta value	1.4%	1.25%
Expected growth rate	5%	9%

In view of the above factors whether the investor should buy, hold or sell the shares? And why?

Q.95. (I.C.W.A. Final June 2005) The following particulars about 4 corporate securities (shares) are available: (`)

Security	Today's price	Predicted Price a year from today	Expected Dividend during the coming year
A	490	580	7.0
B	180	200	7.0
C	570	640	5.0
D	220	235	---

The most recent beta estimates are :

Security	A	B	C
Beta	1.4	1.2	1.0

Expected return in the market is 14% and the risk-free rate of return is 8%.
You are required to calculate for each security :
(i) the estimated return based on the Capital Asset Pricing Model (CAPM), and
(ii) predicted return.
Also, state, giving reasons, whether the securities are undervalued or overvalued.

Q.96. (I.C.W.A. Final June 2008) Your client is holding the following securities

Particulars of securities	Cost (`)	Dividend (`)	Market price (`)	Beta
Equity shares				
Co. X	8,000	800	8,200	0.8
Co. Y	10,000	800	10,500	0.7
Co. Z	16,000	800	22,000	0.5
PSU Bonds	34,000	3,400	32,300	1.0

Assuming the risk free rate of 15%, Calculate :
(i) Expected rate of return in each, using the Capital Asset Pricing Model (CAPM).
(ii) Average return of portfolio

Q.97. (I.C.W.A. Final Dec. 2005) The following information are available from a Merchant Bank:

Company	Forecast equity return (%)	Standard deviation of total equity return	Co-variation with market return (%)
Infosys	16.00	6.3	32
HLL	12.00	4.8	19
Reliance	14.00	4.7	24
Tata Motors	19.00	6.9	43

The market return and the market standard deviation are 14.50 per cent and 5 per cent respectively and the risk-free rate is 6 per cent.
Required : Estimate the 'Alpha' value of each of these companies shares.

Q.98. (I.C.W.A. Final June 2006) (i) If beta (b) is 1.50; R_f (risk-free return), is 6.00%; and R_m (market return) is 12.00%,

(i) What should the return on the share (R_i) with the beta as given above?
(ii) If the alpha value is + 1.5, 1.0 (zero), or – 2.40, what would be the corresponding current expected return from the stock in (i) ?

(iii) What investment action would you suggest for each of the four different situations in (ii)?

Q.100. (I.C.W.A. Final Dec. 2004) As a 'Financial Analyst' you are analyzing the performance of two companies, a Biotechnology firm and a Mobile telephone manufacturer. You have collected the following information about the two companies :

Company	Actual ROE	Beta	ROE of Peer Group	Forecasted ROE
Biotech Firm	20.5%	1.2	16%	22%
Mobile Firm	12.5%	1.4	10%	10.5%

The risk free rate of return is 7%

Evaluate the performance of each of these companies relative to :

(i) the required rate of return,

(ii) the return on equity of the peer group, and

(iii) the forecasted return on equity.

What conclusions would you draw about the investment choices made by these firms?

Q.101. (I.C.W.A. Final June 2008) An analyst of BCK Securities Ltd. has made risk and return projections for the securities of Reliance, Hindalco, which are as follows :

Scenario	Probability	Return on Reliance (%)	Return on Hindalco (%)	Market Return (%)
4% GDP growth	0.30	3	2	1
6% GDP growth	0.35	17	14	15
8% GDP growth	0.25	20	19	17
10% GDP growth	0.10	22	17	25

It is felt that the interest rate of 7 per cent on the 91-day T-Bills is a good approximation of the risk-free rate.

Requirement :

(i) Calculate the betas of Reliance and Hindalco and comment on your findings.

(ii) Find out whether the shares of Reliance and Hindalco are under priced or over priced.

Q.102. (I.C.W.A. Final Dec. 2007) Dark Ltd. has an expected return of 22% and standard deviation of 40%. Penguin Ltd. has an expected return of 24% and standard deviation of 38%. Dark Ltd. has a Beta of 0.86 and Penguin Ltd., a Beta of 1/24/ The correlation coefficient between the return of Dark Ltd. and Penguin Ltd. is 0.72. The standard deviation of the market return is 20%.

Requirements :

(i) Is investing in Penguin Ltd. better than investing in Dark Ltd.?

(ii) If you invest 30% in Penguin Ltd. and 70% in Dark Ltd. What is your expected rate of return and portfolio standard deviation?

(iii) What is the market portfolios expected rate of return and how much is the risk-free rate?

(iv) What is the Beta of portfolio if Dark Ltd.'s weight is 70% and Penguin Ltd's weight is 30%?

Q.103. (I.C.W.A. Final Dec. 2006) You are running a portfolio management business and have assembled the following portfolio for Client-B.

Scrip	Value (`)	Beta
Infosys	5 lakh	1.21
Hindustan Lever	4 lakh	0.97
Reliance	6 lakh	1.40
Tata Motors	3 lakh	1.32
Pfizer	2 lakh	1.25

Client-B insists that the portfolio should comprise the above 5 scrips alone and that each scrip should be at least 10% of the total portfolio value. You project the Sensex which is currently 11400 to move to 11800 by the end of 3 months and to 12200 by the end of 6 months.

(i) What will be the value of your portfolio at the end of 3 months and 6 months?

(ii) What could you do to improve the portfolio performance give your view on the market?

Q.104. (I.C.W.A. Final June 2005) Tara Ltd. is comprised of only four major investment projects, details of which are as follows :

Project	% of market value	Annual % return during the last 5 years	Risk % of standard deviation	Correlation with the market
Alpha	28	10	15	0.55
Beta	17	18	20	0.75
Gamma	31	15	14	0.84
Delta	24	13	18	0.62

The risk free rate is expected to be 5% per year, the market return is 14% per year and the standard deviation of market returns is 13%.

Assume that Tara Ltd's shares are currently priced based upon the assumption that the last five years experience of returns will continue for the foreseeable future. Evaluate whether or not the share price of Tara Ltd. is undervalued/overvalued.

Previous year question of CS Final

Q.105. (CS Final Dec.2003) A portfolio consists of three securities P, Q, and R with the following parameters

	Security			**Correlation coefficient**
	P	**Q**	**R**	
Expected Return (%)	25	22	20	
Standard deviation (%)	30	26	24	
Correlation coefficient				
PQ				-0.5
QR				+0.4
PR				+0.6

If the securities are equally weighted, how much is the risk and return of the portfolio of these there securities ?

Q.106. (CS Final Dec.2003) stock A and B have the following historical returns

Year	**Stock A's return (KA) (%)**	**Stock B's return (KB) (%)**
2002	-12.24	-5.00
2003	23.67	19.55
2004	35.45	44.09
2005	5.82	1.20
2006	28.30	21.16

You are required to calculate the average rate of return for stock during the period 2002 through 2006. Assume that someone held a portfolio consisting 50% of stock B .What would have been the realized rate of return on the portfolio in each year from 2002 through 2006? What would have been the average return on the portfolio during the period ? (You may assume that the year ended on 31st March)

Q.107. (C.S. Final Dec. 2003)

	Security			Correlation coefficient
	P	Q	R	
Expected return (%)	25	22	20	
Standard deviation (%)	30	26	24	
Correlation coefficient :				
PQ				- 0.5
QR				+ 0.4
PR				+ 0.6

If the securities are equally weighted, how much is the risk and return of the portfolio of these three securities?

Q.108. (C.S. Final June 2004) Following information is available in respect of the return from Reliance's stock under different economic conditions :

Economic condition (%)	Return	Probability
Good	20	0.2
Average	16	0.4
Bad	10	0.2
Poor	4	0.2

Find out the expected return of the stock and risk associated with it.

Q.109. (C.S. Final June 2007) Ritesh holds a well diversified portfolio of stock in XYZ Group. During the last 5 years, returns on these stock have averaged 20% per year and had a standard deviation of 15%. He is satisfied with the yearly availability of his portfolio and likes to reduce its risk without affecting overall returns. He approaches you for help in finding an appropriate diversification medium. After a lengthy review of alternatives, you conclude – (i) future average returns and volatility of returns on his current portfolio will be the same as he has historically expected; and (ii) to provide a quarter degree of diversification in his portfolio, investment could be made in stocks of the following groups :

Groups	Expected returns	Co-relation of returns with XYZ Group	Standard deviation
Rekha Ltd.	20%	+ 1.0	15%
Tina Ltd.	20%	- 1.0	15%
Bipasha Ltd.	20%	+ 0.0	15%

(i) If Ritesh invests 50% of his funds in Rekha Ltd. and leaves the remainder in XYZ Group, would this affect both his expected returns and his risk? Why?

(ii) If Ritesh invests 50% of his funds in Tina Ltd. and leaves the remainder in XYZ Group, how would this affect both his expected return and his risk? Why?

(iii) What should Ritesh do? Indicate precise portfolio weightage.

Q.110. (C.S. Final Dec. 2003) An investor is seeking the price to pay for a security, whose standard deviation is 4%. The correlation coefficient for the security with the market is 0.9 and the market standard deviation is 3.2%. The return from government securities is 6.2% and from the market portfolio is 10.8%. The investor knows that, by calculating the required return, he can then determine the price to pay for the security. What is the required return on the security?

Q.111. (C.S. Final June 1998) Calculate the market sensitivity index and the expected return on the portfolio from the following data:

Standard deviation of an asset	2.5%
Market standard deviation	2.0%
Risk-free rate of return	13.0%
Expected return on market portfolio	15.0%[[

Correlation coefficient of portfolio with market 0.8

(i) What will be the expected return on the portfolio if portfolio beta is 0.5 and the risk-free return is 10%.

Q.112. (C.S. Final June 2000) From the following information, calculate the expected rate of return of a portfolio :

Risk-free rate of interest	8%
Expected return of market portfolio	18%
Standard of deviation of an asset	2.8%
Market standard deviation	2.3%
Correlation coefficient of portfolio with market	0.8

Q.113. (C.S. Final Dec. 2000) The following information is given :

Risk-free rate of return	8%
Expected rate of return on market portfolio	16%
β of a security	0.7

(i) Find out the expected rate of return of the security.
(ii) If another security has an expected return of 20%, what must be its beta?

Q.114. (C.S. Final Dec. 2001) Calculate the expected rate of return of the security and interpret the same from the following information :

Beta of a security	0.5
Expected rate of return on portfolio	15%
Risk-free rate of return	0.06

If another security has an expected rate of return of 18%, what would be its beta?

Q.115. (C.S. Final Dec. 2003) From the following data, compute beta of Security J

$\sigma_s = 12\%$ $\sigma_m = 9\%$

$Cor_{jm} = +9.72$

Q.116. (C.S. Final Dec. 2005) The market portfolio has a hi8storically based expected return of 0.10 and a standard deviation of 0.04 during a period when risk-free assets yielded 0.03. The 0.07 risk premium is thought to be constant through time. Riskless investments may now be purchased to yield 0.09. A security has a standard deviation of 0.08 and a coefficient of correlation with the market portfolio is 0.85. The market portfolio is now expected to have a standard deviation of 0.04. You are required to find –

(i) market's return-risk trade-off;
(ii) security beta; and
(iii) equilibrium required expected return of the security.

Q.117. (C.S. Final June 2005) The following information is available in respect of Security X and Security Y :

Security	B	Expected rate of return
X	1.8	22.00%
Y	1.6	20.40%

Rate of return of market portfolio is 15.3%.
If risk-free rate of return is 7%, are these securities correctly priced? What would be the risk-free rate of return, if they are correctly priced?

10. Derivatives

"A derivative can be defined as a financial instrument whose value depends on or derives from the values of other, more basic underlying variables."

"A derivative is simply a financial instrument (or even more simply an agreement between two people) which have value determined by the price of something else."

Kinds of Derivatives:

(a) Exchange – Traded Derivatives:

Derivatives, which trade on exchange are called 'exchange-traded derivatives'. Trades at an exchange generally go through the clearing corporation.

(b) OTC Derivatives:

A derivatives contract, which is privately negotiated, is called an OTC derivative. They generally do not go through a clearing corporation.

Q. 1. Explain the term Straddle, Strangles and Strips and Straps

Ans. Straddle :- A straddle consists of buying a call & a put with same strike price & maturity of these is drastic depreciation gain is made on the put while in case of drastic appreciation the call gives the profit for moderate movements a net loss results.

Strangle :- A strangle is a similar strategy except that the strike prices in the call & put are different. Both Straddles & Strangles are bought when the trader is expecting a strong move in the price but is not sure of the discretion.

Strip & Strap

A Strip consists of buying one call & two put with the same underlying assets, same strike price & same expiration date. In case of strap there will be two calls & one put with same strike price. Same expiration date on the same underlying assets. Strip strategy is adopted by those who expects that prices will move they are not about direction but think that there are chances of pricing going down. In case of strap other things as above but think that there are more chances of prices going up. The Strap is a reverse of the Strip.

	Users	Purpose
(i)	Corporation	To hedge currency risk and inventory risk
(ii)	Individual investors	For speculation heading and yield enhancement
(iii)	Institutional investor	For hedging asset allocation ,yield enhancement & avail arbitrage opportunities
(iv)	Dealers	For hedging position taking exploiting inefficiencies & earning dealer spreads

BASIC DIFFERENCES BETWEEN CASH AND DERIVATIVES MARKET

S.No	Cash Market	Derivatives Market
(i)	Tangible assets are treated	Tangible or intangible assets like index or rates are traded .
(ii)	In cash market we can purchase even one share	In futures and option minimum lots are fixed .
(iii)	Buying securities in cash market involves putting up all the money upfront .	Buying futures simply involves putting up the margin money.
(iv)	More risky than F & O segment	Risk is limited or margin is less than assets value
(v)	Cash assets may be meant for consumption or investment	Derivates contracts are for hedging arbitrage or speculation.

(vi)	With the purchase of shares of the company in cash market ,the holder becomes part owner of the company	In F & O segment it does not happen
(vii)	Cash assets values are not dependent on derivatives assets values	Vale of derivative contract is always based on and linked to the under lying security
(viii)	In the cash market a customer must open securities trading account with a securities depositary .	In the derivatives market , a customer must open a derivatives trading account with a derivative broker .

OBJECTIVES OF DERIVATIVE TRADING

1. **Hedging :-** Suppose you own a stock and you are confident about the prospects of the company. However at the same time you feel that overall market may not perform as good and therefore price of your stock may also fall in line with overall market trend .

   You except that same adverse economic or political event might affect the market sentiments though fundamentals of the company will remain goods. Therefore is good to retain the stock . in both these situations you would Like to insure your portfolio against any such market fall. Such insurance is known has hedging.

   Hedging is a tool to reduce the internet risk in an investment .Various strategies designed to reduce investment risk using call option, put option short selling and futures are used for hedging .The basic purpose of a hedge is to reduce the risk of loss .The counter party to a hedging .The basic purpose of a hedge to reduce the risk of loss .the counter party to a hedging transaction could be a speculator arbitrageur of hedger .

2. **Arbitrage :-** The future price of an underlying asset is function of spot price and cost of carry adjusted for any return on investment .However due to uncertainty about the interest distortions in spot prices ,or uncertainty about future income stream prices in futures and spot prices gives rises to arbitrage opportunities .

   Transaction made to take advantage of temporary distraction in the market are known as arbitrage transaction .

3. **Speculation :-** Suppose you may have a very strong option about the future market price of a particular asset , based on past trends current information and future expectations .Likewise you may also have an option about the overall market trend .To take of advantage of such opinion .individual assets or the entire market (index) could be sold or purchased position taken either in cash market or derivative market on the basis of personal opinion is know as speculation

Derivatives trading at NSE/BSE

The derivatives trading on the National Stock exchange commenced with S & P CNX Nifty Index futures on June ,2000. The trading index options commenced on June 4,2001 and trading in on November 9,2001 .The index futures and option contract on NSE is based on S & P CNX Nifity index .Currently the futures contract have a maximum of 3 months expiration cycles .there contract are available for trading with 1 month ,2months and three months expiry .A new contract is introduced on the next trading day following the expiry of the near month contract . In the BSE, the trading of Derivatives is taking place with SENSEX comprising 30 scrip's for index futures and option . The NSE has its own contract specifications for derivatives .Similarly BSE has its own contract specifications .

Q. 2. [CS Dec 2000] Write a short note on 'derivative'?

Ans.

- A derivative is a financial instrument which derives its value from some other financial price. This other financial price is called the underlying.
- In other words it does not have any value of its own but its value, in turn, depends on the value of other physical assets which are called the underlying assets.
- The underlying securities for derivatives are:-
  - Commodities
  - Precious metals
  - Interest rates
  - Shares
  - Stock index value
- Various participants of derivative market may be classified as
  - Hedgers
  - Speculators
  - Arbitrageurs
- Examples of important derivatives:-
  - Futures
  - Options
  - Forward
  - Swaps

Q. 3. **[CS 2000 Dec; 2001 June]** Write short notes on 'Swaps' and 'Hedging'. **Or**
[CS June 2000] "Swap is a technique of hedging in the international finance market". Explain. **Or**
[CS June 2002; 2010 June] Write a note on 'Types of swap deals' **Or**
[CS June 2008] Distinguish between 'Interest swap' and 'currency swap'?

Ans.

- A swap can be defined as the exchange of one stream of future cash flows with another stream of cash flows with different characteristics.
- A swap is an agreement between two or more people/parties to exchange sets of cash flows over a period in future. Swaps can be divided into two types:-
  1) Currency Swaps,
  2) Interest Rate Swaps

  1) <u>Currency Swaps</u>
     - The currency swap is an agreement between two parties to exchange (swap) payments or receipts in one currency for payment or receipts in other currency.
     - Suppose if two entities are trading in currency, the rationale for currency swap between them lies in the fact that one borrower has a comparative advantage in borrowing in one currency, while the other borrower has an advantage in borrowing in another currency.
  2) <u>Interest Rate Swaps</u>
     - An interest rate swap is an agreement whereby one party exchanges one set of interest rate payment for another rate over a time period.
     - The most common arrangement is an exchange of fixed interest rate payment for another rate over a time period. The interest rates are calculated on notional values of principals.
     - Swaps can be used to hedge certain risks such as interest rate risk or to speculate or changes in the underlying.

Q. 4. **[CS Dec 2001]** Write a short note on 'Currency option hedge'?

Ans.

- Currency options give the holder of the instrument a right and not an obligation to buy or sell a currency over the life period at a specified/pre-determined price against some premium.

- Various factors which affect the quantum of premium are as follows:-
  - Maturity time period
  - Strike price
  - Volatility
- Currency options allow the organizations to hedge their risk.
- By going in for currency option hedge, the organization remains insulated from adverse exchange rate movements, and derives advantage from favourable movement.
- The anticipated benefits should be compared with the premium to be paid before opting for currency options.

Q. 5. [**CS June 2004]** Write a note on 'Straddle'?

Ans.

- A combined position created by the purchase or sale of put & call options at the same exercises price is called a straddle.
- Suppose the exercise price is Rs. 105 for both options. What will be your pay — off it the price of the share I to Rs. 120 in 3 months? You will forgo put option, but you will exercise call option. So, your pay — off will be the excess of share price over the call exercise. Rs. 120 – 105 = 15.
- On the contrary, suppose that the acquisition attempts fails and the price of the share falls to Rs. 95 in 3 months you will exercise put option and let call option lapse your pay-off will be Rs. 10.
- Thus when you will invest in straddle, you will benefit whether the price of the share falls or rises.

Q. 6. [**CS June 2005]** Write a note on 'Mark-to-market' settlement of index futures.

Ans.

- The marking to market feature implies that the value of the futures contract is set to zero at the end of each trading day.
- It means, debiting or crediting the clients' equity accounts with the losses or gains of the day, based on which, margins are sought or released.
- It is important to note that through marking to market process, the clearing house substitutes each existing futures contract with a new contract that has the settle price or the base price(as referred to by NSE). Base price shall be the previous day's closing Nifty value. Settle price is reported in the financial press as the purchase price in the new contract for the next trading day.
- In terms of NSE regulations, mark to market settlement on daily basis and final settlement procedures are as follows and this are subject to changes according to SEBI guidelines.

Q. 7. [**CS June 2008]** Participants of derivatives market?

Ans. <u>Hedgers</u>

- Hedgers use futures and options markets to reduce or eliminate the risk associated with price of an asset.

<u>Speculators</u>

- Speculators use futures and options contracts to get extra leverage in betting on future movements in the price of an asset.
- They can increase both the potential gains and potential losses by usage of derivatives in a speculative venture.

<u>Arbitrageurs</u>

- Arbitrageurs are in business to take advantage of a discrepancy between prices in two different markets.
- If, for example, they see the 'futures price of an asset getting out of line with the cash price, they will take offsetting positions in the two markets to lock in a profit.

Q. 8. **[CS Dec 2005; Dec 2007]** Distinguish between 'Futures contracts' and 'forward contract'

Ans.

S NO.	Forward	Futures
1	Futures contracts are traded on organized exchange.	Forward contracts are traded on personal basis.
2	They have a standardized size and amount involved.	They have no such standardized size.
3	Settlement is made by the clearing house of the exchange.	Settlement takes place mutually between the parties on the pre-determined date.
4	These contracts are subject to marking to market and thus daily settlement takes place.	There is no concept of marking to market.
5	Parties need not to worry about the credit worthiness of the counter-party.	There is credit risk involved.
6	There is no problem of liquidity.	Liquidity problem may arise.

Q. 9. **[CS Dec 2006]** Distinguish between 'Sensex' and 'nifty'

Ans.

S. No.	Sensex	Nifty
1	It is the major index of BSE (Bombay Stock Exchange).	It is the major index of NSE (National Stock Exchange of India).
2	It consists of 30 largest and most actively traded stocks.	It consists of top 50 stocks listed on NSE.
3	It is regarded as the most popular and precise barometer of Indian stock market.	It is simplified tool that helps investors and ordinary people to understand and what is happening in the stock market and the economy.

Q.10. **[CS June 2008/ Dec 2008]** 'Commodity futures' and 'Financial futures' **Or**
[CS June 2009] 'Financial derivatives' and 'commodity derivatives'

S. No.	Future	Options
1	Commodity futures refer to an agreement between the buyer and seller to deliver underlying asset at predetermined price and on specified date.	Financial future has underlying asset as shares, stock, debentures, bonds etc.
2	They may be settled in cash or otherwise.	They are mostly settled in cash.
3	They may have monthly/seasonal delivery period.	They may have 1 month 2month or 3 month delivery period.
4	Problems regarding quality may arise.	No such issue exists.

Q.11. **[CS June 2010]** Distinguish between 'Initial margin' and 'maintenance margin'

Ans. Initial Margin

- In a futures contract both the buyer and seller are required to perform the contract.
- Accordingly, both the buyers and sellers are required to put in the initial margin.
- The initial margin is also known as the performance margin and is usually 5% to 15% of the purchase price of the contract.
- The margin is set by the stock exchange keeping in view the volume of business and size of transactions as well as operative risks of the market in general.
- The initial margin is the first line of defense for the clearing house.
- This protection is further reinforced by prescribing maintenance margin.

Maintenance Margin

- Maintenance margin is the margin required to be kept by the investor in the equity account equal to or more than a specified percentage of the amount kept as initial margin.
- Normally, the deposit in the equity account is equal to or greater than 75% to 80% of the initial margin.
- In case this requirement is not met, the investor is advised to deposit cash to make up the shortfall. If the investor does not respond, than the broker will close out the investors' position by entering a reversing trade in the investors' account.

Q.12. **[CS June 2009]** 'Counter party risk' is faced in forward transactions. **Or**
State the major problems in a forward contract.

Ans. There are three major problems in a forward contract — Liquidity, inadequate knowledge, and counter party risk.

a) Problem of liquidity
- One basic problem with the forward markets is that the terms of the contract are too general and too flexible.

b) Inadequate Knowledge
- There is no regular interface between the buyers and the sellers.
- At best there could be telephonic interaction but there is neither organized market nor any intermediaries on which both the parties could rely.

c) Problems of Counter Party Risk
- There is a risk of the other party not being able to honour its commitment.
- The buyer or seller may back out of the contract.
- Counter party risk could also arise from variation in quality of the goods, place of delivery etc.
- It could also happen that one of the parties to the forward contract goes bankrupt.

Q.13. **[CS Dec 2006]** Short Note on "Stock Lending Scheme"

Ans.

- In Stock Lending, the legal little of the security is temporarily transferred from a lender to a borrower.
- The lender retains all the benefits of ownership, other than the voting rights.
- The borrower is entitled to utilize the securities as required but is liable to the lender for all the benefits.
- Securities lending provides income opportunities for security holders and creates liquidity to facilitate trading strategies for borrowers.
- It is particularly attractive for large institutional stock holder as it is an easy way of generating income to off-set custody fees and required little involvement of time.
- The borrower deposits collateral securities with the approved intermediary.
- In case, the borrower fails to return the securities, he will be declared a defaulter and the approved intermediary will liquidate the collateral deposited with it.
- In the event of default, the approved intermediary is liable for making good the loss caused to the lender. In India, SEBI has presented a stock lending scheme.

Q.14. What are the pre-requisites for trading in exchange traded derivatives?

Ans. The fulfillment of certain pre-requisites was essential before the trading in exchange traded derivatives could start. Some of the pre-requisites are:-

Strong and healthy cash market

An efficient, transparent and fair cash market with strong settlement cycles helps in building an efficient derivatives market.

Clearing Corporation and settlement guarantee

Existence of a common clearing corporation providing settlement guarantee as well as cross margining is essential for speedy settlement as well as for risk minimization.

Reliable wide-area telecommunication network

Since derivative trading must be introduced on nationwide basis so existing and reliable telecommunications network along with existence of proven automated trading systems is extremely important.

Risk containment mechanism

There should exist a strong and disciplined margining system in the form of daily mark to market margins.

Q.15. Features or difference between forward, future and options?

Ans.

S NO.	Features	Forward	Futures	Options
1	Standardization	No	Yes	Yes
2	Liquidity	No	Yes	Yes
3	Margins	No	Yes	Yes
4	Guarantor	No	Clearing Corporation	Clearing Corporation
5	Obligation to perform	Both Parties	Both Parties	Writer
6	Profit settlement	End of Contract	MTM (Market to Market)	MTM (Market to Market)
7	Regulation	Self Regulation	Stock Exchange	Stock Exchange

Q.16. Distinguish between 'Futures' and 'Options'

Ans.

S. No.	Forward	Futures
1	Both the parties are obliged to perform the contract.	Only the seller (writer) is obligated to perform the contract.
2	No premium is paid by either party.	The buyer pays the seller (writer) a premium.
3	The holder of the contract is exposed to the downside risk and has potential for upside return.	The buyer's loss is restricted to downside risk to the premium paid, but retains upward indefinite potentials.
4	The parties of the contract must perform at the settlement date. They are not obligated to perform before the date.	The buyer can exercise his option any time prior to the expiry date.

Q.17. Write a short note on 'Advantages of Commodity Trading. **Or**
Write a short note on 'Commodity market'

Ans.

- Commodity Market is an important constituent of the financial markets of any country.
- It is the market where a wide range of products, viz, precious metals, base metals, crude oil, energy etc are traded.
- It is important to develop a vibrant, active and liquid commodity market.

Advantages of Commodity Trading

1) A good low-risk portfolio diversifier
2) A highly liquid asset class, acting as a counterweight to stocks, bonds and real estate.
3) Less volatile, compared with equities and bonds.
4) Investors can leverage their investments and multiply potential earnings.
5) Better risk-adjusted returns
6) A good hedge against any downturn in equities or bonds as there is little correlation with equity and bond markets.
7) High co-relation with changes in inflation.

Q.18. Briefly discuss about the skills which forex manager is expected to posses.

Ans.

- Awareness of historical development of world trade.
- Ability to forecast future trends.
- Comparative Analysis skills.
- In-depth knowledge of forex market.
- Knowledge of interest rates.
- Willingness to undertake risk.
- Knowledge of hedging strategies.

Q.19. Distinguish between spot contract and forward contract.

Ans.

S NO.	Spot Contract	Forward Contract
1	Spot rate is the current exchange rate and is used for immediate delivery of currency.	Forward is the currency rate which is determined at present for future delivery.
2	The parties to the contract transact on the basis of their present capability.	The parties to the contract transact on the basis of their future capability.
3	Execution of the contract is more or less certain.	The contract may not be executed.
4	Spot transaction is for the present time i.e. to be settled within two working days.	Forward contract can be for a maximum period of 6 months

Q.20. Briefly discuss the advantages of 'forward market'

Ans. Advantages of Forward Markets

a) Forward contracts are useful hedging tools
Hedging is the process of risk management under which the risks emanating from a transaction are covered or mitigated.

b) Forward contracts help in price discovery
The time gap between signing or formulation of a forward contract and its execution gives rise to uncertainty.

Q.21. **[Dec 2010]** Distinguish between the 'Clearing mechanism' and 'settlement mechanism'.

Ans.

Basis	Clearing mechanism	Settlement mechanism
Meaning	It is a process carried out to calculate which party owner the other and by how much.	Settlement mechanism refers to the process of settling out the net position i.e. give or take of the instruments/ securities as well as money.
Who & When	Clearing corporation of the stock exchange perform this clearing function.	Settlement cycles are fixed in advance such As 1&2 days i.e. settlement will take place after 2 days of entering the transaction.

DERIVATIVE - OPTIONS

INTRODUCTION
CALL OPTION
PUT OPTION
EUROPEAN OPTION
AMERICAN OPTION
PARTIES IN OPTION CONTRACT
(A) OPTION WRITER OR OPTION SELLER
(B) OPTION OWNER OR OPTION HOLDER
IN THE MONEY
OUT OF THE MONEY OPTION
AT THE MONEY OPTION

Q. 1. Consider the following six cases of Call option:

	Case 1	Case 2	Case 3	Case 4	Case 5
Spot price at Expiration	80	90	100	110	130
Strike price	100	100	100	100	100

Find in each case:
(i) whether the option is in–the–money, at the money or out–of–the money and
(ii) value of option (to its owner) at expiration.

Q. 2. What will be your answers if the option referred in Q. 1.
(i) are put options ?

Q. 3. Mr. X has purchased a 1 – month call option of ABC Co.'s share with an exercise price of Rs. 51. Determine the value of Call option at expiration if the share price at expiration turns out to be either 47 or 54. Draw a diagram to illustrate your answer.

Q. 4. Mr. X purchased a 3 – months call option from Mr. Y for shares of X Ltd. at a strike price of Rs. 150. Call Premium Rs. 5. Current price Rs. 145. Explain profit / loss (also called "pay off") to X is well to Y, if prices at expiration are Rs. 120, Rs. 130, …….. or Rs. 180.

Q. 5. Mr. X purchased a 3 – months put option from Mr. Y. Strike price Rs. 125, put premium Rs. 5. Current price Rs. 120. Prepare a table and a graph to show pay – offs of Mr. X if expiration prices are Rs. 100, 105, 110, 115, …… or 150. Do the same exercise for Y as well.

STRADDLES AND STRANGLES

Q. 6. Mr. X purchases a 3 – months call as well 3 – months put, both at strike price of Rs. 75. Premium of Call Rs. 3. Premium of put Rs. 2. Prepare a table and draw a graph to show pay – offs of Mr. X is expiration prices are 60, 65, 70, 71, 72, 73, 74……80, 85 or 90. Do the same exercise for Y as well. Find whether the maximum amount of loss to Mr. X is equal to call premium plus put premium.

Q. 7. Consider all the particulars of above question with one change, i.e. the strike price for call is Rs. 74. Revise your answers.

Q. 8. A person purchased a call with an exercise price of Rs. 90 at a premium of Rs. 5. He also purchased a put with an exercise price of Rs. 85 at a premium of Rs. 6. Both the calls have same expiration date. At what price(s) will be strangle breakeven ?

STRIPS & STRAPS

Q. 9. The following options are Q.No uoted at the market:

Option	Expiration	Strike price	Premium
Call	1 month	Rs. 48.50 / $	Rs. 0.30
Put	1 month	Rs. 48.50 / $	Rs. 0.05

A trader is looking at the above options and planning to adopt long strip or long strap strategy to make profit from the rupee – dollar exchange rate volatility.

You are required to:

Show the pay – offs profile and indicate break – even points for strip and strap strategies in a price range of Rs. 47 to Rs. 50 for a dollar.

Q.10. What is a strangle ? What will be the pay off profile of a trader who adopts strangle strategy under the following details:

OPTION	STRIKE PRICE	PREMIUM
Put	Rs. 1.71	Rs. 0.10
Call	Rs. 1.75	Rs. 0.05

Q.11. What is a straddle? If a trader goes long by adopting a straddle strategy what will be his / her pay off profile given the following option details:

OPTION	STRIKE PRICE	PREMIUM
Call	0.5890	0.015
Put	0.5880	0.020
Put	0.5890	0.018
Call	0.6110	0.010

Future & Forward

Q.12. Mr. Brave gave a loan to Mr. Y amounting to Rs. 1,00,000/- with continuous compounding interest rate p.a. of 12% for 3 months. What is the Maturity Value ?

Ans. 103045.42

Q.13. Mr. Hurry is going to receive Rs .8,000/- on zinfosys stock in 3 months time from now. He would like to know the present value of dividend if riskfree continuous compounding rate p.a. is 16%.

Ans. 7686.32

Pricing of Forward & Future Contracts

Securities providing no income

Q.14. A Ltd. a company that historically has not paid any dividend and has no plans to do so in the future, is currently being quoted at the Bombay Stock Exchange at Rs. 60/-. You wish to enter into a futures contract on this stock maturing in 3 months time. If the risk free rate of return is 8% per annum continuously compounded what do you expect the futures price to be ? If the futures contract were priced at Rs. 64, what action would you take ? In case it is priced at Rs. 61 will your decision change ? **Ans.** FFP = Rs. 61.21

Securities providing a known cash income

Q.15. ABC Ltd. is quoted in the market at Rs.40. A 6 – month futures contract on 100 shares of ABC Ltd. can be bought. The risk free rate of interest is 12% per annum continuously compounded. ABC Ltd. is certain to pay a dividend of Rs. 2.5 per share 3 months from now. What should be value of the futures contract ? If the futures contract is priced at Rs. 4100 what action would follow ? If it is priced at Rs. 3800 what would you do ? **Ans.** FFP = Rs. 3990

Securities providing a known yield

Q.16. If Learning Point Ltd. provided a dividend yield of 4% per annum, the current value of the stock is Rs. 500 and that the continuously compounded risk free rate of interest is 8% per annum, what would be the value of a 3 – month futures contract? If the futures price is Rs. 510 what action would follow? Will the position change if the price is Rs. 490?

Ans. FFP = 505.025

Carry type Commodities

Q.17. Consider a 6 – month gold futures contract of 100gm. If the spot price is Rs. 600 per gram and that it costs Rs. 3 per gram for the 6 – monthly period to store gold and that the cost in incurred at the end of 2 months. If the risk rate free rate of interest is 12% per annum continuously compounded, compute the futures price ? If the futures were available at Rs. 620, what action would follow ? Would the position change if the futures were available at Rs. 660?

Ans. FFP 64022

Non – Carry Type Commodities

Q.18. The spot price of steel scrap is Rs. 5000 per ton. The one – year futures price is Rs. 5802. The interest rate is 15%. The present value of storage cost is Rs. 250 per annum. Compute the convenience yield assuming that the futures are fairly priced.

Ans. 5%

Index Futures

Q.19. A 3 month futures contract on NIFTY is available at a time when the NIFTY is quoting 1800 points. Continuously compounded risk free rate of interest is 10%. Continuously compounded yield on the Nifty stocks is 2% per annum. One futures contract equals 200 Nifty. How much will you pay for Nifty futures. If the Nifty forward trades at 1825 what action would follow ?

Ans. 1836

OPTION VALUATION:

(i) PRICE DIFFERENCE APPROACH

Q.20. Given the following data:

Strike Price = Rs. 180
Current Price of one share = Rs. 200
Risk free rate of interest = 10% p.a.

(i) Calculate theoretical minimum price of European call option expiring after one year. **Ans.** 37.13

(ii) If price of the call option is Rs. 30, then how can an arbitrageur make profit. **Ans.** 7.88

Q. 21.Given the following data

Strike Price = ` 400
Current Stock Price = ` 370
Time Until expiration = 6 months
Risk Free Rate of Interest = 5% p.a.

(i) Calculate theatrical minimum price of a European put option.

(ii) If European put option price is ` 10, then how can an arbitrageur make profit.

Ans. (i) 20.13 (ii) 10.39

EXPECTED GAIN APPROACH

Q.22. Loco Banking Company common stock has a present market price per share of $ 28. A 6 – month call option has been written on the stock with an exercise price of $ 30. Presently the option has a market value of $ 3. At the end of 6 months, you estimate the market price of the stock to be $ 24 per share with a probability of .1, $ 28 with a probability of .2, $ 32 with a probability of .4, $ 37 with a probability of .2, and $ 43 with a probability of .1.

(a) What is the expected value of share price 6 month hence ? What is the expiration value of the option if that expected value of share price should prevail ? **Ans.** 32.50, 2.50

(b) What is the expected value of option price at expiration, assuming that the option is held to this time ? Why does it differ from the option value determined in part a ? **Ans.** 3.50

Presently, what is the theoretical value of the option ? Why does it have a positive value?

BINOMIAL MODEL

Q. 23. A share price is currently priced at ` 40, it is known that at end of one month it will be either ` 38 or ` 42, the risk – free interest rate is 8% per annum with continuous compounding. Find the value of a one – month European call option with a strike price of ` 39 with the help of Binomial and Risk Neutralization Model ?

Ans. 1.69

RISK & NEUTRAL METHOD

Q. 24. Find the value of one year European call option using:

Spot Price 200, u = 1.4, d = 0.90, Ex Price 220, r = .15

Note: Value of u indicates possible higher price. u = 1.4. It means if the spot price is 1, at expiration it may be 1.40 i.e. the price may increase by 40%. In other words, at expiration the price may be ` 280. Value of d indicates possible lower price.

Ans. 26.09

BLACK SCHOLES MODEL

Q. 25. Current sales value of share of M Ltd. is 60. There is a call option available with Exercise price = 56 for 6 month period. Find out value of call option given the risk free rate of interest 14%. Standard deviation of share price =0.3. Use Black Scholes Model.

Ans. 9.57

Q. 26. If current price of a share ` 100 and Strike price under 3 – months call option is ` 95. After three months, the price may be ` 150 or ` 70. Risk free rate: 12% p.a. (not compounded continuously). Option writer uses borrowed funds. Calculate Option Premium by Binomial Model ?

Ans. 22.03

Q. 27. Prudencio Jiminez Company's share price is now $60. Six months hence, it will be either $75 with probability of .70 or $50 with probability .30. A call option exists on the stock that can be exercised only at the end of 6 months at an exercise price of $65.

(a) If you wish to establish a perfectly hedged position, what you do on the basis of the facts just presented ? **Ans.** 0.4

(b) Under each of the two possibilities, what will be the value of your hedged position ? **Ans.** 20

(c) What is expected value of option price at the end of the period ? **Ans.** ` 7

Q.28. Current share price ` 100. Risk free rate of return 20% p.a. (not compounded continuously). Find the value of a 3 – months Call option with strike price of ` 100 using Binomial Model assuming that at expiration date the spot price will be either ` 115 or ` 90. Check your answer using Risk Neutral Method. **Ans.** 8.57

Q.29. Current Price ` 120. European Call Option of 6 months. Risk free rate of return = 18% p.a. (not compounded continuously). Possible spot price on expiration: either ` 132 or ` 105. Exercise Price ` 125. Find the value of Call.

Ans. 1366

Q.30. A stock is currently priced at ` 50. It is known that in the first 6 months of current year from the now prices will either rise by 20% or go down by 20%, further in the later half of the year prices may again go up by 20% or go down by 20% in the second step. Suppose risk free interest rate is 5% continuous compounded, and strike rate is ` 52. Calculate value of European Put Option.

PUT CALL PARITY

Q.31. A put and a call option each have an expiration date 6 months hence and an exercise price of $ 10. The interest rate for the 6 – month period is 3 percent.

(a) If the put has a market price of $ 2 and stock is worth $ 9 per share, what is the value of the call ? **Ans.** $ 1.2955

(b) If the put has a market price of $ 1 and the call $ 4, what is the value of the stock per share ? **Ans.** 12.7045

(c) If the call has a market value of $ 5 and market price of the stock is $ 12 per share, what is the value of the put ? **Ans.** 2.7045

Q.32. A six month call option for a share has the exercise price of `38 along with probabilities and price at expiration date as below:

Probabilities	0.10	0.25	0.30	0.25	0.10
Price of share	30	36	40	44	50

What is the expected price of the share after six months ? What is the value of option ? What is the value of option assuming interest rate to be 12% p.a. ? What is the value of option assuming interest rate to be 12% p.a. continuously compounding.

Ans. 40, 3.30, 3.11, 3.107

Q. 33. Spot price `60. A one year European Call Option is being quoted in the market at option premium of `15 with exercise price of `55. Risk – free return = 12% p.a. (not compounded continuously). If one possible spot price at expiration is `42, find the other one.

Ans. ` 81

Q.34. From the following data calculate price of a call option expiring after one year:

Let spot exchange rate	=	`60 per pound
Exercise / Strike rate	=	`64 per pound
Risk free interest rate for Rupees	=	15% p.a.
Risk free interest rate for Dollars	=	20% p.a.

Expected range of (Maximum and Minimum) spot rate on maturity of option after one year = `76.25 – `45 per pound.

Ans. 4.261

Q. 35. The spot price of a bond is `900 and one year's futures rate is `930. Interest payments of `40 are due after 6 months and after 1 year from today. The risk free rate of interest for 6 months and 1 year period are 9% and 10% respectively. Find out the profit of the investor. What should be his strategy if he holds one bond and the futures price is ` 905.

Ans. FFP 912.40 Gain 17.60, 7.40

Q. 36. An investor buys a Sensex Futures at 5500 in market lot of 200 futures. On the settlement date, the Sensex is 5600. Find out his profit or loss for one lot of futures. What would be his position, if the Sensex is 5450 on the settlement date ?

Ans. Gain 20000, Loss 10000

Q.37. An investor buys a NIFTY futures contract for `2,80,000 (lot size 200 futures). On the settlement date, the NIFTY closes at 1,378. Find out his profit or loss, if he pays ` 1,000 as brokerage. What would be position, if he has sold the futures contract ?

Ans. Loss 5400, Gain 3400

Q.38. The shares of Yellow pages Ltd. are being traded at ` 250 on the BSE. Its futures for 1 month, 2 months and 3 months are also available on the BSE. If the risk free rate is 12% p.a. and no dividends are expected during this period, what should be eQ. uilibrium price of these futures ?

Ans. 252.50,255.05, 257.61

Q. 39. An investor buys 500 shares of X Ltd. @ ` 210 per share in the cash market. In order to hedge, he sells 300 futures of X Ltd. @ 195 each. Next day, the share price and futures decline by 5% and 3% respectively. He closes his positions next day by counter transactions. Find out his profit or loss.

Ans. Net loss 3495

Q.40. The market lot of NIFTY futures is 200 an the two months NIFTY futures are available at 1700. An investor creates a long position and buys 5 lots. On the settlement, the NIFTY is 1730. Find out the profit or loss of the investor.

Ans. Profit 30,000

Q. 41. Consider the following date relating to KM stock. KM has a beta of 0.7 with NIFTY. Each Nifty contract is equal to 200 units. KM now quotes at `150 and the Nifty futures is 1400 Index points. You are long on 1200 shares of KM in the spot market.

(i) How many futures contracts will you have to take ?
(ii) Suppose the price in the spot market drops by 10%, how are you protected ?
(iii) Suppose the price in the spot market jumps up by 5%, what happens?

Ans. 4.2

Q. 42. Consider the following date relating to KM stock. KM has a beta of 0.7 with NIFTY. Each Nifty contract is equal to 200 units. KM now quotes at `150 and the Nifty futures is 1400 Index points. You are short on 1200 shares of KM in the spot market.

(i) How many futures contracts will you have to take ?
(ii) Suppose the price in the spot market drops by 10%,how are you protected ?
(iii) Suppose the price in the spot market jumps up by 5%, what happens?

Q. 43. Identify the action to be taken in respect of the following situations ?

Stock beta	Stock position	Stock Value (` lakh)	Hedge needed
0.8	Long	2	Full
1.2	Long	5	Full
0.9	Short	1	Full
1.0	Long	2	50%
1.3	Short	4	110%

Q. 44. On September 13, 2005 a trader buys one Nifty Index Futures contract at 1,870. The initial margin requirement for the contract is ` 10,000 while the maintenance margin is 75% of initial margin. (Nifty Index Futures are traded in multiples of 200). Its settlement prices for the next 8 trading days are as follows

Dates	Settlement Price
September 13	1865
September 14	1858
September 15	1853
September 16	1847
September 17	1849
September 20	1855
September 21	1872
September 22	1879

On September 23, the investor closes his position when futures price was 1883. You are required:

(a) Prepare the margin account showing all the cash flows (assume no amount is withdrawn from the margin account).

(b) Calculate profit/loss.

Q.45. Nifty Index is currently quoting at 1329.78. Each lot is 250. P purchases a March contract at 1364. He has been asked to pay 10% initial margin. What is the amount of initial margin ? Nifty futures rise to 1370. What is the percentage gain ?

Ans. Gain 1500, 4.4%

Q.46. An investor buys a put option at a strike price of `30 for a premium of `6. The current market price of the share is `28. Find out the profit/loss profile of the investor if the market price of the share is `18, `26, `28, `31 or `39, on the expiration date. What will be his position if he buys the call option ?

Q.47. The equity shares of Ramacast Ltd. are being sold at `210. A 3-month call option is available for a premium of `6 per share and a 3-month put option is available for a premium of ` 5 per share. Find out the net pay off of the option holder of the call option and put option given that (i) the strike price in both cases is `220, and (ii) the share price on the exercise day is `200 or ` 210 or `220 or ` 230 or ` 240.

Q.48. The shares of Intro Chemicals Ltd. are currently traded at `42. An investor buys a put option for `3 at the strike price of `40. Under what situation, the investor would be able to make profit ? When he would exercise the option ? Show the profit/loss profile of the investor with help of diagram.

Q. 49. The share of Blue Ink Ltd. is currently traded at `47. An investor writes a call option for a strike price of `50 for a premium if `5. Under what circumstances does the investor make profit ? Show the profit/loss profile of the investor.

Q.50. Explain the reason why the investors are not required to pay margin in case of buying the option (call or put), but are required to pay margin (mark to market) in case they write (sell) options.

Ans. In case, the investors buy the option, they have to pay only the option premium but not the margin. The reason being that when an investor buys an option, he may or may not exercise it. Obviously, he would exercise the option only when he expect a profit from such action. So, in case of buying an option, there is no future liability. Therefore, mark to margin not required for buying the option.

However, in case when investor writes an option, he incurs a future liability because the option can be exercised against him. So, a margin is required to be paid by option writer to the exchange. There is potential future liability of the option writer, and margins are required to protect against the risk of a default by the investor (writer).

Q.51. Call options on a share are available for a period of 3 months for the strike price of `15, `17.50, and `20 for a premium of `4, `2 and Re.1 respectively. Explain how an investor can create a butterfly spread. Also find out the profit potentialities for different prices of shares on the expiration date ?

Q.52. You are given three call options on a stock at exercise price (K) of `40, `45 and `50 with expiration date in three months and the premium of `4, `2 and Re.1 respectively. Show how the options can be used to create a butterfly spread. Construct a table with different market prices and show how profit changes with stock prices ranging from `30 to `60 for the butterfly spread.

Q.53. Am investor has purchased a call option at the strike price of `90. Before the expiration date of the call, the company split the shares in the ratio of 3:1. Explain how the terms of the call option would change?

Ans. In case of share split, the strike price as well as the number of shares under the call option, both change. In the given case, all shares have been split into 3 shares each. The strike price will, therefore, be `30 only and each call option purchased would stand for 3 shares.

Q. 54. The shares of His Majesty Ltd. are being traded at `36. An investor buys a put option at a strike price of `40 for a period of 6 months at a premium of `2. In order to cover his risk, he buys one share today by taking a loan @ 10% p.a. Analyze the profit/loss profile of the investor.

Ans. Gain 0.06

Q.55. The current market price of the equity shares of Redrey Ltd. is `70 per share. It may be either `90 or `50 after a year. A call option with a strike price of `66 (time I year) is available. The rate of interest applicable to the investor is 10%. An investor wants to create a replicating portfolio in order to maintain his pay off on the call option for 100 shares.
Find out the Hedge ratio, Amount of borrowing, Fair value of the call and his cash flow position after a year.

(a) Continue with (a) part, however, the market value of the call option (100 shares) is different from the fair value. Show, how an investor can make net profit by taking an arbitrage opportunity if the market value of the call option is `1,600 or `1,400.

Ans. Fair value of call option 1472, Amount of Browing 2727.27, Hedge ratio 0.6

Spreads :- A spread involves holding different positions in the same type of option having same maturity an investor creating a spread buys and sells .the same type of option with different strike prices with a different intention for each type of spread .

Bull Spread (Strategy) :- An investor hopping rise in prices of an underlying asset may create a " BULL SPREAD " A bull spread involves holding different positions in the same type of option in a manner that if the prices go up he gains

Explanation of strategy :- An investor creating Bull spread may purchase 1 call option with a strike price below or near to the current market price and sell one call option with a strike price above the current market price .

A Bull spread is designed in a manner that in the case of price those down the loss is limited in case the price go up , the profit is limited

Q.56. An investor sells a call option at a strike price of `1,000 option premium charged by him was ` 50 .He simultaneously buys a call option having a strike price of ` 900 after paying a premium of ` 90 .Required :

1. Name of above strategy.
2. Compute cost of strategy
3. Determine Break Even point.
4. Determine profit .loss if the price on maturity is ` 800, 850, 900, 950,980, 1000, 1050, 1080, 1100, 1200.
5. Draw the pay –off the strategy.

Ans. 1 Bull spread : cost = Rs 40 ; BEP =` 940: 4 Profit /Loss = (40) , (40),(40),20,)20),(10) 40,80.

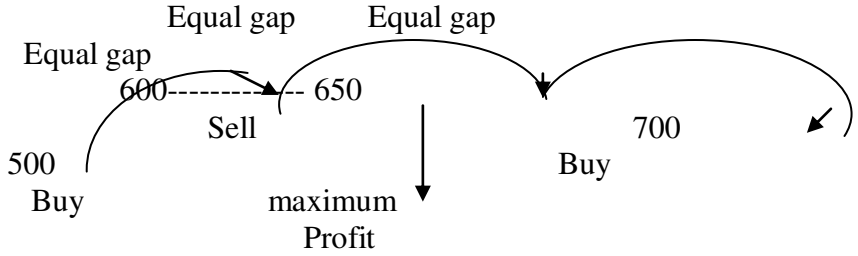
Bear spread strategy :- An investor expecting the current market price of an underlying assets to go down may create a Bear Spread .the investor in such a case would create a trading strategy which involves taking position of a writer /seller and a buyer /Holder in the same type of option (i.e. two puts or two calls

Q.57. An investor hoping the prices of a share to go down buys a call option at a strike price of ` 1,000 after paying a premium of ` 50 and sells a call option at a strike price of ` 900 after charging a premium of ` 90 .
Required :

1. Name of above strategy .
2. Determine the maximum loss & maximum profit of the strategy .
3. Determine Break Even point .
4. Determine profit .loss if the price on maturity is ` 800, 850, 880, 900, 950, 980, 1000, 1050, 1080, 1100.
5. Draw the pay –off the investment .

Ans. 1 Bear spread 2 maximum profit =`40 & maximum Loss = ` 60; 3. BEP =` 940; 4. Profit /Loss = 40, (10), (40), (60), (60), (60), (60), (60)

CONDOR SPREAD STRATEGY :-



A condor spread strategy involves taking different position with options at 4 different strike prices .If can be created by buying a call option with a relatively low strike price and also buying a call option with a relatively high strike price and selling two call options at a strike price between the above two entrance (at two different strike price)

Q.58. Mr. X buys a 2 months call option with a strike price of ` 400 and other a call option at a strike price of ` 550 by paying on option premium of `100 and ` 30 respectively . He sells two call option with the same maturity having a strike price of ` 450 and ` 500 after charging a premium of ` 75 and ` 45 respectively . Required :

1. Name of the strategy .
2. Cost of strategy
3. compute the Break Even point
4. Compute the profit .loss if the price on maturity is ` 350, 380, 400, 440, 450, 460, 480, 500, 520, 540, 550, 560, 580, 600, 620
5. Draw the pay –off the statergy

Ans. Condor spread strategy cost = Rs 10 ;3. BEP =` 410 & ` 540 Profit /Loss = (40) , (40), (40), 20, 0, (10), (10), (10) 10, (10).

BULL CYLINDER STRATEGY or SPLIT STRIKE ZERO OPTION BULLISH STRATEGY This strategy offers a Bullish Approach .It is constructed with a short put at one exercise price and long call at a higher strike price such that the short put premium offsets the long call premium .In other words , the cost of strategy should be Zero .

Q.59. Mr. X buys a one month call option at a strike price of ` 1,000 on share of TISCO after paying a premium of ` 50 .He further sells one month put option of a strike price of ` 950 after charging a premium of ` 50 .

Required :

1. Compute the cost of strategy .
2. Name of the strategy .
3. Compute the profit .loss if the price on maturity is ` 800, 850, 900, 950, 1,000, 1050, 1100, 1150
4. Draw the pay –off the strategy

Ans. 1.Cost =0; 2.Bear cylinder Strategy 3.Profit /Loss= (150),(100),(50),0,0,50,100,150]

BEAR CYLINDER STRATEGY OR SPLIT STRIKE ZERO COST OPTION

BEARISH STRATEGY:- This strategy offers a Bearish Approach .It is constructed with a long put at one exercise price and short call at a higher strike price such that the long put premium offsets the short call premium .In other words , the cost of strategy should be Zero.

Q.60. Mr. X buys a one month put option at a strike price of ` 950 on one share of CISCO after paying a premium of ` 50 .He further sells 1 month call option of a strike price of ` 1000 after charging a premium of ` 50.

Required :

1. Compute the cost of strategy .
2. Name of the strategy .
3. Compute the profit .loss if the price on maturity is ` 800,850,900,950 1,000,1050,1100,1150
4. Draw the pay –off the strategy

Ans. 1.Cost =0; 2.Bear cylinder Strategy 3.Profit /Loss= (150), (100), (50), 0, 0, 50, 100, 150]

PROTECTIVE PUT STRATEGY: -An investor who has purchased a share may be afraid of the risk from fall in prices :- Hence in order to limit his downside risk (i.e. risk from fall in price) he may purchase a put option at the strike price equal to the market price at which share is share is purchased . If price go up , he will not exercise his option but if the prices go down , he will exercise his put option

Q.61. Mr. X has purchased a share of HUL at a price of ` 500 .Desired holding period is 3 months .However he is affaired that the price may fall from the level of ` 500 .Hence in order to hedge his risk he purchases a put option with atrike price of ` 500 by paying a premium of Rs 40 required

1. Determine Break Even point.
2. Name of the strategy.
3. Compute the profit /loss if the price on maturity is ` 450, 480, 500, 520, 550, 580, 620.
4. Draw the pay –off of Mr. X

Ans. 1.Bep =`540; Protective

COLLAR STRATEGY: The strategy is long asset and long protective put at the same strike price equal to the market price at which the share is purchased and a short call at a higher strike price which reduces cost of strategy and also potential of profit .

Q.62. Mr. X has purchased a share of ITC at a price of ` 350 .Desired holding period is 3 months however he is a faired that the price may fall from the level of ` 350. He purchases a 3 months put option with a strike price of ` 350 by paying a premium of ` 30. He also sells a 3 month call option at a strike price of ` 410 by receiving ` 30

Required

1. Determine BEP
2. Name of strategy .
3. Compute profit /Loss if the price on maturity 300, 350, 380, 400, 410, 440, 450
4. Draw pay = Pay off of Mr. X

DELTA

- Delta is used to study the option price sensitivity .It is defined as the change in option premium relative to the price movement in the underlying asset.
- If measure by what extent the option premium moves if the price of the underlying assets moves by one unit.
- Say that past observation had measured the delta as 0.6 .Than a 10 p change in the price of the shares could be expected to produce a 6 p change in the price of the option.
- For a call option the delta will always be tve, put for a put option, the delta will be ve this is logical strike the price of the put will move in the opposite direction to changes in the shares price.
  Secondary, the maximum value a delta of a call option can take is to 1.0 .This is because we can movers see option price increasing more than the price of the underlying. Similarly delta of a put option cannot be less than 1.0.

Q.63. Mr. Manish a fund manager has, 10,000 TISCO equity shares in his portfolio. Beta of TISCO is 1.2 with Nifty contact is 200 units. TISCO is now at ` 250 .The purchase price Nifty futures are quoting at 1600. Suggest the hedging strategy for Manish under the following conditions:

a) Manish feels that TISCO would fall
b) Manish feels that TISCO would rise substantially.
c) Manish is not sure of movement of TISCO share price.

Q.64. On Nov. 2014 when the spot price for Maruti Udyog is ` 432/share, X sells 10 contracts of December Maruti Udyog futures at ` 456 .Assume that each contract covers 50 shares .Assume that the initial margin for Maruti Udyog futures is ` 810 per contract and the maintenance margin is ` 600 per contract .Daily settlement prices for the two days are as follows :

Nov 14 460

Nov. 15 426

Assume that whenever he is allowed to withdraw money from margin account , he withdraw the maximum amount allowed .What is the margin call on Nov. 14th ? What is the Balance in the account at the end of both days ?

Q.65. You have bought 1000 shares of LP Ltd. LP has a beta 1.1 with the Sensex. Each Sensex contract is equal to 50 units. LP now quotes at `100 and the Sensex futures is available at 4500 Index Points.

Required:

(i) How many futures contracts will you have to take ?
(ii) If the price in the spot market drops by 12%, how are you required?
(iii) If the price in the spot market jumps by 5%, what happens ?

Ans. (i) 22 (ii) 12000 (iii) 5000

Q.66. A portfolio manager owns 3 stocks:

Stock	Shares owned	Stock Price	Beta
1	1 lakh	400	1.1
2	2 lakhs	300	1.2
3	3 lakhs	100	1.3

The spot Nifty Index is at 1350 and futures price is 1352 to use stock index futures to (a) decrease the portfolio beta to .8 and (b) increase the portfolio beta to 1.5. Assume the index factor is 100. Find out the number of contracts to be bought or sold index futures.

Q.67. A portfolio manager has the following five stocks in his portfolio.

Security	No. of shares	Price/Share	β
A	10,000	50	1.2
B	5,000	20	2.0
C	8,000	25	0.7
D	1,000	100	1.0
E	500	200	1.3

(i) Compute portfolio beta.

(ii) If the manager wants to reduce the beta to 0.8, how much of risk free investment should he bring in ? What will be the new portfolio?

(iii) If the manger wants to increase the beta to 1.4, how much of risk free investment should he bring in ? What will be the new portfolio?

(iv) Suppose Nifty spot is 1200 points and Nifty futures is 1250 points and futures have a contract multiplier of 200, how can he obtain the same position as in (b) by dealing in Nifty Futures ?

(v) How can he obtain the same position as in (c) by dealing in Nifty futures?

Ans. (i) 1.17(ii) 0.684 (iii) 1.197 (iv) -1.542 (v) 0.9583

Q.68. A few months ago, futures have been introduced on the sensex. An arbitrageur is interested in creating a hypothetical index portfolio to understand the concept of stock index arbitrage and how to gain from it. He has collected the following information:

- The current index is 3495.
- The dividend yield on the index in 6 month is 4%.
- The rate on 364 day T-bills is 9.5%.
- 70% of the companies included in the index are likely to pay dividend in the next six-months.
- Each futures contract is for a value of 100 times the index.
- Actual future price ` 3700 .

You are required to:

(a) Calculate the fair price of a six-month index futures contract.

(b) How can the information available in (a) above be used by an arbitrageur? Calculate the arbitrageur's gain/losses of the index is at 3400 or at 3800 at the end of six – months.

Q.69. The Government of India bond future for September trades at `103.78. The September 103 call trades at 1.29 and September 103 put trades at 0.53 both are the option on September future. Compare relative cost of buying future and creating synthetic Long. (long call/Short put)

Q.70. State whether each one of the following is in the money, at the money or out of the money.

Option	*Exercise Price*	*Stock Price*
Call	60	55
Call	50	50
Call	110	105
Call	40	35
Put	110	100
Put	105	115
Put	12	15
Put	25	20

Ans.

Option	EP	SP	Answer (Action)
Call	60	55	Out of the money (lapse)
Call	50	50	At the money (indifferent)
Call	110	105	Out of the money (lapse)
Call	40	35	Out of the money (lapse)
Put	110	100	In the money (exercise)
Put	105	115	Out of the money (lapse)
Put	12	15	Out of the money (lapse)
Put	25	20	In the money (exercise)

Low Down #3: Intrinsic Value and Time Value

An option's premium consists of two parts (a) Intrinsic value and (b) Time value. Intrinsic value is that part of the option premium which represents the extent to which the option is in the money. It is real worth of the option. The balance (Premium less Intrinsic Value) represents the time value and is the premium paid for the time value of money.

Q.71. A stock with a current market price of ` 50 has the following exercise price and call option premium. Compute intrinsic value and time value.

Exercise price	45	48	50	52	55
Premium	5	6	4	5	7

Ans.

Exercise Price	Option Premium	Nature	Intrinsic Value	Time Value
45	5	In	5	0
48	6	In	2	4
50	4	At	0	4
52	5	Out	0	5
55	7	Out	0	7

Q.72. A stock with a current market price of ` 50 has the following exercise price and put option premium. Compute intrinsic value and time value.

Exercise price	45	48	50	52	55
Premium	5	6	4	5	7

Ans.

Exercise Price	Option Premium	Nature	Intrinsic Value	Time Value
45	5	Out	0	5
48	6	Out	0	6
50	4	At	0	4
52	5	In	2	3
55	7	In	5	2

Low Down #4: European Option and American Option

When an option can be exercised on or before the expiry date it is called an American option. When an option can be exercised only on the expiry date it is called a European option.

Q.73. A call on Reliance stock can be exercised any time before 30th June. A put on Hindustan Lever stock can be exercised only on 25th July. A call on Tata Motors stock can be exercised only on 30th May. A put on Tisco can be exercised on or before 30th Aug. Identify the nature of the option, the underlying asset, type of option and the expiry date.

Ans.

Underlying Asset	Type of Option	Expiry Date	Nature of Option
Reliance Shares	Call	30th June	American
Lever Shares	Put	25th July	European
Tata Motors Shares	Call	30th May	European
Tisco Shares	Put	30th Aug	American

Q.74. European call option

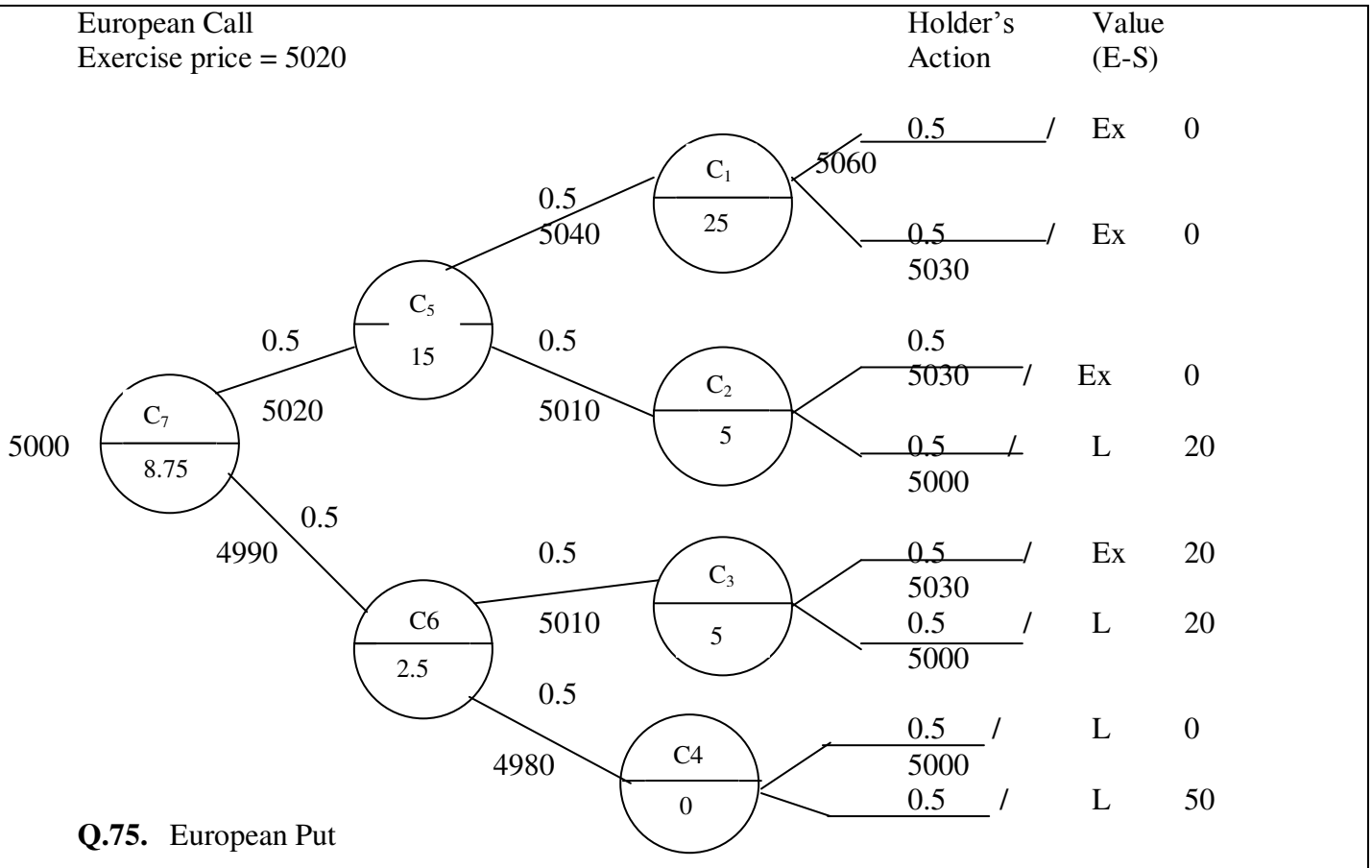
A stock index at 5000 points. There is a 50% probability that it will change either up by 20 points or down by 10 points in each month. Consider a European call option on this index with an exercise price of 5020, which will expire in three months.

a. Find the value of the European call ?
b. If the actual price of the call were `12, what strategy would you adopt ?
c. The actual price if the call were ` 6, will your strategy change?

Ans.

At	C1		=	(40 x 0.5)	+	(10 x 0.5)	= 25
	C2		=	(10 x 0.5)	+	(0 x 0.5)	= 5
	C3		=	(10 x 0.5)	+	(0 x 0.5)	= 5
	C4		=	(0 x 0.5)	+	(0 x 0.5)	= 0
At	C5	= (C1,C2)	=	(25 x 0.5)	+	(5 x 0.5)	= 15
At	C6	= (C3,C4)	=	(5 X 0.5)	+	(0 x 0.5)	= 2.5
At	C7	= (C5,C6)	=	(15 X 0.5)	+	(25 x 0.5)	= 8.75

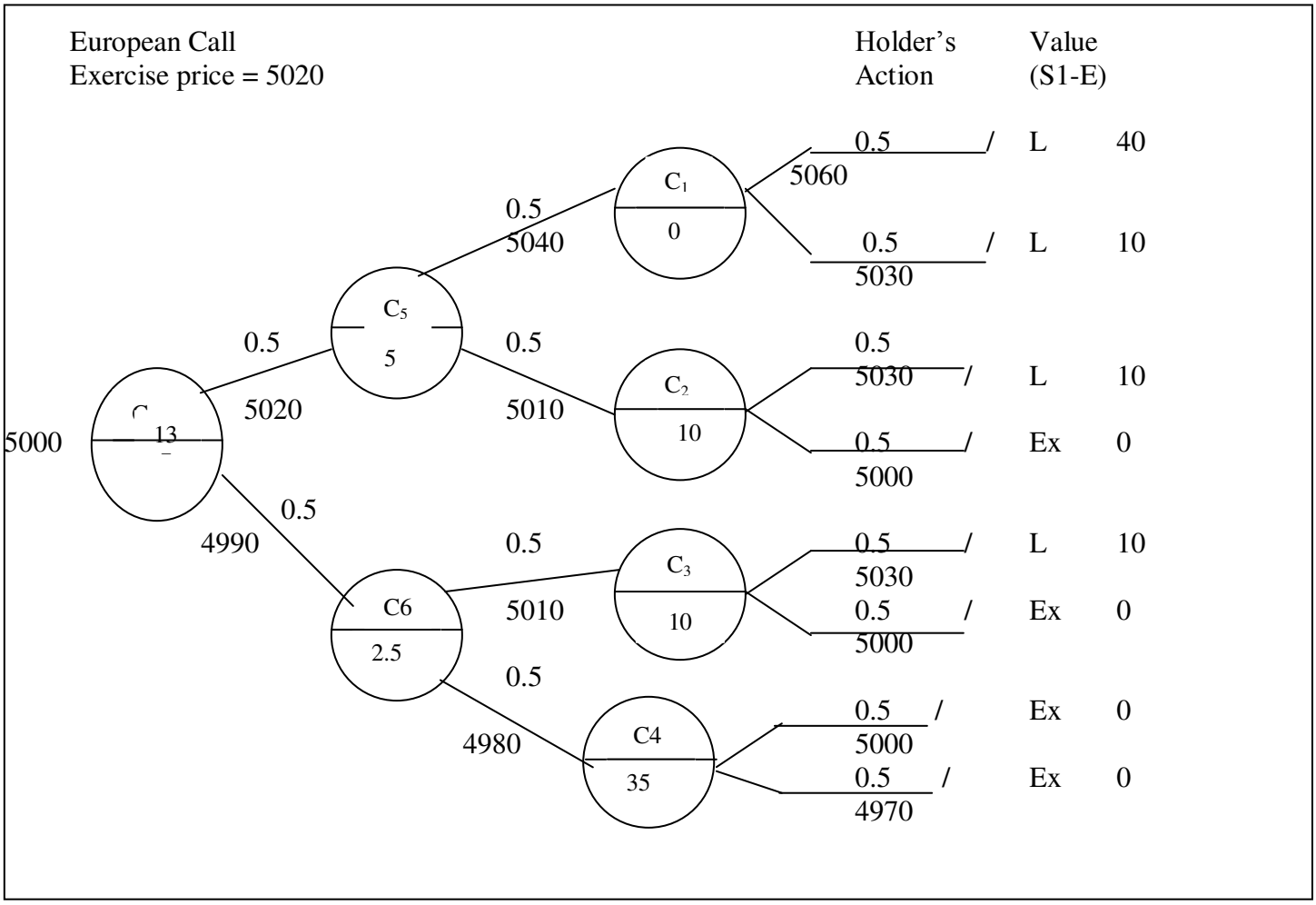
a. Value of European call = ` 8.75
b. If actual price = `12, being overvalued it should be sold.
c. If actual price = `6, being under valued, it should be bought.



Q.75. European Put

Consider the data in the concept above.

a. Find the value of the European put ?
b. If the actual price of the put were `11, what strategy would you adopt.
c. If the actual price of the put were `18, will your strategy change ?



At	C1		=	(0 x 0.5)	+	(0 x 0.5)	=	0
	C2		=	(0 x 0.5)	+	(20 x 0.5)	=	10
	C3		=	(0 x 0.5)	+	(20 x 0.5)	=	10
	C4		=	(20 x 0.5)	+	(50 x 0.5)	=	35
At	C5	= (C1,C2)	=	(0 x 0.5)	+	(10 x 0.5)	=	5
At	C6	= (C3,C4)	=	(10 X 0.5)	+	(35 x 0.5)	=	22.5
At	C7	= (C5,C6)	=	(5 X 0.5)	+	(22.5 x 0.5)	=	13.75

a. Value of European put = 13.75
b. If actual price = `11, being under valued it should be bought
c. If actual price = `18, being overvalued, it should be sold.

The Black – Schools Model

We worked on the risk – neutral model by first assuming that for an option with a one – year life, the price change in stock happens only once a year. We then graduated to the binomial model by keeping the option life at the same one year, but chipped and chopped up the price change in stocks to happen twice a year i.e. every six months. This was then extended to four times a year or every three months. The process could be extended ad infinitum such that we can consider price changes taking place continuously. At this stage the number of times tends to infinity and the period of changes becomes smallest. To use the binomial model to crack such multi – period changes could be monstrous. Picking the clues from the binomial model, Fisher Black and Myron Scholes landed up with a part ugly, part elegant formula that in later years won them the Nobel Prize.

The Formula

$C = S_0 \times N[d_1] - E \times e^{-rt}.N[d_2]$ = Current MP x $n[d_1]$ – PV of exercise price x $N(d_2)$

$$d_1 = \frac{Ln[S_0 / E] + [r - 0.5\sigma^2]t}{\sigma\sqrt{t}}$$

$$d_2 = \frac{Ln[S_0 / E] + [r - 0.5\sigma^2]t}{\sigma\sqrt{t}}$$

where

σ	=	Standard deviation of continuous compound rate
Ln	=	Natural log
t	=	Time remaining before expiration date (expressed as a fraction of a year)
r	=	Continuous compound rate risk – free rate of return
S_0	=	Current market price
E	=	Exercise price
N	=	Cumulative area of normal distribution evaluated at d_1 and d_2

The Assumptions

1. The option is an European option.
2. There are no transaction charges.
3. There are no taxes
4. The risk free rate is known and is constant over the life of the option.
5. The volatility of the underlying asset is known and is constant over the life of the option.
6. The underlying asset's continuously compounded rate of return follows a normal distribution.
7. The prices of the underlying assets cannot be negative.

A few key issues:

Issue 1: The Black Scholes is an improvement over the binomial model because:

a. It recognizes a continuum of possible outcomes as against the limited number of outcomes assumed by the binomial method.
b. The formula is quicker to use than the binomial method.

Issue 2: Why use the Binomial model at all ?

Because there are times when the Black – Scholes model is not usable like in the case of American options.

Issue 3: Black – Scholes and variability

We used the Black Scholes model to find the value of the option. This was related to the variability of the asset. We can twist the issue around and ask given the call price, what is the variability of the returns of the asset.

Q.76. Consider the following information with regard to a call option on the stock of AB Corp

Details	**Price**
Current share price	` 120
Exercise Price	` 115
Time Period	3
Standard deviation of CCRFI	0.6
CCRFI	10%

Compute the value of the call using Black – Scholes model.

What would be the value of the put ?

If the value of the call is `16 in the market what action would follow?

If the value of the put is `18 in the market what action would follow?

Ans. Call price = $(S_0 \times Nd_1) - (E \times e^{-rt} \times Nd_2)$

Term	Calculation	Result
1. S0	Given	120
2. E	Given	115
3. PV of EP	E x e-rt = 115 x e-0.10x0.25 = 115 x 0.97533	112.16
4. Ln (So)/(E)	Ln (120)/(111)	0.03922

5. $d_1 = \dfrac{\text{Ln } [S_0/E] + [r + 0.5\sigma^2]\, t}{\sigma \sqrt{t}} = \dfrac{0.03922 + (0.1 + 0.18)\, 0.25}{0.3} = 0.3641$

6. $d_2 = \dfrac{\text{Ln } [S_0/E] + [r - 0.5\sigma^2]\, t}{\sigma \sqrt{t}} = \dfrac{0.03922 + (0.1 - 0.18)\, 0.25}{0.3} = 0.064$

7. Nd_1
   d_1 is positive and hence the value falls on the right tail.

   Table value for 0.364 is 0.1406
   Cumulative value = 0.5 + 14.06 = 0.6406 = Nd_1
8. Nd_2
   Cumulative value = 0.5 + 0.0239 = 0.5239

9. Call price = $(So \times Nd_1) - (E \times e^{-rt} \times Nd_2)$
   = [120 x 0.6406] – [112.16 x 0.5239]
   = 76.872 – 58.76 = 18.112

10. Put price = Cp + PV of EP - So
    18.112 + 112.16 – 120 = 10.272

Strategy

Option	Actual option price	Fair option price	Valuation	Decision
Call	16	18.112	Under	Buy call option
Put	18	10.272	Over	Sell put option

Q.77. The stock of Y Ltd., a non – dividend paying stock, is today selling at `72. You wish to enter into a futures contract on this stock maturing in 6 months time.

(i) If the risk free rate of return is 12% per annum continuously compounded what the futures price to be ?
(ii) If the price of futures contract is ` 75, what action would you take?
(iii) In case it is priced at ` 77 will your decision change ?

Ans.

(i) This is non – dividend paying stock
Fair futures price = $So \times e^{-rt}$
So = 72; r = 12% p.a. CC; t = 6 months or 6/12 = 0.5
Fair futures price = $72 \times e^{0.12 \times 0.5} = 72 \times e^{0.06} = 72 \times 1.06184$
Fair futures price = `76.45

(ii) If AFP = ` 75
AFP < FFP. Therefore, future is under – valued. Buy from the futures market & sell in the spot market.
Proof: Sell spot & get ` 72
Invest `72 @ 12% p.a. CC for 6 months = 76.45
Buy in the futures market = ` 75.00
Gain = `1.45

(iii) If AFP = ` 77

AFP > FFP. Therefore, future is over – valued. Buy in the spot market & sell in the futures market.

Proof:
Borrow ` 72and buy the stock
Borrowing Rate @ 12% p.a. CC for 6 months
Repayment of ` 72 including interest = (76.45)
Sell in the futures = ` 77.00
Gain = `0.55.

BUTTERFLY SPREAD

A butterfly spread is created by opening two positions in one strike price and offsetting them with one transaction at a higher strike price and another transaction at a lower strike price. The opening strike price is the average of the higher and the lower strike price and is called the middle strike price.

Q.78. Pain Butterfly with reference to options.

A107: This strategy is adopted by those operators who expect insignificant movements, in the market price of underlying asset. This strategy may result in small amount of profit with limited loss.

It involves positions in options with three different strike prices. It can be created by buying a call at relatively low strike price, say X, buying a call with a relatively high strike price, say X_3, and selling 2 calls with a strike price equal to average of X_1 & X_3 (let's call it as X_2). Generally, X_2 is close to current price in the market.

Example: Current Spot Price `61. Call option Quotations in the market:

Strike Price	Premium
`55	`10
`60	` 7
`65	` 5

Mr. X buys one call at strike price 55 and one call at strike price 65. He sells 2 call with strike price 60. Give pay – offs if spot price on expiry on 51, 52, ……70.

Previous Year Examination Problems of Derivative

Q.79. **[CA Final May 2006]** The market received rumour about ABC Corporation's tie-up with a multinational company. This has induced the market price to move up. If the rumour is false, the ABC Corporation stock price will probably fall dramatically. To protect from this an investor has bought the call and put options.
He purchased one 3 months call with a striking price of `42 for `2 premium, and paid Re.1 per share premium for a 3 months put with a striking price of `40.
(i) Determine the Investor's position if the tie up offer bids the price of ABC Corporation's stock up to `43 in 3 months.
(ii) Determine the Investor's ending position, if the tie up programme fails & the price of the stocks falls to `36 in 3 months.

Ans. (i) Net Loss 200 (ii) Net Gain 100

Q.80. **[CA Final Nov 2006]** From the following data for certain stock, find the value of a call option:

Price of stock now	=	`80
Exercise Price	=	`75
Standard Deviation of continuously compounded Annual return	=	0.40
Maturity period	=	6 months
Annual Interest rate	=	12%

Given:

Number of S.D. from Mean (z)	Area of the left or right (one tail)
0.30	0.3821
0.25	0.4013
0.55	0.2912
0.60	0.2743

Q.81. **[CA Final May 2005]** The following data relates to ABC Ltd.'s share prices:

Current price per share `180

Price per share in the futures market 6-months `195

It is possible to borrow money in the market for securities transactions at the rate of 12% per annum.

Required:

(i) Calculate the theoretical minimum price of a 6 month –forward contract. **Ans.** 191.13
(ii) Explain if any arbitraging opportunities exist. **Ans.** Gain 3.87

Q.82. **[CA Final Nov 2004]** Which position on the index future gives a spectacular, a complete hedge against the following transactions:

(i) The share of Right Limited is going to rise. He has a long position on the cash market of `50 lakhs on the Right Limited. The beta of the Right Limited is 1.25.
(ii) The share of Wrong Limited is going to depreciate. He has short position on the cash market of `25 lakhs on the Wrong Limited. The beta of the Wrong Limited is 0.90.
(iii) The share of Fair Limited is going to stagnant. He has a short position on the cash market of `20 lakhs of the Fair Limited. The beta of the Fair Limited is 0.75.

Q.83. **[CA Final May 2005]** Ram buys 10,000 shares of X Ltd. at `22 and obtains a complete hedge of shorting 400 Nifties at `1,100 each. Ram closes out his position at the closing price of the next day at which point the share of X Ltd. has dropped 2% and the nifty future has dropped 1.5%. What is the overall profit/loss of this set of transaction?

Ans. Gain 2200

Q.84. **[CA Final Nov 2006]** XYZ Ltd. is an export oriented business house based in Mumbai. The Company invoices in customers currency. Its receipt of US $1,00,000 is due on September 1, 2005.

Market Information as at June 1, 2005.

Exchange Rates		Currency Futures			
US $/`		US $/`		Contract Size	`4,72,000
Spot	0.02140	June	0.02126		
1 Month Forward	0.02136	September	0.02118		
3 Months Forward	0.02127				

	Initial Margin	**Interest Rates in India**
June	`10,000	7.50%
September	`15,000	8.00%

On September 1, 2005 the spot rate US $Re. Is 0.02133 and currency future rate is 0.02134. Comment which of the following methods would be most advantageous for XYZ Ltd.

(a) Using Forward Contract. **Ans.** ` 4701457
(b) Using Currency futures. **Ans.** ` 4720639
(c) Not hedging currency rises. **Ans.** ` 4688233

It may be assumed that variation in margin would be settled on the maturity of the futures contract.

Q.85. **(CA Final Nov. 2008)** Suppose a dealer quotes ' All in cost 'for a generic swap at 8% against six months LIBOR flat . If the notional principal amount of swap is ` 5,00,000.

1. Calculate semi-annual fixed payment.
2. Find the first floating rate payment for (i) above if the six months period from the effective date of swap to the settlement date comprises 181 days and that the corresponding LIBOR was 6% on the effective date of swap .

In (ii) above if the settlement is on 'Net'basis, how much the fixed rate payer would pay to the floating rate payer? General swap is based on 30/360 days basis. **(4910)**

Q.86. **(CA Final Nov. 2008)** Calculate the price of 3 months PQR futures .If PQR (FV ` 10 ) quotes ` 220 on NSE and the three months future price quotes at ` 230 and the one month borrowing rate is given as 15 percent and the expected annual dividend yield is 25 percent per annum payable before expiry .Also examine opportunities . **(225.75) gain 2.45**

Q.87. **(CA Final Nov. 2008)** Mr. X established the following spread on the Delta Corporation's stock :

(1) Purchase one 3 month call option with a premium of ` 30 and an exercise price of `550.
(2) Purchase one 3 month put option with a premium of ` 5 and an exercise price of ` 450 .

Delta corporation stock is currently selling at ` 500 .Determine profit or loss if the price of delta corporation

(1) Remains at ` 500 after 3 months
(2) Rises to ` 600
(3) Fallse at ` 350 after 3 months

Assume the size option is 100 shares of Delta Corporation

Q.88. **(CA Final Nov. 2008)**

BSE	5000
value of portfolio	`10,10,000
Risk free interest rate	9% p.a.
Dividend yield on index	6% p.a.
Beta of portfolio	1.5

We assume that a future contact on the BSE index with four months maturity is used to hedge the value of portfolio over next three months .One future contract is for delivery of 50 times the index.

(i) Price of future contract **(5050)**
(ii) The gain on short futures position if index turns out to be 4,500 in three months.

Q.89. **(CA Final June 2009 New)** Share of X Ltd. is currently selling for Rs. 300. Risk free interest rate is 0.8% per month. A three months futures contract is selling for Rs. 312. Develop an arbitrage strategy and show what your risk less profit will be 3 month hence assuming that X ltd. will not pay any dividend in the next three months.

Q.90. **[CA Final May 2011)** The current market price of an equity shares of penchant Ltd. is Rs. 420 Within a period of 3 months, the maximum and minimum price of it is expected to be Rs. 500 and Rs. 400 respectively. if the risk free rate of interest be 8% p.a. what should be the value of a 3 months CALL option under the risk neutral method at the strike rate of Rs. 450 Given $e^{0.0}$=1.0202.

Q.91. **(CA Final May 2012)** Sumana wanded to buy share of EIL which has a range of Rs. 411 to 592 a month later. The present price per share Rs. 421 her broken informs her that the price of this share can sore up to Rs. 522 within a month or so, so that she should buy a one month CALL of EIL in order to be prudent in buying the call the share price should be more then or at least Rs. 522 the assurance of which could not be given by her broker. Though she understands the uncertainty of the market, she wants to know the probability of attaining the share price Rs. 592 so that buying of a one month CALL of EIL at the execution price of Rs. 522 is justified Advice her Take the risk free interest to be 3.60% and $e^{0.036}$=1.037.

Q.92. **(CA Final June 2009)** Consider a two year American call option with a strike price of Rs. 50 on a stock the current price of which is also 50 assume that there are two time periods of one year and in each year the stock price can move up or down by equity percentage of 20% the risk free interest rate is 6% using binominal option model calculate the probability of price moving up and down also draw a tw3o step b nominal tree showing price and payoff at each node.

Q.93. **(CA Final May 2011)** A mutual Fund is holding the following assets in Rs. Crores

Investments in diversified equity shares	90.00
Cash and bank Balances	10.00
	100.00

The Beta of Portfolio is 1.1 The index future is selling at 4300 level. The Fund manage apprehends that the index will fall at the most by 10% How many index futures he should short for perfect heeding so that the portfolio beta is reduced to 1.00? One index future consists of 50 units.

Substantiate your assuming the fund manager's apprehension will materialize.

Q.94. **[RTP-Nov. -2009/Nov. -2011]** We have given the following information about XYZ company's shares and call options

Current share price	=Rs. 185
Option exercise price	=Rs. 170
Risk free interest rate	=7%
Time of the expiry of option	=3years
Standard deviation	=0.18%

Calculate value of the option. Using Black Scholes formula.

Q.95. **[RTP-Nov. -2009-old]** From the following data compute value of call option using the Black Scholes option pricing Model (OMP)

Stock price	= Rs. 27.00
Strike price	= Rs. 25.00
Time to expiration	= 6 months
Risk free rate	= 6.0%
Stock return value	= 0.11

Calculate value of the option. using Black Scholes formula.

Q.96. **[RTP-May. 2010]** You are trying to value a long term call option on the standard and poor's 500 expiring in 2 months with a strike price of $900. The index is currently at $930 and the annualized standard deviation in stock prices is 20% per annum. The average dividend yield on the index is 0.3% per month, and is expected to remain uncharged over the next month the Treasury bond rate is 8%

a. Estimate the value of the long term call option
b. Estimate the value of a put option with the same parameters.
c. What are the implicit assumptions you are making when you use the Black scholes model to value this option?

Which of these assumptions are likely to be violated what are the consequence for you valuation?

Q.97. **[RTP-Nov. -2010-New]** X ltd. share is currently trading at Rs. 220. It is expected that in six months time if could double or halved (equivalent to a 0=98%) one year call option on X Ltd. share has an exercise price of 165 Assuming risk free rate of interest to be 20% calculate

(a) Value of option on X Ltd. shares
(b) Option delta for the second six month in case stock price rises to Rs. 440 or falls to Rs. 110

Q.98. [RTP-Nov. -2009-Old] The following information is available for a call option:

Time to expiration (months)	3
Risk free rate	8%
Exercise price	€ 60
Stock price	€ 70
Call price	€ 14

What is the value of a put option if the time to expiration is 3 months, risk free rate is 8% exercise price is € 60 and the stock price € 70?

Q.99. [RTP-May 2011 New] The following table provides the prices of options on equity shares of X ltd. The risk free interest is 9% you as a financial planner are required to spot any mispricing in the quotations of option premium and stock price Suppose if you and any such mispricing then how you can take advantage of this pricing position.

Share	Time to exercise	Exercise price	Share price	Call price	Put price
X Ltd.	6 Months	100	160	56	4
Y Ltd.	3 Months	80	100	26	2

Q.99. [RTP-Nov. -2009-New] The current V / ¥ spot rate is 123.00 6 months European calls with strike 0.0087 and 0.0083 ($ / ¥) are trading premia of €0.02 / $ (cents per yen) respectively. A speculator is expecting a fairly strong appreciation of the yen over the next six months.

(i) What option strategy should he adopt to profit from this forecast?
(ii) What is the breakeven rate?
(iii) How much is the maximum possible profit? (Ignore brokerage fees and interest costs/gains)

Q.100. [RTP May 2012] The current spot price of shares of ABC Ltd. is Rs. 121.00 with strike price Rs. 125.00 and Rs. 130.00 are trading at premium of Rs. 3.30 and Rs. 1.80 respectively. Mr. X a speculator is bullish about the share price over next six month However, he is also of belief that shares price could also go down He approaches to you for advice you are required to

a. Suggest a strategy that Mr. X can adopt which puts limit on his gain and loss.
b. How much is maximum possible profit
c. Draw out a rough diagram of the strategy adopted
d. What will be break-even price of the shares

[Assume- No brokerage fee and interest cost/ gains]

Q.101. [RTP-June. -2009 Old] A 3 month future contract on NIFTY is available at a time when Nifty is quoting 9000 points. Continuously compounded risk free rate is 10% Continuously Compounded yield on the NIFTY Stock is 2% per annum. One Future contract equals to 100 Nifty. How much will you pay for NIFTY Futures? If Nifty Forward trades at 9125, what action would follow?

Q.102. [RTP-May -2012] On 31-07-2011, the value of Stock index is Rs. 2,600 The risk free rate of return is 9% p.a. The dividend yield on the stock index is as follows:

Months	**Dividend Paid**
January	2%
February	5%
March	2%
April	2%
May	5%
June	2%
July	2%
August	5%
September	2%
October	2%
November	5%
December	2%

Assuming that interest is continuously compounded daily then what will be future price of contract deliverable on 31-12-2011

Q.103. [RTP-Nov-2011] Mr. V decides to sell short 10000 shares of ABC plc when it was selling at yearly high of £ 5.60 His broker requested him to deposit a margin requirement of 45% and commission of £ 1550

CWA – Final Suggested

Q.103. [Dec. 2009] The equity share of VCC Ltd. is quoted at Rs. 210.A 3 – month call option is available at a premium of Rs. 6 per share and a 3- month put option is available at a premium of Rs. 5 per share. Ascertain the net payoffs to the option holder of a call option and a put option.

(i) the strike price in both cases in Rs. 220; and
(ii) the share price on the exercise day is Rs. 200,210,220,230,240

Also indicate the price range at which the call and the put options may be gainfully exercised.

Q.104. [June 2004] Dravid Investments Ltd. deals in equity derivatives. Their Current Portfolio comprises of the following instruments

Infosys Rs. 5600 Call Expiry June 2004,200 Units boughts at Rs. 197 each (cost)
Infosys Rs. 5700 Call Expiry June 2004, 3600 Units bought at Rs. 131 each (cost)
Infosys Rs. 5400 Put Expiry June 2004,4000 Units bought at Rs. 181 each (cost)
What will the profits or loss to Drivid Investments Ltd. in the following situations?

(i) Infosys closes on the expiry day at Rs. 6041
(ii) Infosys closes on the expiry day at Rs. 5812
(iii) Infosys closes on the expiry day at Rs. 5085

Q.105. [June 2004] Calculate Profits and losses from the following transactions

(i) Mr. X writes a call option to purchase share at an exercise price of Rs. 60 for a premium of Rs. 12 per share. The share price rise to Rs. 62 by the time the option expires.
(ii) Mr. Y buys a put option at an exercise price of Rs. 80 for a premium of Rs. 8.50 per shares The share price call to Rs. 60 by the time the option expires
(iii) Mr. Z writes a put option at an exercise price of Rs. 80 for a premium of Rs. 11 per share the price of the shares rises to Rs. 96 by the time the option expires
(iv) Mr. XY writes a put option with an exercise price of Rs. 70 for a premium of Rs. 8 per share the price falls to Rs. 48 by the time the option expires.

Q.106. [June 2006] The shares of Bangaluru Corporation Limited are selling at Rs. 105 each, Chandrashekher wants to chip in with buying a three months call option at a premium of Rs. 10 per option. The exercise price is Rs. 110 Five possible price per shares on the expiration date raning from R.s 100 to 140 with intervals of Rs. 10 are taken into consideration by him with it chandrashekhar pay off as call option holder on expiration?

Q.107. [Dec. 2007] The Equity Shares of ENDALCO Ltd. are currently selling at a price of Rs. 500 each an investor is interested in purchasing the shares Endalco Ltd. The investor expects that there is a 80% chance the the price will go up to Rs. 650 or a 20% chance that it will to down to Rs. 450 three months from now. There isa call option on the shares of Endalco Ltd. that can be exercised only at the end of three m0onths at an exercise price of Rs. 550

The risk free rate is 12% per annum.

(i) If the investor wants a perfect hedge. what combination of the share and option should he select?
(ii) Explain how the investor will be able to maintain identical position regardless of the share price
(iii) How much the investor should pay for buying this calls option today?
(iv) What is the expected return on the option?

Q.108. [Dec. 2005] Quickset company's equity shares are currently selling at a price Rs. 400 each An investor is interested in purchasing Quickest shares the investor expects that there is a 70% chance that the price will go up to Rs. 550 or a 30% chance that it will go down to Rs. 350 three months from now There is a call option on the shares of Quickset that can be exercised only at the end of three months at an exercise price of Rs. 450

(i) If the investor wants a perfect hedge, what combination of the shares and option should be select?

(ii) Explain how the investor will be able to maintain identical position regardless of the shares price

(iii) If the risk free rate of return is 5% for the 3 months period what is the value of option at the beginning of the period?

(iv) What is the expected return on the option?

Q.109. [Dec. 2010] The following quotes were observed by Mr. Saxena on September 10, 2010 in the Economic Times

Contracts	Open	High	Low	Close	Open Interest	Traded Quantity	No. of Contract	Underlying
CE-2145 Sept 2010	210.15	222.5	210.15	225.39	45100	1600	8	NIFTY
PE-2310 Sept 2010	21.45	28.6	20.51	21.89	2911700	1369000	6845	NIFTY

Explain, what these quotes indicate.

Q.110. [Study Mat.] [CWA-Dec-2006]

(i) The shares of TIC Ltd. are currently priced at Rs. 415 and call option exercisable in three months time has an exercise rate of Rs. 400 Risk free interest rate is Rs. 5% p.a. and standard deviation (volatility) of shares price is 22% Based on the assumption that TIC Ltd. is not going to declare any dividend over the next there month is the option worth buying for Rs. 25?

(ii) Calculate Value of aforesaid call option based on Black Scholes valuation model if the current price is considered as 380

(iii) What would be the worth of put option if current price is considered Rs. 380

(iv) If TIC Ltd. share price at present is taken as Rs. 408 and a dividend of Rs. 10 is expected to be paid in the two month time then calculate value of the call option

Q.111. [Dec. 2004] An investor purchased. Reliance November Future (600shares Tick size) at Rs. 580 November call option at a premium of Rs. 6(600 Shares Tick size). As on November 20 spot price rises and so the future price rises to Rs. 575 and call premium rises to Rs. 12 Find out profit / loss of the investor, if he /she settles the transaction on that date and stated prices. Brokerage is 0.05% for the transaction value of futures and strike price net of call premium for option.

Q.112. [Dec. 2004] An investor purchased Relience November Future (600 Shares Tick Size) at Rs. 1150 and write a Rs. 1190 November call option at a premium of Rs. 10 (600 Shares Tick Size) spot price rises and so the futures price and the call Premium Futures price to Rs. 1180 and call premium rise to Rs. 16 Brokerage is 0.045% for the transaction value of futures and strike price net to call premium for option.

Find out the profit/ loss of the investor if he/she settles the transaction on that date and at stated price (Assuming no transaction taxes and services taxed exist.)

Q.113. [Study Mat.] We have given the following information about XYZ company's shares and call options:

Current share price	=Rs. 165
Option exercise price	=Rs. 150
Risk free interest rate	=6%
Time to option expiry	=2years
Volatility of shares price (standard deviation)	-=15%

Calculate value of the option.

Q.114. [June 2004] The current market price of the equity shares of Bharat Bank Ltd. is `190 per share. It may be either `250 or `140 after a year. A call option with a strike price of `180 (time 1 year) is available. The rate of interest applicable to the investor is 9%. Rahul wants to create a replicating portfolio in order to maintain his pay off on the call option for 100 shares:

Find out:

(i) Hedge ratio; **Ans.** 12160

(ii) Amount of borrowing; **Ans.** 8909

(iii) Fair value of the call; and **Ans.** 3986

(iv) His cash flow position after a year.

Q.115. [Dec 2005] The following Quotes are available for 3-months options in respect of a share currently traded at `31:

Strike price	`30
Call Option	`3
Put Option	`2

An investor devises a strategy of buying a call and selling the share and a put option. Draw his profit/loss profile if it is given that the rate of interest is 10% per annum. What would be the position if the strategy adopted is selling a call and buying the put and the share? **Ans.** Gain 0.76, Loss 0.76

CS Suggested Questions

Q.116. (CS Final June 2007] Identify the profit or loss (ignoring dealing cost and interest in each of the following cases :

(i) A call option with an exercise price of ` 200 is bought for a premium of ` 89 .The price of underlying share is ` 276 at the expiry date .

(ii) A put option with exercise price of ` 250 is bought for a premium of ` 42 .The price of underlying share is `189 at the expiry date .

(iii) A put option with exercise price of ` 300 is written for a premium of ` 57 .The price of underlying share is `314 at the expiry date .

Ans. (i) -89+(276-200)=13 i.e. loss (ii) -42+(250-189)=19 i.e. profit (iii) +57(0) = 57 i.e. profit

Q.117. (CS Final Dec. 2007] The following information is related to stock of Adars Ltd. Adarsh Ltd. has a beta of 0.5 with Nifty .Each contract is equal to 100 units .Adarsh Ltd. now quotes at ` 250 and the Nifty future is 4,000 index points You are long on 1,200 sahres of Adarsh Ltd. in the spot market.

(i) How many futures contracts will you have to take ?

(ii) Suppose the price in the spot market drops by 10% , how are you protected ?

Ans. (i) No of contract $\frac{1,50,000}{4,00,000} =$

(ii) If market price goes down, Nifty would also go down

Less = 1,200

(ii) If market price goes down , Nifty would also go down

Less = 1,200 × 250×10%=` 30,000

So, investor is fully protected.

Q.118. (CS Final June 2009] An investor buys a NIFTY futures contract for ` 2,80,000 (LOT size 200 futures ) . On the settlement date, the NIFTY closes at 1,378 .Find out this profit or loss, if he pays ` 1,000 as brokege, what would be the amount of profit or loss , if he has sold the futures contract ?

Q.119. Ankush Ltd. has a plan to raise an amount of ` 50 crore for a period of 3 months , 6 months from now .The current rate of interest is 9% but it may rise in 6 months time. The company wants to hedge in self against the increase in interest rate .Bank of India has quoted a forward rate agreement (FRA) at 9.1% per annum .

Find out the effect of FRA and actual interest cost to Ankush Ltd. if the actural rate after 6 months happens to be 9.5% or 8.5 5 . **(11363125),(11390938)**

Q.120. (CS Final June. 2010] On 1st October ,Deepak is retiring from service and he will get amount of ` 16,32,000 as retirement benefits .He is planning to invest this money in the following three scripts , which he considers grossly under valued stocks in the market :

Stock	No of shares	Price	Beta
X	2,000	300	0.42
Y	3,000	416	0.65
Z	4,600	330	1.72

It is September now and the plans to take advantage of this mispricing in the stock market by using futters market .How many October contracts will you be trading if the spot index is 3,900 and October futures are quoted at 4,062?

Q.121. (CS Final June 2010] A futures contract is available on a company that pays an annual dividend of ` 5 and whose stock is currently priced at ` 200 .Each futures contract calls for delivery of ` 1,000 shares of stock in one year. Daily market to market an initial margin of 10% and a maintenance margin of 5% to corporate treasury bill rate is 8% .

(i) Given the above information, what should the price of one futures contract be? **(211)**

(ii) If the company stock price decrease by 7% what will be the change if any in futures price? **(195.88)**

(iii) As a result of the company stock price decrease will an investor that has a long position in one futures contract of this company realises gain or loss? Why what will be the amount of this gain or loss? **(- 15120)**

Q.122. (CS Final June 2012] Identify the profit or loss (ignoring dealing cost and interest) in each of the following cases:

(i) A put option with exercise price of 250 is bought for a premium of 42. The price of underlying share is 189 at the expiry date.

(ii) A put option with an exercise price of? 300 is written for a premium of ? 57. The price of the underlying share is ? 314 at the expiry date.

Q.123. (CS Final Dec. 2012] Internet Services Ltd. is a listed company and the share prices have volatile. An investor expects that the share price may fall from the present level of `1,900 and wants to make profit by a suitable option strategy. He is short of share at a price of `1,900 and wants to protect himself against any loss. The following option rates are available:

Strike Price (`)	Call Option (`)	Put Option (`)
1,700	325	65
1,800	200	80
1,900	85	120
2,000	70	200
2,100	65	280

The investor decides to buy a call at a strike price of `1,800 and to write a put at a strike price of `2,000. Find out the profit or loss profile of the investor if the share price on the expiration date is `1,600, `1,700, `1,800, `1,900, `2,000 or `2,100 respectively.

Q.124. (CS Final Dec. 2012] A share is currently trading at `125. It is expected to give a dividend of `10 per share after 4 month. Assume that the risk-free rate of return is 10% per annum.

What would be the approximate value of the forward contract (assuming annual compounding) on the share for delivery after 3 months?

11. Mutual Funds

Mutual Fund:- A Mutual Fund is a trust that pools together the resources of likeminded investor for investment in the capital market. By investing in the units of the mutual fund. When the value of the mutual fund's investment goes up, the return for the investor increases .When the value of the mutual fund's investment comes down, the return for the investor comes down, the net income earned on the funds, including unrealized capital appreciation, is shared amongst the investors (called unit holders in proportion to the number of units owned by them. Thus mutual fund becomes the indirect vehicle for the investor to invest in the capital markets.

Net Assets Value (NAV): Each day, the mutual fund computes the net asset value of the unit. The NAV of a mutual fund were wound up that day. This value is obtained by deducting the total liabilities of the fund from the closing market value of the holdings and dividing it by the number of units outstanding.

$$NAV = \frac{D_1 + CG_1 + (NAV_1 - NAV_0)}{NAV_0} \times 100$$

Where ,

D1 = Dividend
CG1 = Realized capital gains
NAV1 – NAV0 = Unrealized capital gains
NAV0 = Base net assets value

Q. 1. **[May 2003]** A mutual fund that had a net asset value of `10 at the beginning of the month. It made income and capital gain distribution of `0.05 and `0.04 per unit respectively during the month and then ended the month with a net asset value of `10.03. Compute the monthly.

Ans. Monthly return 1.2%

Q. 4. The NAV of a fund on December 31, 2001 was `16.45 .5 months later, the NAV had grown to `16.985. Using the percentage change in NAV method, find out the annualized return.

Ans. 7.8%

Q. 5. An investor bought units of a mutual fund for `20.425 .At the end of the year , the worth of his holding was `21.85 and he had received a dividend of 17.5% .Using the simple total return method compute his return

Ans. 15.54%

Q. 6. An investor buys a mutual fund unit at `23.75. He subsequently receives a dividend of 12.5%, which he reinvests in the fund, at the prevailing NAV of `23.5 .At the end of the year, the NAV of the fund is `24.65. What is the rate of return of the investor, using the total return with reinvestment method?

Ans. 9.31%

Q. 7. An investor buys a mutual fund unit at `24.65. He subsequently receives a dividend of 13.25%, which he reinvests in the fund, at the prevailing NAV of `24.35. At the end of the year, the NAV of the fund is `25.75. What is the rate of return of the investor, using the total return with reinvestment method?

Ans. 10.75%

Q. 8. FW's return was 20% and that of the stock market as a whole was15%.The standard deviation of the portfolio was 10% while that of the market is 5%. The risk free rate is 6%. What is the sharpe measure of FW's portfolio? Comment on its performance.

Q. 9. Shyam is the CIO of FW mutual Fund. He found that his portfolio had earned a return of 20% and had a beta of 1.2. During the same period. The stock market has a whole went up by 15%. If the risk free rate of return is 6%, compute the Treynor measure for the portfolio. Comment on FW's performance.

Q.10. Shyam is the CIO of FW Mutual Fund. He found that his portfolio had earned a return of 20% and had a beta of 1.2.During the same period, the stock market as a whole went up by 15%. If the risk free rate of return is 6%, Compute the Treynor measure for the portfolio. Comment on FW's performance Jensen measure of FW's performance .

Q.11. Based on the above maintained data decide whether the portfolio has outer performed the market in terms of Treynor, Sharpe or Jensen benchmark evaluation measures.

	Portfolio	**Market**
Average Return	35	28
Beta	1.2	1
Standard Deviation	42	30
Non Systematic risk	0.18	0
Risk free rate	6%	6%

Q.12. You are a stock market buff. Your understanding of the stock market will help you earn of 15% .If you invest by yourself, but you don't plan to do so. You are toying with the idea of using the investment vehicle mutual fund. A new scheme has just been announced by India's top mutual fund .The issue expenses are going to be 6% and the annual expenses ratio will be 2%, on closing NAV .How much should the fund scheme earn to provide return of 15% to you?

Q.13. You can earn a return of 14% by investing in equity shares on your own You are considering a recently announced equity mutual fund scheme where the initial issue expenses are 6% .You believe that the mutual fund scheme will earn 16.5% .At what recurring expenses (in percentage terms) will you be different between investing on your own and investing the mutual fund.

Q.14. Mr. A can return of 16% by investing in equity shares on his own .Now he is considering a recently announced equity based mutual fund scheme in which initial expenses are 5.5% and mutual recurring expenses are 1.5% .How much should the mutual fund earn to provide Mr. A a return of 16% .

Q.15. You can earn a return of 18.6% by investing in equity shares on your own You are considering a recently announced equity mutual fund scheme in where the initial issue expenses are 2% . At what initial expenses (in percentage terms) will you be iddfferent between investing on your own investing though the mutual fund

Q.16. Mr. X is considering a recently announced equity based mutual fund scheme in which initial issue expenses are 5% and mutual recurring expenses are 4% .He believes that the mutual fund scheme will earn 34%. At what percentage earning will be indifferent between investing on his own and investing through the mutual fund.

Q.17.

	MF A	**MF B**
Date of investment	01.01.2004	01.01.2004
Amount invested	`5,25,000	`1,70,000
NAV at the date of investment	`105	`85
Amount of dividend received	`10,000	`5,000
NAV at the end of the year	`105.625	`85.05

Calculate annualized return

Q.18.

	MF A	**MF B**	**MF B**
Date of investment	01.12.2003	01.01.2004	01.03.2004
Amount invested	`50,000	`1,00,000	`50,000
NAV at the entry date	`10.50	`10	`10
Dividend received up to 31.3.04	`950	`1,500	Nil
NAV as at 31.3.01	`10.40	`10.10	`9.80

Required :- What is the effected yield on per annum basis in respect of each of three schemes to Mr. A up to 31.3.04?

Q.19. A mutual fund holds a 91 day treasury bill , issued at `95.25 redeeming at `100 .If there are 34 days to maturity , what is the value of the investment onits book ?

Q.20. A mutual fund holds a 90d days commercial paper , issued at `92.72 redeeming at `100.45 days later, what is the value of the investment on its books?

Q.21. An aggressive mutual fund promises an expected return of 16% with a possible volatility (standard deviation) of 20% .On the other hand a conservative mutual fund promises an expected return of 13% and volatility of 15%.

(a) Which fund would you like to invest in?
(b) Assuming you can borrow money from your provident fund at an opportunity cost of 10% which fund you would invest your money in?
(c) Would you consider both fund or borrow money at 10 %?

Q.22. The NAV of ABC Bond Fund on January 6, 2002 was `25.8750.If the fund charged 1.75% as entry load and 0.50% as exit load, what are the sale and repurchase prices to the investor?

Q.23. The NAV of XYZ Bond Fund on June, 2001 was `28.30. If the fund charged 1.5% as entry load and 0.75% as exit load, what are the sale and repurchase prices to the investor?

Q.24. The NAV of an equity fund was `38.1250. If the fund charged 2.25% as entry load and 0.25% as exit load, if an investor wants to invest `64,000 into this fund, what is the number of units he will get?

Q.25. Given below are the data for the year 2001 & 2004. Find the holding period return for both the years, in case units are issued at 3% sales load.

All amount in `	**2004**	**2001**
Ending NAV	64.84	44.10
Beginning NAV	58.60	59.85
Dividends received	0.83	0.72
Capital gains distribution	2.42	9.02

- Holding period returns for 2004 and 2001 with a 3% load :

With a front-end load of 3% on NAV, the purchase price – Beginning NAV x 1.03.

All amount in `	**2004**	**2001**
Ending NAV	64.84	44.10
Beginning NAV	58.60	59.85
Net increase / (decrease)	6.24	(15.75)
All amount in `	**2004**	**2001**
Return for the year :		
Dividends received	0.83	0.72
Capital gains distribution	2.42	9.02
Net increase in NAV	6.24	(15.75)
Total return before any load	9.49	(6.01)

Less : Load at 3%	(1.76)	(1.80)
Total return with load	7.73	(7.81)
Purchase price	60.36	61.65
HPR	12.81%	12.7%

Since the front-end load decreases the total return and increases the purchase price, the cumulative effect will be a decrease in the HPR.

Q.26. **(CA Final Nov. 2005)** Sun Mutual Fund (Approved Mutual Fund) Sponsored open-ended equity oriented scheme " Chanakya Opportunity Fund" .There were three plans Viz 'A ' – Dividend Reinvestment Plan , 'B ' Bonus Plan & ' C' Growth Plan .

At the time of initial Public Offer on 01.04-1995 , Mr. Anand , Mr. Bacchan & Mrs. Charu , three investor invested `1,00,000 each & chosen ' B' , 'C' & ' A ' Plan respectively . The History of the fund is as follows :

Date	**Dividend (%)**	**Bonus Ratio**	**Net Asset Value per Unit (F.V `10)**		
			Plan A	Plan B	Plan C
28-07-1999	20		30.70	31.40	33.42
31.03.2000	70	5:4	58.42	31.05	70.05
31.10.2003	40		42.18	25.02	56.15
15-03-2004	25		46.45	29.10	64.28
31-03-2004		1:3	42.18	20.05	60.12
24-03-2005	40	1:4	48.10	19.95	72.40
31-07-2005			53.75	22.98	82.07

On 31st July all three investors redeemed all the balance units

Calculate annual rate of return to each of the investors.

Consider :

(i) Long Term Capital Gain is exempt from Income tax.
(ii) Short Term Capital Gain is subject to 10% Income tax.
(iii) Security Transaction Tax 0.2 percent only on sale/redemption of units .
(iv) Ignore Education Cess.

Ans Annual return of : Mrs. Charu = 67.64%, Mr. Anand = 73.33%, Mr. Bacchan = 69.59%.

Q.27. **(CA Final May . 2006)** A mutual Fund having 300 units has shown in NAV of `8.75 and `9.45 at the negining and at the end of year respectively .The mutual fund has given two options :

(i) Pay `0.75 per unit as dividend and `0.60 per unit as a capital gain , or
(ii) These distributions are to be reinvested at an average NAV of `8.65 per unit What difference it would make in terms of return available and which option is preferable?

Ans. Option (i) Holding period reward 23.43%
Option (ii) Holding period reward 24.85%
Option (iii) is preferable due to higher percentage return

Q.28. **(CA Final Nov . 2006)** Mr. X on 01-07-2000 , during the initial offer of same Mutual Fund invested in 10,000 units having face value of `10 for each unit . On 31.03.2001 the dividend operated by the M.F was 10% and Mr. X found that his annualized yield was 153.33%. On 31-12-2002, 20% dividend was given .On 31.03.2003 Mr. X redeemed all his balance of 11,296. II units when his annualized yield was 73.52% .What are the NAV as on 31.03.2001, 31.12.2002 and 31.03.2003?

PROBLEMS & SOLUTION

Q.29. Calculate the NAV of Great fund from the following data :

Size of the fund `200 crores, Face Value `10/- per unit, Market Value of Investment – `280 Crores, Receivables – `2 Crores, accrued Income k- `2 Crores, Liabilities – `1 Crore, accrued Expenses – `1 Crore.

Ans. $NAV = \frac{\text{Market Value of Invests + Receivables + Accrued Income - Liabilities - Accrued Exp.}}{\text{Number of units outstanding}}$

$= \frac{280+2+2-1-1}{200/10} = \text{`}14.10 \text{ per unit}$

Q.30. Calculate the NAV of Great fund from the following data :
The following portfolio details of a fund are available :

Stock	Shares	Price (`)
A	200000	35
B	300000	40
C	400000	20
D	600000	25

The fund has accrued management fees with the portfolio manager totaling `30000. There are 40 lakhs shares outstanding. What is the NAV OF THE FUND? If the fund is sold with a front end load of 5%, what is the sale price?

- The following portfolio details of a fund are available :

Stock	Shares	Price (`)	Value
A	200000	35	7000000
B	300000	40	12000000
C	400000	20	8000000
D	600000	25	15000000
Total			**42000000**

NAV of the fund = (42000000 – 30000) / 4000000 = `10.4925
Sale Price = NAV (1 + Load %)
= 10.4925 * (1.05) = `11.02 approx.

Q.31. Calculate the NAV in each of the following cases (treating each sub-question independently):
a. Sale price is `11 & entry load is 5%
b. Repurchase price is `11 and exit load is 5%
c. Sale Price is `11 & Repurchase Price is `10.80 and there is no entry load
d. Sale Price is `11.40 & Repurchase Price is `11.20 and there is no exit load
e. Sale Price is `10.50 & Repurchase Price is `9.80 and Entry load is 5% and Exit Load is 2%.

Ans. We have, Sale Price = NAV (1 + Load %) and Repurchase Price = NAV(1=Load%
a. NAV = Sale Price (1 + Load %) = 11 / 1.05 = `10.4762
b. NAV = Repurchase Price / (1 – Load %) = 11 / 0.95 = `11.5789
c. Here No entry load; therefore Sale Price = NAV = `11
d. Here No exit load; therefore Repurchase Price = NAV = `11.20
e. Here we are given both Entry and Exit Loads. We can use either to find the NAV. Using, Sale Price = NAV (1 + Load %) and Repurchase Price = NAV (1 – Load %) we get :

NAV = Sale Price / (1 + Load %) = 10.50 / 1.05 = `10 **OR**
NAV = Repurchase Price / (1 – Load %) = 9.80 / (0.98) = `10

Q.32. The unit price of TSS Scheme of a mutual fund is `10. The public offer price (POP) of the unit is `10.204 and the redemption price is `9.80. Calculate a. Front-end Load, and b. Back-end Load :

Ans. a. Calculation of Front-end Load (F)

$\text{Public offer price} = \frac{\text{Net asset value}}{1 - \text{Front} - \text{end load}}$

Where, Public offer price `10.204; Net asset value `1

$$10.204 = \frac{10}{1-F}$$

$10.204\ (1 - F) = 10$

$10.204 - 10.204\ F = 10$

$10.204\ F = 10.204 - 10$

$F = 0.204 / 10.204 = 0.01999$

$\therefore$ Front-end load = 2%

b. Calculation of Back-end Load (B)

$$\text{Redemption} = \frac{\text{Net asset value}}{1 - \text{Back} - \text{end load}}$$

$$9.80 = \frac{10}{1-B}$$

$9.80\ (1 - B) = 10$

$9.80 - 9.80B = 10$

$-9.80B = 10 - 9.80$

$B = 0.20 / 9.80 = 2.04\%$

$\therefore$ Back-end load = 2.04%

Q.33. Calculate the today's NAV of Flexi Fund if the following details are given :
Yesterday's NAV = `12,8700, Total number of outstanding units : 1.25 Crores, Face Value = `10 Expenses = `1 lakh [assume sales NAV & Repurchase NAV to be `12.87]

Appreciation of Portfolio today	`12 lakhs
Units – Fresh subscription	2 lakhs
Units – Redemption	0.75 lakh
Dividends received	`1 lakh

Ans. Net Asset Value =

$$\frac{\text{Yesterday's NAV} \times \text{Outstanding units} + \text{Appriciation of Portfolio} + \text{Net Recpts.} - \text{Exps} + \text{Dividend}}{\text{Outstanding Number of Units}}$$

$$\text{NAV} = \frac{12.87 \times 125 \text{ lakhs} + 12 \text{ lakhs} + (2 - 0.75) \text{ lakhs} \times 12.87 - 1 \text{ lakh} + 1 \text{ lakhs}}{126.25 \text{ lakhs}}$$

Today's NAV of Flexi Fund = `12.9650

Note : New units outstanding = 1.25 Crores + Net subscription = 125 lakhs + 1.25 lakhs = 126.25 lakhs.

Q.34. Calculate the today's NAV of Multi Fund if the following details are given :
Yesterday's NAV = `10,7500, Total number of outstanding units : 250 Crores, Face Value = `10 Expenses = `22 Crores [Assume sales NAV & Repurchase NAV to be `10.75]

Depreciation of Portfolio today	`12 Crores
Units – Redemption	1 Crore
Unrealized losses	`8 Crores
Unrealized Gains	`14 Crores

Ans. Net Asset Value =

$$\frac{\text{OldNAV} \times \text{Current units} - \text{Depreciation of Portfolio} - \text{Redemption} + \text{Net UnrealizedGain / Loss} - \text{Expenses}}{\text{OutstandingNumber of Units}}$$

$$\text{NAV} = \frac{10.75 \times 250 \text{ Crores} - 12 \text{ Crores} - 1\text{Crore x } 10.75 + 6 \text{ Crores} - 22 \text{ Crores}}{249\text{Crores}}$$

Today's NAV of Multi Fund = `10.6376

Q.35. A equity based mutual fund has a outstanding number of units of 150 lakh units (face value = `10). The previous day's net asset value was `32.50 Crores. NAV needs to be calculated for today and the following information is given to us.

Interest on coupon bearing instrument G-Sec	`1.20 lacs
Interest received on Reverse Repo	`38000
Profit on sale of investments	`31 lacs
Dividends received	`81000
Unrealized gains	`37.75 lacs
Less on sale of investment	`1.75 lacs
Management Fees	`1.25 lacs
Initial expenses	`1.25 lacs
Scheme expenses	`1.87 lacs

Ans. Today's NAV is `32.50 Crores / 1.50 lakhs units = `21.67

Net Asset Value =

$$\frac{\text{Today's NAV} + \text{Income} + \text{Depreciation of Portfolio} + \text{Profits} - \text{Net Unrealized Gain/Loss} - \text{Expenses}}{\text{Outstanding Number of Units}}$$

$$\text{NAV} = \frac{32.50\,\text{Crores} + 1.20\ \text{lacs} + 38000 + 31\ \text{lacs} + 81,000 + 37.75\ \text{lacs} - 1.75\ \text{lacs} - 1.25\ \text{lacs} - 1.25\ \text{lakhs} - 1.87\ \text{lacs}}{150\ \text{Lacs Units}}$$

Today's NAV of equity based Fund = `22.10

Q.36. **A** new equity based mutual fund collected `50 Crores through the New Fund Offer at `10 a unit. On the first day when the NAV was to be released, the following stock purchases were made. The balance was parked in reverse repo for a day at 6% yield. The initial expense is 6% and is expected to be amortized over 5 years. The total recurring expenses which would be deducted on a daily basis (which also includes investment and advisory fees for this fund size) is 2.5% per annum. Assume recurring expenses is charged on opening balance of net assets. Find 1st day NAV for this fund..

	Qty	Cost	Closing Price
BHEL	2500	1968.00	1968.25
Infosys	3000	1600.00	1630.20
TCS	2500	928.45	928.45
ITC	25600	169.00	164.55
Reliance Communication	16500	265.00	258.20

Ans.

Fund Collection :	50.00000 Crores	
Stock Purchases	2.07389 Crores	
Balance Corpus	47.92611 Crores	
Income – repo (479261100 x 0.06) x (1/365)		78783
Unrealized Loss	– 134895	
Initial Expenses (0.06*50 Crores) ÷ (5 x 365)		16438 [amortized over five years]
Recurring Expenses (0.025*50 Crores) ÷ 365		34247

Name of the Stock	Qty	Cost	Closing Price	Total Cost	Unrealized Gain / Loss
BHEL	2500	1968	1968.25	4920000	625
Infosys	3000	1600	1630.2	4800000	90600
TCS	2500	928	928	2320000	0
ITC	25600	169	164.55	4326400	-113920

Reliance Communication	16500	265	258.2	4372500	-112200
				20738900	**-134895**

$$\text{Net Asset Value} = \frac{\text{Balance Corpus} + \text{Income} + \text{Stock Purchases} - \text{Unrealized Loss} - \text{Expenses}}{\text{Outstanding Number of Units}}$$

$$\text{NAV} = \frac{47.92611\text{Crores} + 78783 + 2.07389\text{ Crores} - 134895 - 16438 - 34348}{5\text{ Crores}}$$

First day's NAV of equity based Fund = `9.9979

Q.37. Mr. Pravin requires a monthly payment of `1000 for 5 years from a mutual fund that has a track record of paying 9% per annum. What should be his investment today to get this amount?

Ans. The money Pravin invests should give him `1000 per month for 5 years @ 9%. This implies that the monthly interest is 9% / 12 = 0.75% and the total number of periods is 5 x 12 = 60. Therefore amount to be invested today = 1000 x PVIFA (0.75%, 60) = 1000 x 48.17337 = `48173.37

Q.38. A mutual fund has a net asset value (NAV) of `50 at the beginning of the year. During the year a sum of `4 was distributed as income (dividend) besides `3 as capital gains distribution. At the end of the year NAV was `55, calculate total return for the year. Suppose the aforesaid Mutual Fund in the next year gives a dividend of `5 as income distribution and no capital gains distribution and NAV at the end of second year is `50. What is the return for the second year?

Ans.

- Total Return $= \frac{\text{Change in NAV} + \text{Distributions (Dividend / Capital)}}{\text{NAV at the beginning of the period}}$

  $$\text{Return} = \frac{(55-50)+4+3}{50} = 0.24 = 24\%$$

- Total Return II year $= \frac{\text{Change in NAV} + \text{Distributions}\left(\text{Dividend / Capita l}\right)}{\text{NAV at the beginning of the period}}$

  $$\text{Return} = \frac{(55-50)+0+5}{50}$$

Q.39. A mutual fund company offers a "safe" money market fund which provides a annualized return of 4.50%. The same company also offers an equity fund with an aggressive growth objective which historically has exhibited an expected return of 20% and a standard deviation of 25% . What allocation should be placed in the money market fund if an investor desires an expected return of 15%?

Ans. Let X represents the investment in the "safe" Money Market Fund and (1-X) represent the weight of investment in aggressive growth fund. Therefore we have :
X*0.045 + (1-X)*0.20 = 0.15
Solving we get,
X = Investment in safe fund = 32.26%
Therefore, investment in aggressive fund = 1 – 0.3226 = 0.6774 or 67.74%

Q.40. Suppose an individual invests `10,000 in a load mutual fund for two years. The load is attributed to initial expenses charged at the rate of 4 percent of the amount invested and is deducted from the original funds invested, which would be amortized over 5 years. In addition, recurring expenses are 2.25 percent. The recurring expenses are charged on the average net asset value invested in the fund and are recorded at the end of each year. Investments in the fund return 5 percent each year paid on the last day of the year. If the

investor reinvests the annual returns paid on the investment, calculate the annual return on the mutual fund over the two year investment period.

Ans. **Annual Return Calculation Based on Present Value of Investment :**

Initial investment in the fund	= `10000
Front-end load of 4.00%	= ` 400
Total investible funds	= ` 9600
Investment value at end of year one = `9600 x 1.05	= `10080.00
Operating expenses based on average NAV = `9840 x 0.0225	= ` 221.40
Net investible funds for year two	= ` 9858.60
*Average NAV = (9600 + 10080) ÷ 2	= 9840
Investment value at end of year two = `9858.60 x 1.05	= `10351.53
Operating expenses based on average NAV = `10105.065 x 0.0225 =	`227.36
Net investment at end of year two	= ` 10124.17
*Average NAV = (9858.60 + 10351.53) ÷ 2	= 10105.065

Average annual compound return `10124.17 = `10000 $(1 + 4)^2 \rightarrow$ r = 0.62%

Q.41. Ajit has a investment in a mid cap fund to the extent of 1254.778 units. Ajit decides to redeem these units now and the repurchase price is `66.2722. If he redeems Securities Transaction Tax (STT) of 0.2% is payable (round of to nearest rupee).What is the net redemption value, Ajit gets?

Ans.

The current number of units	= 1254.778 units
If Ajit redeems he would get 1254.778 x 66.27	= `83156.90
Less : STT @ 0.2%	= ` 166.00
Net redemption Value	= `82990.90

Q.42. A fund has a entry load of 2.25% and an exit load of 1%. Kailash invests in a Bull Fund when the NAV was `22. He redeems his investments after a year when the NAV was `23. He did receive dividends of `2 during the year. What is his percentage return on his investment had he invested `50000 a year ago?

Ans. Kailash invested `50000 at a NAV of `22. since there is a entry load of 2.25%, he would be allotted units at `22 x (1.0225) = `22.50. At this price his number of units = 50000 / 22.5 = 2222.22. On these units he receives dividend of `2 i.e. he receives `4444.44. Now he redeems the current units (i.e. 2222.22) when the NAV is `23. Owing to the exit load of 1%, he would receive only `22.77 per unit i.e. `50600.

Rate of return on investment = [(50600 – 50000) + 4444.44] ÷ [50000] = 10.09%

Q.43. Shailesh invested `50000 in debt-oriented fund when the NAV was `16.10, and sold the units allotted when the NAV was `17.10 after one year. Assume that there existed an entry load of 2% and no exit load. He received `2 per unit as dividend which is taxable at 30% during the year. There is no capital gains tax. What is the after tax rupee return from this investment?

Q.44. Shailesh invested `50000, when NAV was `16.10 and the sale price was = 16.10 x 1.02 = `16.4220. At this price he was issued 3044.70 (50000 / 16.4222) units. On this he received dividend = 3044.7 x 2 = `6089.40. However, dividends are taxable at 30%. His post tax receipt = 4262.58. Now if he sells after a year when the NAV is `17.10, he gets full value as there is no exit load.

Rupee return in value

= (Post Tax Div. + (Repurchase Price – Sale Price) x No. of Units

= 4262.58 + (17.10 – 16.422) x 3044.7

= 6326.89

Rupee return in %

= 6326.89 / 50000

= 12.65%

Q.45. Mr. J purchased an open ended load fund withy a NAV of `50 per unit and a 3% sales load. One year later, J sold the fund with a NAV of `54 per unit with a back-end load of 3% as well. During the year, the fund paid a Re. 0.25 dividend per unit and distributed Re. 0.40 in capital gains per unit. If J invested `10,000 in this fund, what was J's rupee and percentage return over the year? What would have the return been if this was a no-load fund?

Ans. With a 3% front-end load, 3% is immediately taken out of the `10,000. Thus only `9,700 is invested in this fund. At `50 a unit, 3 purchased 194 units. J earned `0.65 in dividends and capital gains per unit over the year. The fund's new NAV is at `54 per unit. However, with a 3% back-end load, only 95% of the `54 will be paid, so J will only net 52.38 per unit or a `2.38 per unit profit. Thus, for each unit, J makes `3.03 (Re.0.65 + `2.38). The total rupee return is 194 units * `3.03 = `587.82. On a `10,000 investment, J's percentage return was `587.82 / `10,000 = 5.87%.

If this was a no-load fund, 200 units could have been purchased. They would have been sold at `54. The profit would have 200 units * (re. 0.65 + `4) = `930 and the return would have been `930 / 10,000 = 9.3%.

Q.46. A closed ended fund starts the year with a NAV of `12. By year end NAV equals `12.10. At the beginning of the year the fund was selling at 2% premium to the NAV and at the end of the year the fund is selling at a 7% discount to NAV. The fund paid year end distributions of income and capital gains of `1.50.

a. What is the rate of return to an investor in the fund during the year?
b. What would have been the rate of return to an investor who held the same securities at the fund manager during the year?

Ans. a. Investor bought at 12 x 1.02 = `12.24 (since it was selling at a premium)
Investor would have sold at 12.10 x 0.93 = 11.253 (since it was selling at a discount)
Return for the investor = – 0.987
Investor got Income & Capital gains of `1.50
Rate of return = 1.50 – 0.987 / 12.24 = 4.19%

b. Had he done on his own the same way the fund has done :
(Meaning if he was managing his own funds and no additional charges)
Investor rate of investment = `12
Investor's rate of sale = `12.10
Income & Capital Gains = `1.50
Rate of Return = 0.1 + 1.50 / 12 = 13.33%

Q.47. Mr. V purchased a closed-end fund with a NAV of `25 a unit for only `20. At the end of the year, the fund's NAV was `27 and was selling at a 5% premium. It did not pay out any dividends or capital gains during the year. How much was the original discount and what was Mr. V's return?

Ans. The premium or discount for closed-end funds is calculated as (Market Price – NAV) / NAV. In this case, since the market price is less than the NAV, the fund is selling at discount which is (`20 – `25) / `25 = – 20% . One year later, it is selling at a 5% premium. If the new NAV is `27, the market price is `27 * 1.05 or `28.35. Thus, Mr. V's return is (`28.35 – `20) / `20 = 41.75%.

Q.48. Given are the details of dividend & capital gains distribution for a mutual fund with beginning and ending NAV for years 1998-2003. Calculate the five year compounded annual return.

All amount in `	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**
Beginning NAV						– 10
Dividends	0.95	0.85	0.85	0.75	0.60	
Capital Gains	1.05	1.00	0.00	1.00	0.00	

Closing NAV	15.73					

Ans.

All amount in `	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**
Beginning NAV						– 10
Dividends	0.95	0.85	0.85	0.75	0.60	
Capital Gains	1.05	1.00	0.00	1.00	0.00	
Closing NAV	15.73					
Net Cash Flow	17.73	1.85	0.85	1.75	0.60	– 10

It can be seen that `10 is invested today and we get the following inflows i.e. `0.60, `1.75, Re. 0.85 & `1.85 and finally `17.73 at the end of the fifth year. Therefore to find the 5 year compounded rate of return we need to simply find the IRR using the formula :

$– 10 + 0.60 / 1 + r + 1.75 / (1+r)^2 + 0.85 / (1+r)^3 + 1.85 / (1+r)^4 + 17.73 / (1+r)^5 = 0$

Solving for r, i.e. using interpolation we get r, = 20.63%