

PAPER-14 Advanced Financial Management

1. (a) Ashrin Ltd. has an EPS of ₹ 3 last year and it paid out 60% of its earnings as dividends that year. This growth rate in earnings and dividends in the long term is expected to be 6%. If the required rate of return on equity for Ashrin Ltd. is 14%. Calculate the P/E ratio of Ashrin Ltd.

Answer:

$$\begin{aligned} \text{P/E Ratio} &= \frac{\text{Pay - out ratio}}{r - gn} \\ &= \frac{0.6(1.06)}{0.14 - 0.06} \\ &= \frac{0.636}{0.08} = 7.95 \end{aligned}$$

- (b) State Non-financial Intermediaries.

Answer:

Non-financial intermediaries are those institutions which do the loan business but their resources are not directly obtained from the savers. Many non-banking institutions also act as intermediaries and when they do so they are known as non-banking financial intermediaries, e.g. LIC, GIC, IDBI, IFC, and NABARD.

- (c) The Beta co-efficient of equity stock of TECHBOARD LTD. is 1.6. The risk-free of return is 12% and the required rate of return is 18% on the market portfolio. If the dividend expected during the coming year is ₹2.50 and the growth rate of dividend and earnings is 8%, at what price the stock of Techboard Ltd. can be sold (based on the CAPM) ?

Answer:

Expected rate of return: (By applying CAPM)

$$\begin{aligned} R_e &= R_f + \beta (R_m - R_f) \\ &= 12\% + 1.6 (18\% - 12\%) \\ &= 12\% + 9.6\% = 21.6\% \end{aligned}$$

Price of stock: (with the use of dividend growth model formula)

$$\begin{aligned} R_e &= D_t/P_0 + g \\ 0.216 &= 2.50/(P_0 - 0.08) \\ \text{Or, } P_0 &= 2.50/(0.216 - 0.08) \\ &= 2.50/0.136 \\ &= ₹18.38 \end{aligned}$$

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(d) The current spot rate for the US\$ is ₹ 50. The expected inflation rate is 6 per cent in India and 2.5 per cent in the US. What will be the expected spot rate of the US\$ a year hence?

Answer:

$$\frac{(\text{Expected spot rate a year from now})}{(\text{Current Spot rate})} = \frac{(1 + \text{Expected inflation on home country})}{1 + \text{Expected Inflation in foreign country}}$$

Or, Expected spot rate of US\$ a year hence = $(₹ \times 1.06) / 1.025 = ₹ 51.71$

(e) PNB Ltd. placed ₹52 Crores in overnight call with a foreign bank for a day in overnight call. The call ruled at 5.65% p.a. What is the amount it would receive from the foreign bank the next day?

Answer:

Amount placed in call = ₹52 crores

Interest = 5.65% p.a.

$$\begin{aligned} \text{Amount receivable next day} &= \text{Principal} + \text{Interest for a day} \\ &= ₹52 \text{ Crores} + 52 \text{ crores} \times \frac{1}{365} \times \frac{5.65}{100} \\ &= ₹52,00,80,493 \end{aligned}$$

(f) The rates available in the Kolkata market are:

₹/\$ Spot 46.75/78

£/\$ 0.5285/86

If an Indian Importer requires pounds, calculate the rate quoted to him.

Answer:

The rate to be quoted to the importer is the Ask rate

$$= (\text{₹}/\$)_{\text{Ask}} \times (\$/\text{N})_{\text{Ask}}$$

$$= (\text{₹}/\$)_{\text{Ask}} \times (1/(\text{£}/\$))_{\text{Bid}}$$

$$= 46.78 \times 1/0.5285 = ₹ 88.51/\text{£}$$

(g) What do you mean by viability gap funding?

Answer:

Viability gap funding was introduced in 2006, which provides Central Government grants up to 20 per cent of the total capital cost to PPP projects undertaken by any central ministry, state government, statutory entity, or local body. The scheme aimed at providing upfront capital grant to PPP projects to enable financing of commercially unviable projects. The level of grant is the net present value of the gap between the project cost and estimated revenue generation

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over the concession period based on a user fee that was to be levied in a pre-determined manner.

(h) Angel Ltd., an export customer who relied on the interbank rate of ₹/\$ 46.50/10 requested his banker to purchase a bill for USD 80,000. Calculate the rate to be quoted to Angel Ltd., if the banker wants a margin of 0.08%.

Answer:

Profit margin of 0.08% is to be deducted from the bid rate.

That is $46.50 \times 0.0008 = ₹ 0.04$

Spot bid rate = $46.50 - 0.04 = ₹ 46.46$

(i) Two Firms Preeti Ltd and Mahati Ltd. are similar in all respects except that Mahati Ltd. uses ₹ 10,00,000 debt in its capital structure. If the corporate tax rate for these firms is 40%. Calculate the value of Mahati Ltd. exceeds that of Preeti Ltd.

Answer:

When Corporate taxes are considered, the value of the firm that is levered would be equal to the value of the unlevered firm increased by the tax shield associated with debt i.e.,

$$V = \frac{O(1+ti)}{K} + t_1B$$

Therefore, Value of Mahati Ltd. would exceed the value of Preeti Ltd. by only t_1B i.e., $0.4 \times 10,00,000 = ₹ 4,00,000$.

(j) The stock of Anusa Ltd. has a beta of 0.95 and an expected return of 13.60 per cent. The market portfolio has an expected return of 14.00 per cent. Based on CAPM, calculate the risk premium for Anusa Ltd.'s stock.

Answer:

Expected return on Equity fund = $7.00 + 10.00 = 17\%$

Applying the SML equation to Anusa Ltd's stock:

$$0.136 = R_f + 0.95 (14.0 - R_f) \rightarrow R_f (1 - 0.95) = (0.136 - 0.95 \times 0.140)$$

$$\text{Therefore } R_f = \frac{0.136 - 0.133}{0.05} = 0.06 \text{ i.e., } 6\%$$

Hence, Risk Premium for Anusa Ltd.'s stock: $E(R_1) - R_f = 0.136 - 0.06 = 0, 0.076$ i.e., 7.60%.

SECTION – A

2. (a) **State Co-operative Banks. List the objective and functions of State Cooperative Banks.**
(b) **Describe the typical attributes of Hard infrastructure.**

Answer:

Co-operative Banks:

The State Cooperative Bank is a central institution at the State level which works as a final link in the chain between the small and widely scattered primary societies, on the one hand, and the money market, on the other. It balances the seasonal excess and deficiency of funds and equates the demand for and supply of capital. It takes-off the idle money in the slack season and supplies affiliated societies and Central Co-operative Banks with fluid resources during the busy season. It is the vertex of the pyramidal structure in a state for the provision of short and medium-term credit to agriculturists on co-operative basis. These are formed by joining together all districts central cooperative banks in a particular state. It collects funds by way of share capital, deposits from public, loan from commercial banks etc.

Objective and functions of State Co-operative Banks:

The chief objectives of State Cooperative Bank are to coordinate the work of the Central Banks, and to link Cooperative Credit Societies with the general money market and the Reserve Bank of India.

These banks work as real pivots of the Cooperative movement in the state. They act as initial source of credit for seasonal and urgent needs of their members. Their main functions are:-

- (i) They act as banker's bank to the Central Cooperative Banks in the districts. These banks not only mobilise the financial resources needed by the societies, but they also deploy them properly among the various sectors of the movement.
- (ii) They coordinate their own policies with those of the cooperative movement and the government.
- (iii) They form a connecting link between the cooperative credit societies and the commercial money market and the RBI.
- (iv) They formulate and execute uniform credit policies for the cooperative movement as a whole.
- (v) They promote the wise of cooperation in general by granting subsidiaries to the Central Cooperative Banks for the development of cooperative activities.
- (vi) They act as a clearing house for capital i.e., money flows from, the Apex Banks to the Central Banks and from the Central Banks to the rural societies and from them to individual borrowers.
- (vii) They supervise, control and guide the activities of the Central Bank through regular inspections by their inspection staff and rectify the defects in their work. Thus, they act as their friend, philosopher and guide.
- (viii) They also perform general utility functions such as issuing drafts, cheques and letters of

credit on various centres and thereby help remittance of funds.

- (ix) They collect and discount bills with the permission of the Registrar.
- (x) In certain place they also provide safe deposit locker and facilities for safe custody of valuables.
- (xi) They help the state Governments in drawing up Cooperative development and other development plans and in their implementation.

(b) Hard infrastructure generally has the following attributes:

(i) Capital assets that provide services

These are physical assets that provide services. The people employed in the hard infrastructure sector generally maintain, monitor, and operate the assets, but do not offer services to the clients or users of the infrastructure. Interactions between workers and clients are generally limited to administrative tasks concerning ordering, scheduling, or billing of services.

(ii) Large networks

These are large networks constructed over generations, and are not often replaced as a whole system. The network provides services to a geographically defined area, and has a long life because its service capacity is maintained by continual refurbishment or replacement of components as they wear out.

(iii) Historicity and interdependence

The system or network tends to evolve over time as it is continuously modified, improved, enlarged, and as various components are rebuilt, decommissioned or adapted to other uses. The system components are interdependent and not usually capable of subdivision or separate disposal, and consequently are not readily disposable within the commercial marketplace. The system interdependency may limit a component life to a lesser period than the expected life of the component itself.

(iv) Natural monopoly

The systems tend to be natural monopolies, insofar that economies of scale means that multiple agencies providing a service are less efficient than would be the case if a single agency provided the service. This is because the assets have a high initial cost and a value that is difficult to determine. Once most of the system is built, the marginal cost of servicing additional clients or users tends to be relatively inexpensive, and may be negligible if there is no need to increase the peak capacity or the geographical extent of the network.

In public economics theory, infrastructure assets such as highways and railways tend to be public goods, in that they carry a high degree of non-excludability, where no household can be excluded from using it, and non-rivalry, where no household can reduce another from enjoying it. These properties lead to externality, free ridership, and spillover effects that distort perfect competition and market efficiency. Hence, government becomes the best actor to supply the public goods.

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3. (a) Sun Moon Mutual Fund (approved Mutual Fund) sponsored open ended 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 1-4-2005, Mr. Anand, Mr. Bachhan & Mrs. Charu, three investors invested ₹1 lakh each & chosen 'B', 'C' & 'A' plan respectively. The History of the Fund is as follows:

Date	Dividend %	Bonus Ratio	NAV per unit (FV ₹ 10)		
			Plan A	Plan B	Plan C
28.07.2009	20	-	30.70	31.40	33.42
31.03.2010	70	5:4	58.42	31.05	70.05
31.10.2013	40	-	42.18	25.02	56.15
15.03.2014	25	-	46.45	29.10	64.28
31.03.2014	-	1:3	42.18	20.05	60.12
24.03.2015	40	1:4	48.10	19.95	72.40
31.07.2015	-	-	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: Long-term Capital+ Gain is exempt from Income tax; Short-term Capital Gain is subject to 10% Income tax; Security Transaction Tax 0.2 percent only on sale/redemption of units; Ignore Education Cess.

- (b) X Co. Ltd. Issued Commercial Paper as per the following details:

Date of issue	17 th January 2015
Date of Maturity	17 th April 2015
No. of Days	90 days
Interest rate	11.25%

What was the net amount received by the company on issue of commercial paper?

Answer:

- (a) As given in the problem Mr. Anand, chose Bonus Plan, Mr. Bachhan chose Growth Plan and Mrs. Charu chose Dividend Re-investment Plan. All invested at the time of Initial Public Offer on 1-4-2005, ₹ 1 lakh each and since the face value was ₹ 10, each were allotted 1000 units. We write down the number of units accumulated till 31.7.2015, when all three finally redeem their total units.

Date	Div: %	Bonus	Number of Units		
			Plan A	Plan B	Plan C
			Div. Reinvestment	Bonus	Growth
			Charu	Anand	Bachhan
28.7.09	20		= 10000+(10000×2)/30.70 =10652	10000	10000

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31.3.10	70	5:4	= 10652+ (10652×7)/58.42 = 11928	= 10000+10000×(5/4) = 22500	10000
31.10.13	40		= 11928+ (11928×4)/42.18 = 13059	22500	10000
15.03.14	25		= 13059+ (13059×2.5)/46.45 = 13762	22500	10000
31.03.14		1:3	13762	= 22500 + 22500×(1/3) = 30000	10000
24.3.15	40	1:4	= 13762+ (13762×4)/48.10 =14906	= 30000 + 30000×(1/4) = 37500	10000
31.7.15	Units		14906	37500	10000
	NAV		53.75	22.98	82.07
Redemption			801197.50	861750.00	820700.00
LT CG			0	0	0
STCG			0	= 0.10× (22.98-19.95) ×7500 = 2273	0
STT 0.2%			1602	1724	1641
Net Return			799595.50	857753	819059
CAGR%			= 23.11%*	23.98%**	23.40%***

* $(799595.50/100000)^{1/10} - 1 = 23.11\%$

** $(857753/100000)^{1/10} - 1 = 23.98\%$

*** $(819059/100000)^{1/10} - 1 = 23.40\%$

Note:

(I) CAGR is nothing but finding IRR, from the PVIF Table.

(II) For example, we invested 100000 in year 0 to get 799595 at the end of year 10. i.e.

$$100000 = \frac{799595.50}{(1+k)^{10}} \text{ or } 0.125 = \frac{1}{(1+k)^{10}} \text{ Now we look in the PVIF table for 0.125 across year 10}$$

to get a value near 23%. Using interpolation we can find the exact value of 23.11%, which is the IRR.

(III) The period of total investment though is 10.25 years; we take 10 years for convenience.

(b) Effective pre-tax cost (for company) or Interest Yield (for investor) of commercial paper =

$$\left[\frac{\text{Face Value} - \text{Net Amount Realised}}{\text{Net Amount Realised}} \right] \times \left[\frac{365}{\text{Maturity Period}} \right]$$

FV is not given hence assume to be ₹ 100. M = 90 days & Interest rate = 11.25%

$$0.1125 = \left[\frac{100 - A}{A} \right] \times \left[\frac{365}{90} \right] \rightarrow 1.0277A = 100 \rightarrow A = ₹ 97.30$$

Thus if the company issues a CP worth ₹10 Crores, company would receive only ₹ 9.73 Crores.

4. (a) Describe the economic functions of Financial Markets.

(b) Explain the fundamental factors that apply to all commodities.

Answer:

(a) A financial market is a market where financial instruments are exchanged or traded. Financial markets provide the following three major **economic functions**:

- (i) Price discovery
- (ii) Liquidity
- (iii) Reduction of transaction costs

(i) **Price discovery** function means that transactions between buyers and sellers of financial instruments in a financial market determine the price of the traded asset. At the same time the required return from the investment of funds is determined by the participants in a financial market. The motivation for those seeking funds (deficit units) depends on the required return that investors demand. It is these functions of financial markets that signal how the funds available from those who want to lend or invest funds will be allocated among those needing funds and raise those funds by issuing financial instruments.

(ii) **Liquidity** function provides an opportunity for investors to sell a financial instrument, since it is referred to as a measure of the ability to sell an asset at its fair market value at any time. Without liquidity, an investor would be forced to hold a financial instrument until conditions arise to sell it or the issuer is contractually obligated to pay it off. Debt instrument is liquidated when it matures, and equity instrument is until the company is either voluntarily or involuntarily liquidated. All financial markets provide some form of liquidity. However, different financial markets are characterized by the degree of liquidity.

(iii) The function of **reduction of transaction costs** is performed, when financial market participants are charged and/or bear the costs of trading a financial instrument. In market economies the economic rationale for the existence of institutions and instruments is related to transaction costs, thus the surviving institutions and instruments are those that have the lowest transaction costs.

The key attributes determining transaction costs are

- **Asset specificity,**
- **Uncertainty,**
- **Frequency of occurrence.**

(b) There are various fundamentals factors that drive the commodity markets. These fundamentals may be different for different commodities based on its characteristics. There are certain important fundamentals that apply to all commodities either directly or indirectly.

(i) Demand & supply

Demand and supply are basic factors that affect the movement of any commodity prices. The law of demand and supply is same for equity as well as commodity markets. However demand and supply of all commodities vary during different time periods depending upon seasons, domestic and global conditions and various other major factors influencing its characteristics.

(ii) Demand Curve

It is refined form of demand analysis. Demand curve in a laymen's term is a graphical representation of demand over a period of time. Price is represented on y-axis and demand on the x-axis. The graph is a line graph representing demand at particular prices over a period of time. It gives a clear understanding of the demand situation over a period of time at various price levels.

(iii) Global and domestic economy

Economic scenario significantly affects the prices of a commodity. Demand and supply of any commodity has a direct relationship with economic condition in the state. Depending upon the nature of the commodity, global and domestic economic scenarios affect the commodity prices. For e.g.; Steel prices highly depend on global economic factors as this is a globally and massively used commodity. However as far as a commodity like Kapas (cotton beans) is concerned global factors affect less when compared to domestic factors.

(iv) Economic growth

Economic growth of the world as well as the domestic economy is an important fundamental that will affect the demand and supply positions in a country. If the country is growing at a fast rate the consumption level will also be at a higher rate. This will increase the demand on one hand but supply may not increase at the same rate as it takes time to set up new industries and increase production. This drives the commodity prices of all major commodities.

(v) Inflation

Commodities are considered as hedge against inflation because unlike equity, commodity prices move in direction of inflation. With increase in inflation the prices of major commodities tend to increase and it is true the other way as well.

(vi) Geo-political concerns

Political factors have a direct as well as indirect effect on commodity prices. For example if we take the case of Potato when one year back it was barred from trading on the exchanges. However at time political factors can have positive effects as well.

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(vii) Major Economic Indicators

The Gross Domestic Product, Industrial Production, Purchasing Managers Index, Durable Goods, Housing data, Unemployment Data, Retail Sales, Producer Price Index, Consumer Price Index, Interest Rate, Consumer Confidence Index etc.

(viii) Extra-ordinary events

There may be certain extra-ordinary factors that do not occur very frequent. Wars, natural calamities, depression etc. are such events that affect the commodity prices in a dramatic way.

(xi) Speculation

Speculators bring information into system at times fake or over hyped in-order to trigger the price movement in a particular direction. Speculators are though a part of technical analysis but it is important in the matter of fact that speculation may be of some fundamental factors. However they are an important part of the market's price discovery mechanism.

5. (a) List the characteristics of commodity exchange in India.

(b) 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.

	Qty	Cost	Closing Price
BHEL	2500	1,968.00	1,968.25
Infosys	3000	1,600.00	1,630.20
TCS	2500	928.45	928.45
ITC	25600	169.00	164.55
Reliance Communication	16500	265.00	258.20

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.

Answer:

(a) Characteristics of Commodity Exchange in India:

- There is no value-adding process performed on commodity items. A unit of one type of commodity is broadly interchangeable with another unit. This allows the units to be traded on exchanges without prior inspection.

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Initial Expenses $(0.06 \times 50 \text{ Crores}) \div (5 \times 365)$ 16,438

[Amortized over five years]

Recurring Expenses $(0.025 \times 50 \text{ Crores}) \div 365$ 34,247

Net Asset Value = $\frac{\text{Balance Corpus} + \text{Income} + \text{Stock Purchases} - \text{Unrealized Loss} - \text{Expenses}}{\text{Outstanding Number of Units}}$

NAV = $\frac{47.92611 \text{ Crores} + 78783 + 2.07389 \text{ Crores} - 134895 - 16438 - 34247}{5 \text{ Crores}}$

First day's NAV of equity based Fund = ₹ 9.9979.

6. (a) "The functions of a market are performed by its diverse participants" – Justify.

(b) Jatin purchased a load fund named Lion when the sale price was ₹ 73.5680. There was a sales load of 2.25%. He invested ₹ 4000. In another three months he subscribed to the same fund, again investing ₹ 4000, when the sale price was ₹ 92.9500. The load structure was not changed by the fund during the period. Answer the following:

- (i) What was the NAV when Jatin invested first and when he invested again after three months?
- (ii) How many units he was issued on each occasion?
- (iii) What is his total investment & what is the current value of his investment?
- (iv) If he wants to sell now, will he make any money?

(c) State Reinvestment of profits. List the benefits of this source of finance to the company.

Answer:

(a) The functions of a market are performed by its diverse participants. The participants in financial markets can be also classified into various groups, according to their motive for trading:

- Public investors, who ultimately own the securities and who are motivated by the returns from holding the securities. Public investors include private individuals and institutional investors, such as pension funds and mutual funds.
- Brokers, who act as agents for public investors and who are motivated by the remuneration received (typically in the form of commission fees) for the services they provide. Brokers thus trade for others and not on their own account.
- Dealers, who do trade on their own account but whose primary motive is to profit from trading rather than from holding securities. Typically, dealers obtain their return from the differences between the prices at which they buy and sell the security over short intervals of time.

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- Credit rating agencies (CRAs) that assess the credit risk of borrowers.

In reality three groups are not mutually exclusive. Some public investors may occasionally act on behalf of others; brokers may act as dealers and hold securities on their own, while dealers often hold securities in excess of the inventories needed to facilitate their trading activities. The role of these three groups differs according to the trading mechanism adopted by a financial market.

(b)

- On the first occasion Jatin bought units at ₹ 73.5680 per unit when the load was 2.25%. Therefore the NAV = Sale Price ÷ (1 - Load %) = $73.5680 \div (1 - 2.25\%) = ₹ 75.2614$. Similarly, we have NAV for the second occasion investment = $92.95 \div (1 - 2.25\%) = ₹ 95.0895$
- Jatin was issued on the first occasion $4000/73.5680 = 54.371$ units and on the second occasion = $4000 \div 95.0895 = 42.065$ units
- His total investment is ₹ 8,000 and the current value of investment is = $(54.371 + 42.065) \times ₹ 92.95 = ₹ 8,963.73$
- If he sells now, he would a return of $₹ (8963.73 - 8000) \div ₹ 8,000 = 12.04\%$.

(c) Reinvestment of Profits:

Profitable companies do not generally distribute the whole amount of profits as dividend but, transfer certain proportion to reserves. This may be regarded as reinvestment of profits or ploughing back of profits. As these retained profits actually belong to the shareholders of the company, these are treated as a part of ownership capital. Retention of profits is a sort of self financing of business. The reserves built up over the years by ploughing back of profits may be utilised by the company for the following purposes:-

- Expansion of the undertaking
- Replacement of obsolete assets and modernisation.
- Meeting permanent or special working capital requirement.
- Redemption of old debts.

The benefits of this source of finance to the company are:

- It reduces the dependence on external sources of finance.
- It increases the credit worthiness of the company.
- It enables the company to withstand difficult situations.
- It enables the company to adopt a stable dividend policy.

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7. (a) Explain the Risk Management Procedures of Clearing House.

(b) The following table describes how three mutual funds performed over a 5 year period:

Fund	Average Annual Return	Beta	σ of Annual Return
A	19.2%	1.20	24.7%
B	15.8%	0.90	28.3%
C	20.8%	1.32	26.5%
Market Index	13.5%		20.6%
Risk free Asset	2.2%		

- Compute the Sharpe ratio, the Treynor measure and Jensen's Alpha for each fund.
- Which fund exhibited the best performance over this period from the perspective of an investor for whom the fund is the entire risky portfolio?
- Which fund exhibited the best performance over this period from the perspective of an investor for whom the fund is just one component of a broader risky portfolio?

(c) The RBI offers 91-day T-Bill to raise ₹ 5000 Crores. The following bids have been received.

Bidder	Bid rate	Amount (₹ Crores)
A	98.95	1,800
B	98.93	700
C	98.92	1,000
D	98.90	1,200
E	98.90	600
F	98.87	200
G	98.85	350
H	98.85	150

- Who are the winning bidders if it was a yield based auction, and how much of the security will be allocated to each winning bidder?
- If this auction is single price auction, that is the price to be paid by the winning bidders?

Answer:

(a) Risk Management Procedures of Clearing House:

- Imposition of membership requirements, including capital requirements, and an ongoing monitoring of compliance with such requirements in order to limit the likelihood of defaults;
- Imposition of security deposit, collateral requirements and exposure ceilings to limit loss by using more than one settlement bank. Another technique to minimize the risk of settlement

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bank failure is to convert customer cash held in deposits at the settlement bank into securities, e.g. Treasury bonds, held by the settlement bank. While a cash deposit account creates a debtor/creditor relationship between the bank and its customer for the amount on deposit and a customer claim against the assets of the bank in the event of its insolvency, customer securities held by a settlement bank are segregated for the benefit of the customer on its books, are not included in its assets upon its insolvency and can be recovered by the customer free of any claims against the bank.

(b)

(i) **Sharpe ratio = (Average Return - Risk free Rate)/Standard Deviation**

$$S_A = (0.192 - 0.022)/0.247 = 0.68826$$

$$S_B = (0.158 - 0.022)/0.283 = 0.48057$$

$$S_C = (0.208 - 0.022)/0.265 = 0.70189$$

$$S_M = (0.135 - 0.022)/0.206 = 0.54854$$

Treynor value = (Average Return - Risk free Rate)/beta

$$T_A = (19.2-2.2)/1.2 = 14.167$$

$$T_B = (15.8-2.2)/0.9 = 15.111$$

$$T_C = (20.8-2.2)/1.32 = 14.091$$

$$T_M = (13.5-2.2)/1 = 11.300$$

$$\text{Jensen's Alpha} = \text{Average fund return} - [R_f + \beta_i(\text{Average market return} - R_f)]$$

$$\text{Jensen's Alpha}_A = .192 - [.022 + 1.2*(.135 - .022)] = .192 - .15760 = 3.4400\%$$

$$\text{Jensen's Alpha}_B = .158 - [.022 + 0.9*(.135 - .022)] = .158 - .12370 = 3.4300\%$$

$$\text{Jensen's Alpha}_C = .208 - [.022 + 1.32*(.135 - .022)] = .208 - .17116 = 3.6840\%$$

(ii) If the fund is the entire risky portfolio, the relevant performance measure is the Sharpe Ratio. (Because for such an investor σ (standard deviation) is the proper measure of risk.) So for this investor, fund C exhibited the best performance.

(iii) If the fund is just one part of a broader risky portfolio, either Jensen's Alpha or Treynor value could be used. (Because for this investor, beta is the relevant measure of risk; as for him measuring systematic risk is more irrelevant.) There is no consensus which is the better measure. If you use the Treynor value we judge B to be the best fund. If you use Jensen's Alpha we judge C to be the best fund.

(c)

(i) **Fully accepted bids will be as follows:**

Bidder	Price Quoted	Approved Amount (₹ Crores)
A	98.95	1,800
B	98.93	700
C	98.92	1,000
	Total	3,500

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D and E will be allotted proportionately in the following manner:

Bidder	Price	Amount	Proportionate amount allotted (₹ Crores)
D	98.90	1,200	1,000
E	98.90	600	500
		1,800	1,500

- (ii) Had this been a single price auction, the price to be paid by the winning bidder would be ₹ 98.90. Because starting from ₹ 98.95, in the descending order of price (i.e. in the ascending order of yield) ₹ 5000 crores can be collected by accepting bids upto ₹ 98.90. [Find cumulative total from 98.95 till 98.90 downwards/descending.]

8. (a) List the different types / categories of NBFCs registered with RBI.

- (b) A fund had an NAV of ₹21.50 at the beginning of the year. An investor subscribed to this fund had to pay a load of ₹1.85 per unit. NAV increased to ₹23.04 at the end of the year. During the year dividend and capital gains were distributed to the extent of ₹1.05. What is the total return? Had there been no load what would have been the return?

Answer:

- (a) NBFCs are categorized a) in terms of the type of liabilities into Deposit and Non-Deposit accepting NBFCs, b) non deposit taking NBFCs by their size into systemically important and other non-deposit holding companies (NBFC-NDSI and NBFC-ND) and c) by the kind of activity they conduct. Within this broad categorization the different types of NBFCs are as follows:

- (i) **Asset Finance Company (AFC)** : An AFC is a company which is a financial institution carrying on as its principal business the financing of physical assets supporting productive / economic activity, such as automobiles, tractors, lathe machines, generator sets, earth moving and material handling equipments, moving on own power and general purpose industrial machines. Principal business for this purpose is defined as aggregate of financing real/physical assets supporting economic activity and income arising therefrom is not less than 60% of its total assets and total income respectively.
- (ii) **Investment Company (IC)** : IC means any company which is a financial institution carrying on as its principal business the acquisition of securities,
- (iii) **Loan Company (LC)**: LC means any company which is a financial institution carrying on as its principal business the providing of finance whether by making loans or advances or otherwise for any activity other than its own but does not include an Asset Finance Company.
- (iv) **Infrastructure Finance Company (IFC)**: IFC is a non-banking finance company (a) which deploys at least 75 per cent of its total assets in infrastructure loans, (b) has a minimum Net

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Owned Funds of ₹ 300 crores, (c) has a minimum credit rating of 'A 'or equivalent (d) and a CRAR of 15%.

(v) Systemically Important Core Investment Company (CIC-ND-SI): CIC-ND-SI is an NBFC carrying on the business of acquisition of shares and securities which satisfies the following conditions:-

- it holds not less than 90% of its Total Assets in the form of investment in equity shares, preference shares, debt or loans in group companies;
- its investments in the equity shares (including instruments compulsorily convertible into equity shares within a period not exceeding 10 years from the date of issue) in group companies constitutes not less than 60% of its Total Assets;
- it does not trade in its investments in shares, debt or loans in group companies except through block sale for the purpose of dilution or disinvestment;
- it does not carry on any other financial activity referred to in Section 45l(c) and 45l(f) of the RBI act, 1934 except investment in bank deposits, money market instruments, government securities, loans to and investments in debt issuances of group companies or guarantees issued on behalf of group companies.
- Its asset size is ₹ 100 crores or above and
- It accepts public funds

(vi) Infrastructure Debt Fund: Non- Banking Financial Company (IDF-NBFC): IDF-NBFC is a company registered as NBFC to facilitate the flow of long term debt into infrastructure projects. IDF-NBFC raise resources through issue of Rupee or Dollar denominated bonds of minimum 5 year maturity. Only Infrastructure Finance Companies (IFC) can sponsor IDF-NBFCs.

(vii) Non-Banking Financial Company - Micro Finance Institution (NBFC-MFI): NBFC-MFI is a non-deposit taking NBFC having not less than 85% of its assets in the nature of qualifying assets which satisfy the following criteria:

- loan disbursed by an NBFC-MFI to a borrower with a rural household annual income not exceeding ₹60,000 or urban and semi-urban household income not exceeding ₹1,20,000;
- loan amount does not exceed ₹35,000 in the first cycle and ₹50,000 in subsequent cycles;
- total indebtedness of the borrower does not exceed ₹50,000;
- tenure of the loan not to be less than 24 months for loan amount in excess of ₹15,000 with prepayment without penalty;
- loan to be extended without collateral;
- aggregate amount of loans, given for income generation, is not less than 75 per cent of the total loans given by the MFIs;
- loan is repayable on weekly, fortnightly or monthly installments at the choice of the borrower.

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(viii) **Non-Banking Financial Company – Factors (NBFC-Factors):** NBFC-Factor is a non-deposit taking NBFC engaged in the principal business of factoring. The financial assets in the factoring business should constitute at least 75 percent of its total assets and its income derived from factoring business should not be less than 75 percent of its gross income.

(b)

Purchase (offer) price—beginning of year = 21.5+1.85	₹ 23.35
Current price (NAV) end of year	23.04
Decrease	(₹ 0.31)
Return for the year:	
Dividend and gains distribution	₹ 1.05
Loss in value	(0.31)
Total return	₹ 0.74
HPR % = 0.74/23.35	3.17%

Had this been a no-load fund, the HPR i.e. return would have been:
(₹ 1.54 + ₹ 1.05)/₹1.50= 12.05%

9. (a) **Describe Indian Infrastructure. List the key reasons to invest in infrastructure in India.**

(b) **Which of the two funds is better? An entry load fund 'A' charging 8% load and returning 15% per annum or an exit load fund 'B' charging 2%, but earning only 10% per annum?**

Answer:

(a) Indian infrastructure is currently under a major overhaul. It is being increasingly noticed that in order to sustain the high growth rates of 8-9 percent achieved by India in the past few years need to be supported by corresponding improvement in infrastructure. Moreover, the financing in Indian infrastructure is gradually moving away from public to private realm. It is expected in the 12th Five-Year plan's 50% of investment in infrastructure will come through the private route.

According to Goldman Sachs, the country would need investments of more than \$1 trillion in infrastructure from 2010 to 2019, with roads entailing \$427 billion, power \$288 billion and railways \$281 billion (Goldman Sachs). So far, India's success across the sectors has been mixed. Capacity under construction or fully constructed according to the Eleventh Year Plan (Annexure 1) reveals that the only sector on track is the power sector, achieving 100 percent of planned capacity, while ports sector is at 85 percent, the airports sector at 75 percent and the roads sector at 50 percent. The repercussion, India is close to a deficit of USD 150 billion to USD 190 billion.

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The definition of infrastructure as provided by UNESCAP is a term used to refer to the basic architecture of any system, mechanical, social, political or cultural (United Nations Economic and Social Council for Asia and Pacific). The expanded definition of infrastructure includes transport (Roads, Railways, Ports, and Airports), public utilities (Power and Water Supply etc.), public services (Fire Service, Flood Protection, and Police etc.), national services (defense, monetary and postal systems and the legal and regulatory system) along with "soft infrastructure" which denotes institutions that maintain the health and cultural standards of the population.

The key reasons to invest in infrastructure in India are as follows:

- (i) Infrastructure: Major growth driver:** The booming Indian economy combined with the high population growth rate is creating tremendous pressure to modernize, sustain and accelerate investment in country's infrastructure. This has become more prominent over the past few decades since the investment backlog has exceeded billions.
- (ii) Private Capital Requirements:** The basis of economic activity is infrastructure. India could have grown faster had the investments in infrastructure been commiserate with economic activity. Construction activity has a direct impact on output and all economic sectors benefit from comprehensive infrastructure.
- (iii) Immense Regional Disparities:** Inter-state disparity in per capita income among Indian states has been rising over the last couple of decades. In addition, the inter-state disparities in economic and social infrastructure facilities too have remained at alarmingly high levels. Hence, investment in infrastructure is required in order to boost inter-state level of development.
- (iv) Managing Institutional Risks:** The big infrastructure opportunities are not without inherent risks like macroeconomic risks associated with emerging markets like India, low degree of liquidity in markets and unsatisfactory transparency of market players and the market itself. Therefore, these risks need to be managed competently for Indian infrastructure to flourish.

(b) Assume that an investor invests ₹ 100 in each fund.

If he invests ₹ 100 in 'A' Fund, then the funds that would be invested in the market would be 8% less i.e. ₹ 92 only. A return of 15% on this would be giving him a total of ₹ 105.80 (92×1.08) on an initial investment of ₹ 100 i.e. 5.8%.

On the other hand, if he invests ₹ 100 in 'B' Fund, then the funds that would be invested in the market is still ₹ 100 as there is no entry load. A return of 10% on this would be giving him a total of ₹ 110 (100×1.10). With a repurchase (exit) load of 2%, he would get ₹ 107.84 i.e. 7.84% on an initial investment of ₹ 100.

Therefore Fund B is a better choice.

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10. (a) Explain the major steps taken by the RBI for facilitating increased flow of credit to infrastructure projects.
- (b) 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.
- (i) Calculate the rate of return to an investor in the fund during the year.
- (ii) What would have been the rate of return to an investor who held the same securities as the fund manager during the year?

Answer:

- (a) The Reserve Bank has initiated a number of regulatory measures/concessions for facilitating increased flow of credit to infrastructure projects. A briefly touch upon, few of the critical measures taken in this regard.

➤ **Use of Foreign Exchange Reserves for Infrastructure Development**

In India, the increase in quantum of foreign exchange reserves during the decade of 2000, coupled with escalating infrastructure constraints and the related financing deficit led to a debate on possibility of using foreign exchange reserves for investment in infrastructure sector. Although use of reserves for such purposes does not meet the criterion of reserve management objectives, a special and limited window has been created. Accordingly, IIFC (UK) Ltd. was incorporated in London and was set up in April 2008. Under this scheme, RBI invests, in tranches, up to an aggregate amount of USD 5 billion in fully government guaranteed foreign currency denominated bonds issued by this overseas Special Purpose Vehicles (SPV) of the IIFCL. The funds, thus raised, are to be utilized by the company for on-lending to the Indian companies implementing infrastructure projects in India and/or to co-finance the ECBs of such projects for capital expenditure outside India without creating any monetary impact.

➤ **Enhanced Exposure norms**

In view of the generally large requirements of funds for infrastructure projects, the existing RBI guidelines provide for enhanced exposure ceilings for the infrastructure lending. The credit exposure ceiling limits are 15 per cent of capital funds in case of a single borrower and 40 per cent of capital funds in the case of a borrower group. Credit exposure to a single borrower may exceed the exposure norm of 15 per cent of the bank's capital funds by an additional 5 per cent (i.e., **up to 20 per cent**) and a borrower group may exceed the exposure norm by an additional 10 per cent (i.e., **up to 50 per cent**), provided the additional credit exposure is on account of extension of credit to infrastructure projects.

➤ **Asset-Liability Management in the context of Infrastructure Financing**

In order to meet long term financing requirements of infrastructure projects and address

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asset liability management issue, banks are permitted to enter into take out financing arrangement with IDFC/other FIs. Further, banks have also been allowed to issue long term bonds with a minimum maturity of five years to the extent of their exposure of residual maturity of more than five years to the infrastructure sector.

➤ **Issuance of Guarantee**

Keeping in view the special features of lending to infrastructure projects, viz., high degree of appraisal skills on the part of lenders and availability of resources of a maturity matching with the project period, banks are permitted to issue guarantees favouring other lending institutions in respect of infrastructure projects provided the bank issuing the guarantee takes a funded share in the project at least to the extent of five per cent of the project cost and undertakes normal credit appraisal, monitoring and follow up of the project.

➤ **Financing Promoters' Equity**

Banks have been permitted to extend finance for funding promoter's equity in cases where the proposal involves acquisition of share in an existing company engaged in implementing or operating an infrastructure project in India, subject to certain conditions.

➤ **Relaxation from Capital Market Exposure**

In order to encourage lending by banks to the infrastructure, the promoters' shares in the SPV of an infrastructure project pledged to the lending bank is permitted to be excluded from the banks' capital market exposure.

➤ **Permission to invest in Unrated Bonds**

In order to encourage banks to increase the flow of credit to infrastructure sector, banks are allowed to invest in unrated bonds of companies engaged in infrastructure activities within the ceiling of 10 per cent for unlisted non SLR securities.

➤ **Relaxation in the Classification of Investments**

Investment by banks in the long-term bonds issued by companies engaged in executing infrastructure projects and having a minimum residual maturity of seven years are allowed to be classified under the HTM category, which means they need not be marked to market.

➤ **Relaxations relating to asset classification**

With effect from March 31, 2008, the infrastructure project accounts of banks were permitted to be classified as sub-standard if the date of commencement of commercial production extended beyond a period of two years (as against 6 months in the case of other projects) after the date of completion of the project, as originally envisaged. With effect from March 31, 2010, if an infrastructure project loan classified as 'standard asset' is restructured

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any time during the above period of two years, it can be retained as a standard asset if the fresh date of commencement of operations is fixed within certain limits prescribed by the Reserve Bank, and provided the account continues to be serviced as per the restructured terms.

Certain relaxations as far as conditions specified for deriving asset classification benefits under our restructuring guidelines are made in respect of infrastructure exposure of banks i.e. **in respect of repayment period of restructured advances and regarding tangible security.**

➤ Infrastructure Debt Funds

Realizing the potential of Infrastructure Debt Funds in enhancing financing to the sector, Reserve Bank of India has, as a special case, permitted several prudential relaxations. Sponsor bank of IDF-NBFC has been permitted to contribute upto 49 per cent of the equity.

In order to enable and encourage higher quantum of take out financing by an IDF-NBFC, they have been permitted to take-on upto 50 per cent of its capital fund for individual projects. An additional exposure of 10 per cent can be taken subject to the approval of the Board. On a case to case basis, Reserve Bank will permit such entities for additional exposures of another 15 per cent, subject to conditions. Thus, exposure can go upto 75 per cent of the capital funds.

Another significant relaxation is that for the purpose of computing capital adequacy of the IDF-NBFC, bonds covering PPP and post COD projects in existence over a year of commercial operation shall be assigned a lower risk weight of 50 percent.

(b)

- (i) Investor bought at $12 \times 1.02 = ₹ 12.24$ (since it was selling at a premium)

Investor would have sold at $12.10 \times 0.93 = 11.253$ (since it was selling at a discount)

Return for the investor = -0.987

Investor got Income & Capital gains of ₹ 1.50

Rate of return = $1.50 - 0.987 / 12.24 = 4.19\%$

- (ii) Had he done on his own the same way the fond 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 = $0.1 + 1.50 / 12 = 13.33\%$

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SECTION- B

11. (a) The following table shows interest rates and exchange rates for the US Dollar and French Franc. The spot exchange rate is 7.05 Francs per Dollar. Complete the missing entries –

	3 Months	6 Months	1 Year
Euro Dollar Interest Rate (Annual)	11½%	12¼%	?
Euro Franc Interest Rate (Annual)	19½%	?	20%
Forward Francs per Dollar	?	?	7.52
Forward Discount on Franc (Percent per Year)	?	(6.3%)	?

- (b) Discuss the need for setting-up a Depository System in India.

Answer:

(a)

Particulars	3 Months	6 Months	1 Year
Euro Dollar Interest Rate (Annual)	11½%	12¼%	12½%
Euro Franc Interest Rate (Annual)	19½%	18.94%	20%
Forward Francs per Dollar	7.1871	7.2721	7.52
Forward Discount on Franc (Percent per Year)	(7.78%)	(6.3%)	6.67%

Working Notes:

(i) Spot Rate 1 \$ = 7.05 Francs

(ii) 3 Months Forward, (for \$ 1)

$$= \text{Spot Rate} \times \frac{[1 + \text{Euro Francs Interest Rate for 3 Months}]}{[1 + \text{Euro Dollar Interest Rate for 3 Months}]}$$

$$= 7.05 \text{ Francs} \times \frac{[1 + 19.5\%/4]}{[1 + 11.5\%/4]} = \text{Fr. } 7.1871 \text{ [Interest Rate Parity Method]}$$

(iii) Forward Discount Rate [3 Months]

$$= \frac{[(\text{Forward Rate} - \text{Spot Rate}) / \text{Spot Rate}] \times 100 \times 12}{\text{No. of Months' Forward Rate}}$$

$$= \frac{(7.1871 - 7.05)}{7.05} \times 100 \times 12/3 = 7.78\% \text{ (Annualized)}$$

(iv) 6 Months Forward Rate,

$$= \text{Spot Rate} \times [1 + (\text{Discount Rate} \times \text{No. of Months Forward} / 12)]$$

$$= \text{Fr. } 7.05 \times [1 + (6.3\% \times 6 / 12)]$$

$$= \text{Fr. } 7.05 \times [1 + 0.0315] = \text{Fr. } 7.2721$$

(v) Franc Interest Rate [6 Months] = Assuming Franc Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate –

$$\text{Forward Rate} = \text{Franc Spot Rate} \times \frac{(1 + \text{Francs Interest Rate for 6 Months})}{(1 + \text{Euro Dollar Interest Rate for 6 Months})}$$

$$\text{Fr. } 7.2721 = \text{Fr. } 7.05 \times \frac{(1 + x/2)}{(1 + 12.25\%/2)}$$

$$\text{Fr. } 7.2721 = \text{Fr. } 7.05 \times \frac{(1 + x/2)}{(1 + 0.06125)},$$

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$$\begin{aligned}
 1 + x/2 &= \text{Fr. } 7.2721 \times 1.06125 / \text{Fr. } 7.05 \\
 x/2 &= 1.0947 - 1 = 0.0947 \text{ or } 9.47\% \\
 x &= 18.94\%
 \end{aligned}$$

(vi) Euro Interest Rate [6 Months] = Assuming Euro Interest Rate = x, applying the same in Interest Rate Parity Formula for determining Forward Rate:

$$\text{Forward Rate} = \text{Franc Spot Rate} \times \frac{(1 + \text{Francs Interest Rate for 1Year})}{(1 + \text{Euro Dollar Interest Rate for 1Year})}$$

$$\text{Fr. } 7.52 = \text{Fr. } 7.05 \times (1 + 20\%) / (1 + x)$$

$$\text{Fr. } 7.52 = \text{Fr. } 7.05 \times (1 + 0.2) / (1 + x),$$

$$1 + x = \text{Fr. } 7.05 \times 1.2 / \text{Fr. } 7.52$$

$$x = 1.125 - 1 = 0.125 \text{ or } 12.50\%$$

(vii) Forward Discount Rate:

$$\begin{aligned}
 &= [\text{Forward Rate} - \text{Spot Rate}] / [\text{Spot Rate}] \times 100 \times 12 / \text{No. of Months Forward} \\
 &= (7.52 - 7.05) / 7.05 \times 100 \times 12 / 12 \text{ Months} = 0.0667 \text{ or } 6.67\%
 \end{aligned}$$

(b) The need was realized in the 1990s due to various reasons as under:

- A lot of time was consumed in the process of allotment and transfer of shares
- Increase in volume of transactions
- Large scale irregularities in the securities scam of 1992 exposed the limitations of the prevailing settlement system
- Problems associated with dealing in physical shares, such as
 - problems of theft, fake and/or forged transfers,
 - share transfer delays particularly due to signature mismatches; and
 - paper work involved in buying, selling, and transfer leading to costs of handling, storage, transportation, and other back office costs.

To overcome these problems, the Government of India, in 1996, enacted the Depositories Act, 1996 to start depository services in India.

12. (a) State Secondary Market. List the function of secondary Market.

(b) Companies A and B face the following Interest Rates:

	A	B
U.S. Dollars (Floating Rate)	LIBOR + 0.5%	LIBOR + 1.0%
Canadian (Fixed Rate)	5.0%	6.5%

A wants to borrow U.S. Dollars at a floating rate of interest and B wants to borrow Canadian Dollars at a Fixed Rate of Interest. A Financial Institution is planning to arrange a Swap and requires a 50 basis point spread.

If the swap is equally attractive to A and B, what rates of Interest will A and B end up paying?

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Answer:

(a) Secondary Market:

The secondary market is a market in which existing securities are resold or traded. This market is also known as the stock market. In India, the secondary market consists of recognized stock exchanges operating under rules, by-laws and regulations duly approved by the government.

Functions of the Secondary Market:

- To contribute to economic growth through allocation of funds to the most efficient channel through the process of disinvestment to reinvestment.
- To facilitate liquidity and marketability of the outstanding equity and debt instruments.
- To ensure a measure of safety and fair dealing to protect investors' interests.
- To induce companies to improve performance since the market price at the stock exchanges reflects the performance and this market price is readily available to investors.
- To provide instant valuation of securities caused by changes in the internal environment.

(b)

	Particulars	Value
1.	Difference in Floating Rates [(LIBOR + 1%) - (LIBOR + 0.5%)]	0.5%
2.	Difference in Fixed Rates [6.5% - 5%]	1.5%
3.	Net Difference {[(2) - (1)] in Absolute Terms}	1.0%
4.	Amount paid for arrangement of Swap Option	(0.5%)
5.	Net Gain [(3) - (4)]	0.5%
6.	Company A's share of Gain [0.5% x 50%]	0.25%
7.	Company B's share of Gain [0.5% x 50%]	0.25%

Company A		Company B	
1	Company A will borrow at Fixed Rate.	1	Company B will borrow at Floating Rate.
2	Pay interest to Bankers at Fixed Rate (i.e. 5.0%)	2	Pay interest to its Bankers at Floating Rate (i.e. LIBOR +1.0 %)
3	Will collect from Company B interest amount differential i.e. Interest computed at Fixed Rate (5.0%) Less Interest computed at Floating Rate of (LIBOR+0.5%) = 4.5% - LIBOR	3	Will pay interest amount differential to Company A i.e. Interest computed at Fixed Rate (5.0%) Less Interest computed at Floating Rate of (LIBOR + 0.5%) = 4.5% - LIBOR
4	Receive its share of Gain from Company B = 0.25%	4	Pay to Company A its share of Gain = 0.25%

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5	Effective Interest Rate: 2 – 3 - 4 = Fixed Rate paid by Company A - Interest Differential Received from Company B - Share of Gain. = 5.0% - (4.5% - LIBOR) - 0.25% = LIBOR + 0.25%	5	Pay Commission Charges to the Financial Institution for arranging Interest Rate Swaps i.e. 0.5%
		6	Effective Interest Rate: 2 + 3 + 4 + 5 = Floating Rate to Company B (LIBOR+1.0%) + Interest Differential paid to Company A (4.5% - LIBOR) + Share of Gain paid to Company A (0.25%) + Commission charges paid (0.5%) = LIBOR + 1.0 % + 4.5% - LIBOR + 0.25% + 0.5% = 6.25%

13. (a) Given the following information -

BSE Index	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 Futures Contract on the BSE Index with 4 months Maturity is used to Hedge the value of Portfolio over next 3 months. One Future Contract is for delivery of 50 times the Index. Based on the information, Calculate — (i) Price of Future Contract, (ii) The Gain on Short Futures Position if Index turns out to be 4,500 in 3 months.

(b) State Credit Rating Symbols in India. Explain the various Credit Rating Agencies in India.

Answer:

(a)

1. Computation of Price of Futures Contract

Spot Price [S_x]	₹ 5,000
Dividend Yield Expected [y]	6% or 0.06
Tenor / Time Period [t] in Years	4 Months or 0.3333 Year
Risk Free Interest Rate [r]	9% or 0.09
Price of Futures Contract [TFP _x] $TFP_x = S_x \times e^{(r-y)t}$	$= ₹ 5,000 \times e^{(0.09 - 0.06) \times 0.3333}$ $= ₹ 5,000 \times e^{0.03 \times 0.3333}$ $= ₹ 5,000 \times e^{0.01} = ₹ 5,000 \times 1.0101 = ₹ 5,050$

Therefore, price of the Futures Contract is ₹ 5,050.

2. Gain on Short Futures Position

(i) Computation of No. of Contracts to be entered into:

$$\text{No of Contracts} = \frac{\text{Portfolio Index} \times \text{Beta of Portfolio}}{\text{Value per Future Contract}} = \frac{10,10,000 \times 1.5}{5,050 \times 50} = 6 \text{ Contracts}$$

(ii) Computation of Gain on Short Futures Position (SELL Position)

$$\begin{aligned} \text{Total Gain} &= (\text{Contracted Sale Price} - \text{Actual Price}) \times \text{No. of Contracts} \\ &= (5,050 - 4,500) \times 50 \text{ units} \times 6 \text{ Contracts} \\ &= 1,65,000. \end{aligned}$$

(b) Credit Rating Symbols in India:

Credit rating agencies generally use symbols to express the creditworthiness rather than give marks or descriptive credit opinion. Rating symbols indicate relative creditworthiness of securities within a defined frame of reference. A simple alphanumeric symbol is normally used to convey a credit rating. The credit rating agencies of India assign the following ratings to the companies:

- (i) AAA- Highest Safety
- (ii) AA- High Safety
- (iii) A-Adequate Safety
- (iv) BBB- Moderate Safety
- (v) BB- Inadequate Safety
- (vi) B- High Risk
- (vii) C- Substantial Risk
- (viii) D- Default Risk

Various Credit Rating Agencies in India:

There are five credit rating agencies registered with the SEBI. They are outlined as follows:

(i) CRISIL Limited (Formerly the Credit Rating Information Services of India Limited) :-

(a) CRISIL is the oldest rating agency originally promoted by ICICI.

(b) **Services Offered:** CRISIL offers a comprehensive range of integrated product and service offerings - real time news, analyzed data, opinion and expert advice - to enable investors, issuers, policy makers de-risk their business and financial decision making, take informed investment decisions and develop workable solutions.

(c) **Risk Standardisation:** CRISIL helps to understand, measure and standardise risks -

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financial and credit risks, price and market risks, exchange and liquidity risks, operational, strategic and regulatory risks.

(ii) ICRA Limited (Formerly Investment Information and Credit Rating Agency of India) –

(a) ICRA is an independent and professional Company, providing investment information and credit rating services.

(b) Activities: ICRA executes assignments in credit ratings, equity grading, and mandated studies spanning diverse, industrial sectors. ICRA has broad based its services to the corporate and financial sectors, both in India and overseas and offers its services under three banners namely- Rating Services, Information Services, Advisory Services.

(iii) CARE (Credit Analysis and Research Limited) –

(a) CARE is equipped to rate all types of debt instruments like Commercial Paper, Fixed Deposit, Bonds, Debentures and Structured Obligations.

(b) Services: CARE's Information and Advisory services group prepares credit reports on specific requests from banks or business partners, conducts sector studies and provides advisory services in the areas of financial restructuring, valuation and credit appraisal systems.

(iv) Fitch Ratings India Private Limited: Fitch Rating India was formerly known as DCR India-Duff and Phelps Credit Rating Co. Fitch Ratings, USA and DCR India merged to form a new entity called Fitch India. Fitch India is a 100% subsidiary of Fitch Ratings, USA and is the wholly owned foreign operator in India. Fitch is the only international rating agency with a presence on the ground in India. Fitch Rating India rates corporates, banks, financial institutions, structured deals, securitized paper, global infrastructure and project finance, public finance, SMEs, asset management companies, and insurance companies.

(v) Brickwork Ratings: It is the fifth agency in the ratings business which commenced its activities from September 24, 2008. It rates IPOs, perpetual bonds of banks, non-convertible debenture issues, and certificate of deposits.

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14. (a) Following are the Spot Exchange Rates quoted at three different Forex Markets –

INR/USD	48.30 in Mumbai
INR / GBP	77.52 in London
USD /GBP	1.6231 in New York

The arbitrageur has USD 1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates.

(b) Compute the Theoretical Forward Price of the following Securities

Securities	P Ltd	Q Ltd	R Ltd
Spot Price	₹ 4,500	₹ 350	₹ 900
Dividend Expected	₹ 50	₹ 20	₹ 50
Dividend Receivable in	2 Months	3 Months	4 Months
6 Month's Futures Contract Rate	₹ 4,650	₹ 360	₹ 900

You may assume a Risk Free Interest Rate of 9% p.a.

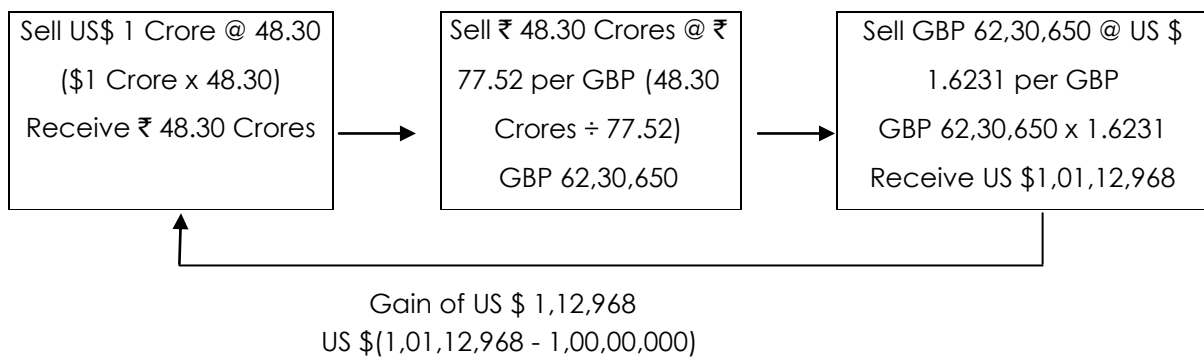
What is the course of action to benefit from Futures Contract? Is there any arbitrage?

Answer:

(a) USD per GBP (Directly Available Quote) = 1.6231
 USD per GBP (Cross Currency Quote) = $\text{USD}/₹ \times ₹/\text{GBP}$
 $= 1/₹ 48.30 \times ₹ 77.52/\text{GBP 1}$
 $= \text{USD } 1.6050 \text{ per GBP}$

Inference: The quote directly available for USD/GBP and cross currency quote are different, there exists an arbitrage opportunity.

Course of Action for Arbitrageur to make profit: Buy GBP under Cross Currency Route (Cheaper Quote for GBP). Sell GBP under Directly Available Quote.



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(b)

Particulars	P Ltd	Q Ltd	R Ltd
Spot Price [S_x]	₹ 4,500	₹ 350	₹ 900
Dividend Expected [D_f]	₹ 50	₹ 20	₹ 50
Dividend Receivable in [t]	2 Months or 1/6 Year or 0.1667	3 Months or 1/4th Year or 0.25	4 Months or 1/3 year or 0.333
Risk Free Interest Rate [r]	9% or 0.09	9% or 0.09	9% or 0.09
Present Value of Dividend [D_p]	$DF \times e^{-rt}$ or $DF \div e^{rt}$ = ₹ 50 × $e^{-0.09 \times 0.1667}$ = ₹ 50 × $e^{-0.015}$ = ₹ 50 × 0.9851 = ₹ 49.255	$DF \times e^{-rt}$ or $DF \div e^{rt}$ = ₹ 20 × $e^{-0.09 \times 0.25}$ = ₹ 20 × $e^{-0.0225}$ = ₹ 20 × 0.9775 = ₹ 19.555	$DF \times e^{-rt}$ or $DF \div e^{rt}$ = ₹ 50 × $e^{-0.09 \times 0.3333}$ = ₹ 50 × $e^{-0.03}$ = ₹ 50 × 0.9704 = ₹ 48.52
Adjusted Spot Price [S_{Adj}] = $S_x - D_p$	₹ 4500 – ₹ 49.255 = ₹ 4,450.745	₹ 350 – ₹ 19.555 = ₹ 330.445	₹ 900 – ₹ 48.520 = ₹ 851.48
Theoretical Forward Price [TFP_x] = $S_{Adj} \times e^{rt}$	= 4,450.745 × $e^{0.09 \times 0.50}$ = 4,450.745 × $e^{0.045}$ = 4,450.745 × 1.0461 = ₹ 4,655.924	= 330.445 × $e^{0.09 \times 0.50}$ = 330.445 × $e^{0.045}$ = 330.445 × 1.0461 = ₹ 345.678	= 851.48 × $e^{0.09 \times 0.50}$ = 851.48 × $e^{0.045}$ = 851.48 × 1.0461 = ₹ 890.733
6 Months Futures Contract Rate [AFP_x]	₹ 4,650	₹ 360	₹ 900
TFP_x Vs. AFP_x	AFP_x is Lower	AFP_x is Higher	AFP_x is Higher
Valuation in Futures Market	Undervalued	Overvalued	Overvalued
Recommended Action	Sell Spot. Buy Future.	Buy Spot. Sell Future.	Buy Spot. Sell Future.

Conclusion: Since the Theoretical Forward Price is different from the Stock Price, Arbitrage exists in all the three cases.

15. (a) From the following information available regarding 8 options, advice on the course of action to be followed by Ranveer (who can either hold or write an option) —

Security	Nature of Option	Exercise Price	Premium Payable [Value of Option]	Spot Price on Expiry Date
A	Put	₹ 250	₹ 25	₹ 220
B	Call	₹ 1,000	₹ 120	₹ 1,150
C	Call	₹ 600	₹ 50	₹ 640
D	Put	₹ 200	₹ 20	₹ 190
E	Put	₹ 700	₹ 80	₹ 640
F	Call	₹ 100	₹ 12	₹ 110
G	Put	₹ 2,000	₹ 180	₹ 1,800
H	Call	₹ 1,400	₹ 150	₹ 1,580

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(b) What do you mean by Credit Risk? Explain the types of credit risk.

Answer:

(a)

Security	Nature of Option	Exercise Price	Premium [Actual Value of Option]	Spot Price on Expiry Date	Theoretical Value	Position	Course of Action	Gain on Action
A	Put	₹ 250	₹ 25	₹ 220	₹ 30	Undervalued	Buy Put Option, Buy Stock in Spot Market	₹ 5
B	Call	₹ 1,000	₹ 120	₹ 1,150	₹ 150	Undervalued	Buy Call Option, Sell Stock in Spot Market	₹ 30
C	Call	₹ 600	₹ 50	₹ 640	₹ 40	Overvalued	Sell Call Option, Buy Stock in Spot Market	₹ 10
D	Put	₹ 200	₹ 20	₹ 190	₹ 10	Overvalued	Sell Put Option, Sell Stock in Spot Market	₹ 10
E	Put	₹ 700	₹ 80	₹ 640	₹ 60	Overvalued	Sell Put Option, Sell Stock in Spot Market	₹ 20
F	Call	₹ 100	₹ 12	₹ 110	₹ 10	Overvalued	Sell Call Option, Buy Stock in Spot Market	₹ 2
G	Put	₹ 2,000	₹ 180	₹ 1,800	₹ 200	Undervalued	Buy Put Option, Buy Stock in Spot Market	₹ 20
H	Call	₹ 1,400	₹ 150	₹ 1,580	₹ 180	Undervalued	Buy Call Option, Sell Stock in Spot Market	₹ 30

(b) Credit risk refers to the risk that a borrower will default on any type of debt by failing to make payments which it is obligated to do. The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs. The loss may be complete or partial and can arise in a number of circumstances. For example:

- A consumer may fail to make a payment due on a mortgage loan, credit card, line of credit, or other loan
- A company is unable to repay amounts secured by a fixed or floating charge over the assets of the company
- A business or consumer does not pay a trade invoice when due
- A business does not pay an employee's earned wages when due
- A business or government bond issuer does not make a payment on a coupon or principal payment when due
- An insolvent insurance company does not pay a policy obligation
- An insolvent bank won't return funds to a depositor
- A government grants bankruptcy protection to an insolvent consumer or business

To reduce the lender's credit risk, the lender may perform a credit check on the prospective borrower, may require the borrower to take out appropriate insurance, such as mortgage insurance or seek security or guarantees of third parties, besides other possible strategies. In general, the higher the risk, the higher will be the interest rate that the debtor will be asked to pay on the debt.

Types of credit risk

Credit risk can be classified in the following way:

- **Credit default risk** - The risk of loss arising from a debtor being unlikely to pay its loan obligations in full or the debtor is more than 90 days past due on any material credit obligation; default risk may impact all credit-sensitive transactions, including loans, securities and derivatives.
- **Concentration risk** - The risk associated with any single exposure or group of exposures with the potential to produce large enough losses to threaten a bank's core operations. It may arise in the form of single name concentration or industry concentration.
- **Country risk** - The risk of loss arising from sovereign state freezing foreign currency payments (transfer/conversion risk) or when it defaults on its obligations (sovereign risk).

16. (a) TMC Corporation entered into €3.5 million notional Principal Interest Rate Swap Agreement. As per the agreement TMC is to pay a Fixed Rate and to receive a Floating Rate of LIBOR.

The Payment will be made at the interval of 90 days for one year and it will be based on the adjustment factor 90/360. The term structure of LIBOR on the date of agreement is as follows -

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Days	90	180	270	360
Rate (%)	7.00	7.25	7.45	7.55

You are required to calculate Fixed Rate on the Swap and first net payment on the Swap.

(b) X Ltd. an Indian Company has an export exposure of 10 million (100 Lakhs) Yen by September end.

Yen is not directly quoted against Rupee.

- The current spot rates are - USD/INR = 41.79 and USD/JPY = 129.75.
- It is estimated that Yen will depreciate to 144 level and Rupee to depreciate against dollar to 43.
- Forward rate for September, 2015 USD/Yen = 137.35 and USD/INR = 42.89.

You are required to:

- (i) Calculate the expected loss if hedging is not done. How the position will change with company taking forward cover?
- (ii) If the spot rate on 30th September, 2015 was eventually USD/Yen = 137.85 and USD/INR = 42.78, is the decision to take forward cover justified?

Answer:

(a)

1. Computation of Discount Factors / Fixed Rate

The discount bond prices are as follows -

Term	Rate (%)	Discount Bond Price
90 days	7.00	$B_0(90) = \frac{1}{1 + 0.0700(90 \div 360)} = 0.9828$
180 days	7.25	$B_0(180) = \frac{1}{1 + 0.0725(180 \div 360)} = 0.9650$
270 days	7.45	$B_0(270) = \frac{1}{1 + 0.0745(270 \div 360)} = 0.9471$
360 days	7.55	$B_0(360) = \frac{1}{1 + 0.0755(360 \div 360)} = 0.9298$

Therefore, the Fixed Rate is = $\frac{1 - 0.9298}{0.9828 + 0.9650 + 0.9471 + 0.9298} \times \frac{360}{90} = 0.0734$ or 7.34%

Alternatively/assuming fixed rate per annum = r,

$$\left(1 + \frac{r}{4}\right)^4 = (1 + \text{Floating Rate for 4 Quarters}) = 1.0755$$

$$\Rightarrow \left(1 + \frac{r}{4}\right) = \sqrt[4]{1.0755}$$

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- $\left(1 + \frac{r}{4}\right) = 1.01836$
- $\frac{r}{4} = 0.01836$
- $r = 0.01836 \times 4 = 0.0734$ or 7.34%

2. Computation of Cash Flows

The first net payment is based on a fixed rate of 7.34 percent and a floating rate of 7 percent:

Fixed payment: € 35,00,000(0.0734)(90/360) = € 64,225

Floating payments: € 35,00,000(0.07)(90/360) = € 61,250

The Net Amount Payable (by Fixed Rate Payer) = € 2,975

(b)

1. Computation of Exchange Rates of JPY / INR

Applying Cross Rates,

Exchange Rate (JPY / INR) : Exchange Rate (JPY / USD) × Exchange Rate (USD / INR)

: [1 ÷ Exchange Rate (USD/ JPY)] × [Exchange Rate (USD/ INR)]

Rate (JPY / INR)	Computation
Spot Rate	<ul style="list-style-type: none"> ➤ [1 ÷ 129.75] × [41.79] ➤ 0.3221 = ₹ 32.21 per 100 JPY
Expected Rate	<ul style="list-style-type: none"> ➤ [1 ÷ 144] × [43] ➤ 0.2986 = ₹ 29.86 per 100 JPY
Forward Rate	<ul style="list-style-type: none"> ➤ [1 ÷ 137.35] × [42.89] ➤ 0.3123 = ₹ 31.23 per 100 JPY
Spot Rate as on September 30	<ul style="list-style-type: none"> ➤ [1 ÷ 137.85] × [42.78] ➤ 0.3103 = ₹ 31.03 per 100 JPY

2. (a) Expected Loss without Forward Cover

(i) Cash Flow if the Forward Contract is not undertaken

Particulars	₹
Exposure of (100 Lakhs) Yen at Current Spot Rate of ₹ 32.21 per 100 Yen	32,21,000
Exposure of (100 Lakhs) Yen at estimated rate of ₹ 29.86 per 100 Yen	29,86,000
Expected loss without forward cover	2,35,000

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(ii) Cash Flow if the Forward Contract is undertaken

Particulars	₹
Exposure of (100 Lakhs) Yen at forward rate of ₹ 31.23 per 100 Yen	31,23,000
Loss due to Forward Cover [₹ 31,23,000 – ₹ 32,21,000]	98,000

2. (b) Cash Flows in case of the given Forward Rates

Particulars	₹
Exposure of (100 lacs) Yen at the spot rate of ₹ 31.03 per 100 Yen	31,03,000

Inference: Without Forward Cover the loss was ₹ 1,18,000 (₹ 31,03,000 – ₹ 32,21,000). Hence, decision of the company to take forward cover is justified.

17. (a) Sumana wanted to buy shares of EIL which has a range of ₹ 411 to ₹ 592 a month later. The present price per share is ₹ 421. Her broker informs her that the price of this share can sore up to ₹ 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 than or atleast ₹ 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 ₹ 592 so that buying of a one month Call of EIL at the execution price of ₹ 522 is justified. Advise her. Take the Risk Free Interest to be 3.60% and $e^{0.036} = 1.037$.

- (b) The Chief Financial Officer (CFO) of SK Mulberries & Cottons Ltd (SKMC Ltd) has been studying the exchange rates and interest rates relevant to India and USA. SKMC has purchased materials from an American Company at a cost of US \$ 5.05 Millions, payable in US \$ in 3 Months time. In order to maintain profit margins, the CFO wishes to adopt, if possible, a risk-free strategy that will ensure that the cost of the goods to SKMC does not exceed ₹ 21 Crores.

Exchange Rates	Bid Rate [₹ / US \$ 1]	Ask Rate [₹/ US\$1]
Spot Rate	40.35	40.65
1 Month Forward	41.20	41.50
3 Months Forward	42.15	42.50

Interest Rates (available to SKMC Ltd) -

Period	India		USA	
	Deposit Rate	Borrowing Rate	Deposit Rate	Borrowing Rate
1 Month	5%	12%	3%	8%
3 Months	6%	13%	4%	9%

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Calculate whether it is possible for SKMC to achieve a cost directly associated with this transaction of no more than ₹ 21 Crores, by means of a Forward Market Hedge, or Money Market Hedge. Transaction costs may be ignored.

Answer:

(a)

Factor	Notation	Value
Spot Price	SP ₀	₹ 421
Exercise Price	EP	₹ 522
Expected Future Spot Price — Lower Limit [FP ₁]	FP ₁	₹ 411
Expected Future Spot Price — Higher Limit [FP ₂]	FP ₂	₹ 0.592
Extent of Lower Limit of Future Spot Price [FP ₁] on Current Price [SP ₀] $\left[\frac{FP_1}{SP_0} \right]$ = $\frac{₹411}{₹421}$	D	0.976
Extent of Upper Limit of Future Spot Price [FP ₂] on Current Price [SP ₀] = $\left[\frac{FP_2}{SP_0} \right]$ = $\frac{₹592}{₹421}$	U	1.406
Risk Free Rate of Return (Assumed that the rate given is for one month)	R	3.60%
Future Value Factor [Continuous Compounding Factor] = $e^{0.036}$	f	1.037

Probability = $\frac{(f - d)}{(u - d)} = \frac{(1.037 - 0.976)}{(1.406 - 0.976)} = \frac{0.061}{0.43} = 0.1419$. Therefore, the Probability of Rise in Price to ₹ 592 is 14.19%.

(b)

1. Forward Market Hedge

- (i) Requisite: Forward Market Hedge is possible only if amount payable at Forward Rate (Ask Rate) is lower than ₹ 21 Crores.
- (ii) Amount Payable after 3 Months: US \$ 50.50 Lakhs × ₹ 42.50 (Forward Ask) = ₹ 21.46 Crores.
- (iii) Conclusion: Since the amount payable under Forward Rate is more than the desired level of ₹ 21 Crores, there is no Forward Market Hedge.

2. Money Market Hedge

- (i) Requisite: Money Market Hedge is possible only in case of difference in rates of interest for borrowing and investing.

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(ii) Activity Flow:

- Borrow: Borrow rupee equivalent of money to be invested at 6% p.a. for 3 Months.
 Convert: Convert the money borrowed in Rupee to US \$ at Spot Rate (Bid)
 Invest: Invest US \$ so converted in Dollar Deposits at 4% p.a. for 3 Months
 Realize: Realize the Deposit including Interest and use the proceeds to settle the liability.

(iii) Cash Flow:

Particulars	Amount
Amount Payable After 3 Months	US \$ 50.50 Lakhs
Amount to be Invested at 4% p.a. for realizing US \$ 50.50 Lakhs = US \$ $50.50 \text{ Lakhs} \div (1 + \text{Interest Rate of } 4\% \text{ p.a.} \times 3/12) = 50.50 \div 1.01$	US \$ 50.00 Lakhs
Amount to be borrowed Amount to be invested in US \$ 50.00 Lakhs × Spot Ask Rate ₹ 40.65/\$	₹ 2,032.50 Lakhs
Interest payable on money borrowed @ 13% p.a. for 3 Months = ₹ $20.325 \text{ Crores} \times 13\% \times 3 \text{ Months}/12 \text{ Months}$	₹ 66.06 Lakhs
Total Amount Payable Amount Borrowed ₹ 2,032.50 + Interest ₹ 66.06	₹ 2,098.56 Lakhs

Conclusion: Since the amount payable is ₹ 20.99 Crores i.e. less than ₹ 21 Crores, it is advisable to go by Money Market Hedge.

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SECTION – C

18. Consider two securities A and B, with expected returns of 5% and 25% respectively. They carry standard deviations of 5% and 30% respectively. Answer the following:
- (i) How to find the lowest possible risk the portfolio can take for any given weights?
 - (ii) How to find the lowest possible risk the portfolio can take for a given correlation?
 - (iii) Find the point of minimum risk when correlation is 0. What is the return of the portfolio at this point?
 - (iv) Find the point of minimum risk when correlation is 0.5. What is the return of the portfolio at this point?
 - (v) For a perfectly correlated situation between two stocks, what should be the weights for zero risk? What is the return of the portfolio at this point?
 - (vi) For a correlation of -1, what should be the weights for zero risk? What is the return of the portfolio at this point?

Answer:

We may refer 'stock A' as 1 and 'stock B' as 2, for convenience. Thus we can state the given information as $R_1 = 5\%$, $R_2 = 25\%$, $\sigma_1 = 5\%$ and $\sigma_2 = 30\%$.

- (i) For given weights, portfolio risk is least when correlation is -1. Thus substituting $\rho = -1$, in the equation: $\sigma_p = [w_1^2\sigma_1^2 + 2w_1w_2\sigma_1\sigma_2\rho_{12} + w_2^2\sigma_2^2]^{1/2}$, we get $\sigma_p = w_1\sigma_1 + w_2\sigma_2$. We can find the lowest risk by substituting for weights and level of standard deviations.
- (ii) For a given correlation, portfolio risk is least when we solve the following equation.

$$w_1 = \frac{\sigma_2^2 - \sigma_1\sigma_2\rho_{12}}{\sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2\rho_{12}} \text{ or } \frac{\sigma_2^2 - \sigma_1\sigma_2\rho_{12}}{\sigma_1^2 + \sigma_2^2 - 2\sigma_1\sigma_2\rho_{12}}$$

$$w_2 = 1 - w_1$$

- (iii) For correlation = 0, we substitute for $\rho_{12} = 0$, in the equation given in (ii) above. We get:

$$w_1 = \frac{30^2 - 5 \times 30 \times 0}{30^2 + 5^2 - 2 \times 5 \times 30 \times 0} = 0.973 \text{ or } 97.3\%$$

$$w_2 = 1 - 0.973 = 0.027 \text{ or } 2.7\%$$

The risk at this point would be given by substituting the weights in:

$$\sigma_p = [w_1^2\sigma_1^2 + 2w_1w_2\sigma_1\sigma_2\rho_{12} + w_2^2\sigma_2^2]^{1/2},$$

$$\sigma_p = [0.973^2 \times 5^2 + 0 + 0.027^2 \times 30^2]^{1/2} = 4.93\%$$

The return at this point would be = $W_1R_1 + w_2R_2 = 5.54\%$

- (iv) For correlation = 0.5, we substitute for $\rho_{12} = 0.5$, in the equation given in (ii) above. We get:

$$w_1 = \frac{30^2 - 5 \times 30 \times 0.5}{30^2 + 5^2 - 2 \times 5 \times 30 \times 0.5} = 1.065 \text{ or } 106.5\%$$

$$w_2 = 1 - 1.065 = -0.065 \text{ or } -6.5\%$$

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The risk at this point would be given by substituting the weights in:

$$\sigma_p = [w_1^2\sigma_1^2 + 2w_1w_2\sigma_1\sigma_2\rho_{12} + w_2^2\sigma_2^2]^{1/2},$$

$$\sigma_p = [1.065^2 \times 5^2 + 2 \times 1.065 \times (-0.065) \times 5 \times 30 + (-0.065)^2 \times 30^2]^{1/2} = 4.67\%$$

The return at this point would be $= w_1R_1 + w_2R_2 = 3.71\%$

- (v) In a perfect correlation situation $\rho_{12} = 1$. Therefore the general portfolio risk equation becomes:

$$\sigma_p = [w_1\sigma_1 + w_2\sigma_2]^2 = w_1\sigma_1 + w_2\sigma_2$$

Now this is zero as given. Thus substituting zero for σ_p we get:

$$W_1 = \frac{\sigma_2}{\sigma_2 - \sigma_1} \text{ and } W_2 = 1 - W_1 = \frac{-\sigma_1}{\sigma_2 - \sigma_1}$$

Thus we get $W_1 = 30/(30 - 5) = 1.2$ and $w_2 = 1 - 1.2 = -0.2$

Substituting for w_1 and w_2 in the equation $w_1R_1 + w_2R_2$ we get $= 1\%$

- (vi) In a perfect negative correlation situation $\rho_{12} = -1$. Therefore the general portfolio risk equation becomes:

$$\sigma_p = [w_1\sigma_1 - w_2\sigma_2]^2 = w_1\sigma_1 - w_2\sigma_2$$

Now this is zero as given. Thus substituting zero for σ_p we get:

$$w_1 = \frac{\sigma_2}{\sigma_2 + \sigma_1} \text{ and } w_2 = 1 - w_1 = \frac{\sigma_1}{\sigma_2 + \sigma_1}$$

Thus we get $w_1 = 30/(30 + 5) = 0.857$ and $w_2 = 1 - 0.857 = 0.143$

Substituting for w_1 and w_2 in the equation $w_1R_1 + w_2R_2$ we get $= 7.857\%$.

- 19. (a) The common stocks of Bajaj and TVS have expected returns of 15% and 20% respectively, while the standard deviations are 20% and 40%. The expected correlation coefficient between the two stocks is 0.36. What is the expected value of return and the standard deviation of a portfolio consisting of (i) 40% Bajaj and 60% TVS? (ii) 40% TVS and 60% Bajaj? Under both cases, in what direction should the correlation coefficient move to bring the portfolio risk still lower?**

- (b) Explain the techniques used in Economic Analysis.**

Answer:

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(a)

Stock	Exp. Return	σ
Bajaj	15%	20%
TVS	20%	40%

Also given $\rho = 0.36$

- (i) The expected value of return for investment of 40% Bajaj and 60% TVS would be
 $= 0.4 \times 0.15 + 0.6 \times 0.20 = 18\%$

$$\text{And for standard deviation } \sigma_p = \left[\sum_{j=1}^n x_j x_j \rho_{ij} \sigma_i \sigma_j \right]^{\frac{1}{2}}$$

Substituting we have σ_p

$$\begin{aligned} &= [(0.4) \times (0.4) \times (0.2)^2 + (0.6) \times (0.6) \times (0.4)^2 + 2 \times (0.4) \times (0.6) \times 0.36 \times 0.2 \times 0.4]^{\frac{1}{2}} \\ &= [0.077824]^{\frac{1}{2}} \\ &= 27.90\% \end{aligned}$$

- (ii) The expected value of return for investment of 60% Bajaj and 40% TVS would be
 $= 0.6 \times 0.15 + 0.4 \times 0.2 = 17\%$

$$\text{And for standard deviation } \sigma_p = \left[\sum_{j=1}^n x_j x_j \rho_{ij} \sigma_i \sigma_j \right]^{\frac{1}{2}}$$

Substituting we have σ_p

$$\begin{aligned} &= [(0.4) \times (0.4) \times (0.4)^2 + (0.6) \times (0.6) \times (0.2)^2 + 2 \times (0.4) \times (0.6) \times 0.36 \times 0.2 \times 0.4]^{\frac{1}{2}} \\ &= [0.0538]^{\frac{1}{2}} \\ &= 23.20\% \end{aligned}$$

In order to lower the portfolio risk further down, the correlation coefficient should be lowered from their present levels.

(b) Techniques used in Economic Analysis:

(I) Anticipatory Surveys:

- (i) Facilitate investors to form an opinion about the future state of the economy.
- (ii) Incorporates industry surveys on construction activities, expenditure on plant and machinery, levels of inventory - all having a definite bearing on economic activities.
- (iii) Future spending habits of consumers are taken into account.

However, an important limitation is that the survey results do not guarantee that intentions surveyed would materialize. They are not regarded as forecasts per se, as there can be a consensus approach by the investor for exercising his opinion.

- #### (II) Barometer/Indicator Approach:
- Various indicators are used to find out how the economy shall perform in the future. The indicators have been classified as under:

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- (i) **Leading Indicators:** They lead the economic activity in terms of their outcome. They relate to the time series data of the variables that reach high/low points in advance of economic activity.
- (ii) **Roughly Coincidental Indicators:** They reach their peaks and troughs at approximately the same time as the economy.
- (iii) **Lagging Indicators:** They are time series data of variables that lag behind in their consequences vis-à-vis the economy. They reach their turning points after the economy has reached its own already.
- (iv) **Diffusion/composite index:** This index combines several indicators into one index to measure the magnitude of the movement of a particular set of indicators. Computation of diffusion indices are however difficult. Moreover it does not eliminate irregular movements. But this is most useful when the other indicators give conflicting signals and also since they do not measure the magnitude of change.

(III) Economic Model Building Approach: In this approach, a precise and clear relationship between dependent and independent variables is determined. GNP model building or sectoral analysis is used in practice through the use of National Accounting framework. The steps used are as follows:

- (i) Hypothesize total economic demand by measuring total income (GNP) based on political stability, rate of inflation, changes in economic levels.
- (ii) Forecast the GNP by estimating levels of various components viz. consumption expenditure, gross private domestic investment, government purchases of goods/ services, net exports.
- (iii) After forecasting individual components of GNP, add them up to obtain the forecasted GNP.
- (iv) Comparison is made of total GNP thus arrived at with that from an independent agency for the forecast of GNP and then the overall forecast is tested for consistency.

(IV)Gross National Product Analysis: Gross National Product (GNP) as a measure national income reflects the growth rate in economic activities and is regarded as a forecasting tool for analyzing the overall economy along with its various components during a particular period.

20. (a) 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 38%. A Ltd. has a beta of 0.86 and beta of B Ltd. is 1.24. The correlation of 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 if A Ltd's weight is 70% and B Ltd's weight is 30%?**

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(b) Consider the following information:

State of Economy	Probability	Rate of return if state occurs		
		Stock A	Stock B	Stock C
Boom	25%	14%	15%	33%
Bust	75%	12%	3%	-6%

- (i) Calculate the expected return of an equally weighted portfolio of these three stocks.
 (ii) Calculate the variance of a portfolio invested 15% each in stock A & B and 70% in stock C.

Answer:

(a) Given

Stock	Exp. Return	Standard Deviation
A Ltd.	22%	40%
B Ltd.	24%	38%

- (i) The expected return of B Ltd. (24%) is higher than that of A Ltd. (22%). Moreover the risk measure, the standard deviation of B Ltd. (38%) is less than that of A Ltd. (40%). Thus investing in B Ltd. is better than investing in A Ltd.

- (ii) Now we use the formula for the expected portfolio return $\bar{R}_p = \sum x_i \times \bar{R}_i$

$$\text{And for standard deviation } \sigma_p = \left[\sum_{j=1}^n x_i x_j \rho_{ij} \sigma_i \sigma_j \right]^{\frac{1}{2}}$$

We get $R_{AB} = 22.6\%$

$\sigma_{AB} = 37\%$ approx.

- (iii) Now we also have $\beta_A = 0.86$ $\beta_B = 1.24$

$$R_A = R_f + \beta_A(R_m - R_f) \quad \& \quad R_B = R_f + \beta_B(R_m - R_f)$$

Therefore

$$R_A - R_B = \beta_A(R_m - R_f) - \beta_B(R_m - R_f)$$

$$2\% = (\beta_A - \beta_B)(R_m - R_f)$$

$$0.02 = 0.38 \times (R_m - R_f)$$

$$\text{Therefore } (R_m - R_f) = 0.0526 = 5.26\%$$

$$R_f = R_A - \beta_A(R_m - R_f) = 0.22 - 0.86(0.0526) = 17.5\% \text{ approx. [Risk Free Rate]}$$

$$R_m = 5.26\% + 17.5\% = 22.76\% \text{ [Market Portfolio's expected rate of return]}$$

- (iv) $\beta_{AB} = \beta_A W_A + \beta_B W_B = 0.86 \times 0.7 + 1.24 \times 0.3 = 0.974 = 9.74\%$

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- (b) Since the weights are equal, we have w_1, w_2 & $w_3 = 1/3$.
The expected returns would therefore be,

(i) Boom : $E[R_p] = (0.14 + 0.15 + 0.33)/3 = 0.2067$;
 Bust : $E[R_p] = (0.12 + 0.03 - 0.06)/3 = 0.03$
 $E[R_p] = 0.25(0.2067) + 0.75(0.03) = 0.0740$ i.e. 7.40%

(ii) Now, if w_1 & $w_2 = 0.15$ & $w_3 = 0.7$, then
 Boom : $E[R_p] = 0.15(0.14) + 0.15(0.15) + 0.7(0.33) = 0.2745$
 Bust : $E[R_p] = 0.15(0.12) + 0.15(0.03) + 0.7(-0.06) = -0.0195$
 $E[R_p] = 0.25(0.2745) + 0.75(-0.0195) = 0.0540$
 $\sigma_p^2 = 0.25(0.2745 - 0.0540)^2 + 0.75(-0.0195 - 0.0540)^2 = 0.01621 = 1.621\%$.

21. (a) Describe the key factors considered in company analysis.

- (b) Mr. Khan is considering building a portfolio containing two assets, L and M. Asset L will represent 40% of the rupee value of the portfolio, and asset M will account for the other 60%. The expected returns over the next 6 years, 2016-2021, for each of these assets, are shown in the following table.

	Year	2016	2017	2018	2019	2020	2021
Expected Return %	Asset L	14	16	17	18	18	19
	Asset M	20	18	16	14	12	10

- (i) Calculate the expected value of portfolio returns, over the 6-year period.
 (ii) Calculate the standard deviation of expected portfolio returns, σ over the 6-year period.
 (iii) Is investing in the negatively correlated equal weighted portfolio of L & M better than individual investments?

Answer:

(a) Factors considered in Company Analysis are :-

- (I) Net Worth and Book Value:
 • Computation:

Particulars	Amount
Equity Share Capital	XXX
Add: Free Reserves	XXX
Less: Accumulated Losses	(XXX)
Total Net Worth of Business	XXX
Book Value of Share = Total Net Worth/Number of Shares Outstanding	XX

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- **Book Value may not be an indicator of the intrinsic worth of the share, due to the following reasons :-**
 - ❖ First, the market price of the share reflects the future earnings potential of the firm which may have no relationship with the value of its assets. Example: Service Sector, where intrinsic value is based more on future earning potential than on Asset Backing.
 - ❖ Second, the book value is based upon the historical costs of the assets of the firm and these may be gross underestimates of the cost of the replacement or resale values of these assets.

(II) Sources and utilisation of funds:

- The identification of sources and uses of funds is known as Funds Flow and Cash Flow Analysis.
- One of the major uses of Funds Flow Analysis is to find out whether the firm has used Short Term sources of funds to finance Long-Term Investments.
- Such methods of financing increases the risk of liquidity crunch for the firm, as Long-Term Investments, because of the gestation period involved may not generate enough surplus in time to meet the short-term liabilities incurred by the firm. This increases the Credit and Default Risk of the Entity.

(III) Time Series Analysis, Common Sized Statements and Financial Ratio Analysis:

- Financial Statements are utilized to make Inter and Intra Firm Comparison.
- The techniques that are used to do such comparative analysis are: Common-Sized Statements, and Financial Ratio Analysis.

(IV) Size and Ranking:

- A rough idea regarding the size and ranking of the company within the economy, in general, and the industry, in particular, would help the investment manager in assessing the risk associated with the company.
- It may also be useful to assess the position of the company in terms of Technical Know-how, Research and Development activity and price leadership.

(V) Growth Record:

- The growth in sales, net income, net capital employed and Earnings per share of the company in the past few years should be examined.
- The following three growth indicators may be looked into in particular:
 - ❖ Price Earnings ratio,
 - ❖ Percentage Growth rate of Earnings per annum, and
 - ❖ Percentage growth rate of net block.
- An evaluation of future growth prospects of the company should be carefully made. This requires an analysis of-
 - ❖ Existing capacities and their utilization which is indicated by the Quantitative information present in the Financials,
 - ❖ Proposed expansion and diversification plans and the nature of the company's technology - which is generally indicated by Director's Reports

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- Growth is the single most important factor in company analysis for the purpose of investment management. A company may have a good record of profits and performance in the past; but if it does not have growth potential, its shares cannot be rated high from the investment point of view.

(b) (i) & (ii) Calculation of Expected Return and Standard Deviation of portfolio of L & M

	Expected Return %		Portfolio-L: 40% & M: 60%			Asset L		Asset M	
Year	Asset L	Asset M	Return	σ	$(\sigma)^2$	σ	$(\sigma)^2$	σ	$(\sigma)^2$
2016	14	20	17.6	1.8	3.24	-3	9	5	25
2017	16	18	17.2	1.4	1.96	-1	1	3	9
2018	17	16	16.4	0.6	0.36	0	0	1	1
2019	18	14	15.6	-0.2	0.04	1	1	-1	1
2020	18	12	14.4	-1.4	1.96	1	1	-3	9
2021	19	10	13.6	-2.2	4.84	2	4	-5	25
Sum	102	90	94.8		12.4		16		70
Average	17	15	15.8		1.57	σ	1.63	σ	3.42

(iii) Portfolio standard deviation of equally weighted stocks of Assets L & M with negative correlation would be

$$\sigma_p = \left[\sum_{j=1}^n x_i x_j \rho_{ij} \sigma_i \sigma_j \right]^{1/2}$$

Substituting we have σ_p

$$= [(0.5)^2 \times (0.0163)^2 + (0.5)^2 \times (0.0342)^2 + 2 \times (0.5) \times (0.5) \times -1 \times 0.0163 \times 0.0342]^{1/2} = 0$$

We get the standard deviation of this portfolio as zero, implying zero total risk. Thus in terms of risk this portfolio is better than individual investments in assets L and M. In terms of return only stock L provides a higher return of 17% as against the portfolio return of 15.8%.

22. (a) State Portfolio Management. List out the main objectives of Portfolio Management.

(b) Given the following risky portfolios

	A	B	C	D	E	F	G	H
Return %	10	12.5	15	16	17	18	18	20
σ %	23	21	25	29	29	32	35	45

- (i) Which of these portfolios are efficient? Which are inefficient?
- (ii) Suppose one can tolerate a risk of 25%, what is the maximum return one can achieve if no borrowing or lending is resorted to?
- (iii) Suppose one can tolerate a risk of 25%, what is the maximum return one can achieve if borrowing or lending at the rate of 12% is resorted to?

Answer:

(a) A portfolio refers to a collection of investment tools such as stocks, shares, mutual funds, bonds, cash and so on depending on the investor's income, budget and convenient time frame.

Portfolio Management refers to the selection of securities and their continuous shifting in the Portfolio for optimizing the return and maximizing the wealth of an investor.

A Portfolio Management refers to the science of analyzing the strengths, weaknesses, opportunities and threats for performing wide range of activities related to one's portfolio for maximizing the return at a given risk. It helps in making selection of debt vs. equity, growth vs. safety, and various other tradeoffs.

So we can say that Portfolio Management is the art of selecting the right investment policy for the individuals in terms of minimum risk and maximum return.

Portfolio management refers to managing an individual's investments in the form of bonds, shares, cash, mutual funds etc. so that he earns the maximum profits within the stipulated time frame.

Objectives of Portfolio Management:

- (i) **Reduce Risk:** To reduce the risk of loss of capital / income, by investing in various types of securities and over a wide range of industries, i.e. diversification.
- (ii) **Safety of Principal:** To keep the capital / principal amount intact, in terms of value and in terms of purchasing power. The capital or the principal amount invested should not erode, either in value or in terms of purchasing power. By earning return, principal amount will not erode in nominal terms, by earning returns at a rate not lesser than the inflation rate; principal amount will be intact in present value terms.
- (iii) **Stability of Income:** To facilitate a more accurate and systematic re-investment of income, to ensure growth and stability in returns.
- (iv) **Capital growth:** to enable attainment of capital growth by reinvesting in growth securities or through purchase of growth securities.
- (v) **Marketability:** To have an easily marketable investment portfolio, so that the investor is able to take advantage of attractive opportunities in the market.
- (vi) **Liquidity:** Some investors prefer that the portfolio should be such that whenever they need their money, they may get the same.

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- (vii) **Maintaining the Purchasing Power:** Inflation eats the value of money, i.e., purchasing power. Hence, one object of the portfolio is that it must ensure maintaining the purchasing power of the investor intact besides providing the return.
- (viii) **Tax Savings:** To effectively plan for and reduce the tax burden on income, so that the investor gets maximum from his investment.
- (b) (i) Using the risk-return tradeoff, an investor would prefer B to A (B gives higher return for lower risk, hence dominant); would prefer C; would prefer E to D (E gives higher return for lower risk and hence dominant); would prefer F to G (F is dominant because it offers 18% at lower risk); and H; Hence portfolios B, C, E, F & H are efficient. Portfolios A, D & G are inefficient.
- (ii) As seen from the table, if the maximum risk of 25% can be tolerated, then Portfolio C can be chosen to give a maximum return of 15%.
- (iii) However, if borrowing/lending can be resorted to @12%, then one can borrow in such a manner that the total risk does not exceed 25%. As we know higher returns can be obtained by borrowing at the risk free rate and investing in a risky portfolio. Obviously risk too would increase. Now we need to find that portion of investment in risky portfolio, which will give us maximum return for a risk not greater than 25%. Therefore, let us assume weight of investment in risky portfolio be 'x'. Therefore (1-x) would be the weight in risk free asset. It is clear that since σ of risk free asset is zero, we need to find just that proportion in risky security to get 25%.

Thus we have for Portfolio A investment in proportion of 25/23 and -2/23 in risk free instrument (indicating borrowing) to arrive at a total risk of 25%. We simply used the below formula. [Note substitute σ of Risk free portfolio = 0]

$$x \times \sigma \text{ of Risky Portfolio} + (1-x) \times \sigma \text{ of Risk free portfolio} = 25\%$$

'x' found above, would be used it to find total return.

$$\text{Total return} = x \times \text{Return of Risky Portfolio} + (1-x) \times 12$$

Thus we get the table given below.

	A	B	C	D	E	F	G	H
Proportion in risky security	25/23	25/21	25/25	25/29	25/29	25/32	25/35	25/45
To get Risk	25	25	25	25	25	25	25	25
Return	9.83	12.60	15.00	15.45	16.31	16.69	16.29	16.44

We see from the table that a maximum return of 16.69% is obtained for portfolio F, when we invest in a proportion of 25/32 in portfolio F & balance 7/32 in risk free asset.

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23. (a) Mr. Prayag 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	12.00
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?

- (b) The following table shows how various betas change as you take a given firm and perform a pure capital structure change. Fill in the questions. Assume asset beta remains same in all calculation.

D/(D+E)	β_d	β_e	β_a
0.00	?	?	?
0.20	0.10	0.90	?
0.40	0.15	?	?
?	0.20	1.40	?
0.70	?	1.53	?

Answer:

- (a) We have return of a stock, as per APT model given by the equation:

$$E(r_i) = R_f + \beta_1\lambda_1 + \beta_2\lambda_2 + \dots + \beta_n\lambda_n$$

Here β_i is the factor sensitivities and λ_i is the factor risk premium of different factors, ($i = 1, 2, \dots, n$)

In this problem the difference between the actual and the expected is construed as factor premiums, where factor risk premium = λ = Actual values - Expected values

Thus we first calculate risk premiums for each factor as:

$$\text{Risk Premium (GNP)} = 7.70 - 7.70 = 0\%$$

$$\text{Risk Premium (Inflation)} = 7.00 - 5.50 = 1.50\%$$

$$\text{Risk Premium (Interest Rate)} = 9.00 - 7.75 = 1.25\%$$

$$\text{Risk Premium (Stock Market Index)} = 12.00 - 10.00 = 2.00\%$$

$$\text{Risk Premium (Industrial Production)} = 7.50 - 7.00 = 0.50\%$$

Using the given betas, we can find the return for the stock using APT model as:

$$= 9.25 + 1.2 \times 0 + 1.75 \times 1.5 + 1.3 \times 1.25 + 1.7 \times 2 + 1.00 \times 0.5 = 17.4\%$$

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(b) First Row: Since there is no debt. Therefore, equity beta equals the asset beta. Whatever is the equity beta the same would be asset beta.

Second Row: $\beta_a = (D/V) \beta_d + (E/V) \beta_e = 0.2 \times 0.1 + 0.8 \times 0.9 = 0.74$

Third row: We solve for β_e : $\beta_e = \beta_a + (D/E)[\beta_a - \beta_d]$
 $= 0.74 + (0.4/0.6) \times (0.74 - 0.15) = 1.1333$

Fourth row we solve for D/V: $0.74 = x \times 0.2 + (1-x) \times 1.4 \Rightarrow x = (1.4 - 0.74)/(1.4 - 0.2) = 0.55$

Last row we solve for β_d : $0.74 = 0.7 \times \beta_d + 0.3 \times 1.53 \Rightarrow \beta_d = (0.74 - 0.3 \times 1.53)/0.7 = 0.401$

The completed table would then be:

D/V	β_d	β_e	β_a
0.00	-	0.74	0.74
0.20	0.10	0.90	0.74
0.40	0.15	1.13	0.74
0.55	0.20	1.40	0.74
0.70	0.40	1.53	0.74

Note: Debt beta and equity beta both increase as D/V goes up.

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SECTION - D

24. The following table gives dividend and share price data for Shona Limited:

Year	Dividend Per Share (₹)	Closing Share Price (₹)
2005	2.50	12.25
2006	2.50	14.20
2007	2.50	17.50
2008	3.00	16.75
2009	3.00	18.45
2010	3.25	22.25
2011	3.50	23.50
2012	3.50	27.75
2013	3.50	25.50
2014	3.75	27.95
2015	3.75	31.30

You are required to calculate:

- (i) The Annual Rates of Return of Shona Ltd.
- (ii) The Expected (Average) Rate of Return of Shona Ltd.
- (iii) The Variance & the Standard Deviation of Returns of Shona Ltd.
- (iv) If the Return on market is as follows, compute the covariance between Shona Ltd. & the market.

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
40.00	42.00	11.00	30.00	41.00	23.00	15.00	5.00	27.00	29.00

- (v) Compute coefficient of correlation between Shona Ltd. & the market.
- (vi) Compute Beta of Shona Ltd.

Answer:

- (i) Annual Rates of Return:

Year	Dividend Per Share (₹)	Closing Share Price (₹)	Annual Rates of Return (%) = $\frac{P_1 - P_0 + D_1}{P_0}$
2005	2.50	12.25	-----

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2006	2.50	14.20	$\frac{₹2.50 + (₹14.20 - ₹12.25)}{₹12.25} = 36.33\%$
2007	2.50	17.50	$\frac{₹2.50 + (₹17.50 - ₹14.20)}{₹14.20} = 40.85\%$
2008	3.00	16.75	$\frac{₹3.00 + (₹16.75 - ₹17.50)}{₹17.50} = 12.86\%$
2009	3.00	18.45	$\frac{₹3.00 + (₹18.45 - ₹16.75)}{₹16.75} = 28.06\%$
2010	3.25	22.25	$\frac{₹3.25 + (₹22.25 - ₹18.45)}{₹18.45} = 38.21\%$
2011	3.50	23.50	$\frac{₹3.50 + (₹23.50 - ₹22.25)}{₹22.25} = 21.35\%$
2012	3.50	27.75	$\frac{₹3.50 + (₹27.75 - ₹23.50)}{₹23.50} = 32.98\%$
2013	3.50	25.50	$\frac{₹3.50 + (₹25.50 - ₹27.75)}{₹27.75} = 4.50\%$
2014	3.75	27.95	$\frac{₹3.75 + (₹27.95 - ₹25.50)}{₹25.50} = 24.31\%$
2015	3.75	31.30	$\frac{₹3.75 + (₹31.30 - ₹27.95)}{₹27.95} = 25.40\%$

(ii) **Average Rate of Return:** The arithmetic average of the annual rates of return can be taken as: $(36.33\% + 40.85\% + 12.86\% + 28.06\% + 38.21\% + 21.35\% + 32.98\% + 4.50\% + 24.31\% + 25.40\%) / 10 = 26.48\%$.

(iii) **Statement Showing Computation of Variance and Standard deviation** are calculated as shown below:

Year	Annual Rates of Returns	Annual Minus Average Rates of Return	Square of Annual Minus Average Rates of Return
2006	36.33	9.84	96.82
2007	40.85	14.36	206.21
2008	12.86	(13.63)	185.78
2009	28.06	1.57	2.46
2010	38.21	11.72	137.36
2011	21.35	(5.14)	26.42
2012	32.98	6.49	42.12
2013	4.50	(21.99)	483.56
2014	24.31	(2.18)	4.75
2015	25.40	(1.09)	1.19
Sum	264.85		1,186.67
Average	26.49		

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$$\text{Variance} = \frac{1186.67}{10} = 118.67$$

$$\text{Standard deviation} = \sqrt{118.67} = 10.89$$

(vi) Statement Showing Computation of Covariance between Shona Ltd. & the Market:

Year	Annual Rates of Return of Shona Ltd.	Annual Rates of Return of Market	Deviation of Return from Mean of Shona Ltd. (A)	Deviation of Return from Mean of Market (B)	Square of Annual Minus Avg. Rates of Return of Market	Cov. Shona Ltd. & mkt (A) x (B)
2006	36.33	40.00	9.84	13.70	187.69	134.81
2007	40.85	42.00	14.36	15.70	246.49	225.45
2008	12.86	11.00	(13.63)	(15.30)	234.09	208.54
2009	28.06	30.00	1.57	3.70	13.69	5.81
2010	38.21	41.00	11.72	14.70	216.09	172.28
2011	21.35	23.00	(5.14)	(3.30)	10.89	16.96
2012	32.98	15.00	6.49	(11.30)	127.69	(73.34)
2013	4.5	5.00	(21.99)	(21.30)	453.69	468.39
2014	24.31	27.00	(2.18)	0.70	0.49	(1.53)
2015	25.4	29.00	(1.09)	2.70	7.29	(2.94)
Sum	264.85	263.00			1498.10	1,154.44
Average	26.49	26.30				115.44

(v) Coefficient of Correlation between Shona Ltd. & the Market

$$r = \frac{\text{Covariance}}{\text{SD of market} \times \text{SD of Shona Ltd.}} = \frac{115.44}{10.89 \times 12.24} = 0.866$$

Working Note:

$$\text{Variance} = 1498.10/10 = 149.81$$

$$\text{Therefore, SD} = \sqrt{149.81} = 12.24$$

(vi) Beta of Shona Ltd.

$$\beta = \frac{\text{SD of Shona Ltd.} \times \text{Coefficient of Correlation between Shona Ltd. \& Market}}{\text{SD of Market}}$$

$$= \frac{10.89 \times 0.866}{12.24} = 0.77$$

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25. (a) List the relevance of Social Cost Benefit Analysis for Private Enterprises.

(b) A company has to make a choice between two projects namely A and B. The initial capital outlay of two projects are ₹ 1,35,000 and ₹ 2,40,000 respectively for A and B. There will be no scrap value at the end of the life of both the projects. The opportunity cost of capital of the company is 16%. The annual cash inflows are as under:

Year	Project A	Project B	Discounting Factor @ 16%
1	-	60,000	0.862
2	30,000	84,000	0.743
3	1,32,000	96,000	0.641
4	84,000	1,02,000	0.552
5	84,000	90,000	0.476

You are required to calculate for each project:

- (i) Discounted Payback Period
- (ii) Profitability Index
- (iii) Net Present Value

Answer:

(a) Relevance of Social Cost Benefit Analysis for Private Enterprises:

- Social cost benefit analysis is important for private corporations also which have a moral responsibility to undertake socially desirable projects.
- If the private sector includes social cost benefit analysis in its project evaluation techniques, it will ensure that it is not ignoring its own long-term interest, since in the long run only projects that are socially beneficial and acceptable, will survive.
- Methodology of social cost benefit analysis can be adopted either from the guidelines issued by the United Nations Industrial Development Organisation (UNIDO) or the Organisation of Economic Cooperation and Development (OECD). Financial Institutions e.g. IDBI, IFCI, etc. even insist on social cost benefit analysis of a private sector project before sanctioning any loan.
- Private enterprise cannot afford to lose sight of social aspects of a project.

(b) Working Notes: (1)

Year	Cash Flows		PVF @ 16%	Discounted Cash Flows	
	Project A	Project B		Project A	Project B
	(1)	(2)	(3)	(3) x (1)	(3) x (2)
0	(1,35,000)	(2,40,000)	1.000	(1,35,000)	(2,40,000)
1	—	60,000	0.862	—	51,720
2	30,000	84,000	0.743	22,290	62,412
3	1,32,000	96,000	0.641	84,612	61,536
4	84,000	1,02,000	0.552	46,368	56,304

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5	84,000	90,000	0.476	39,984	42,840
Net Present Value				58,254	34,812

Working Notes: (2)

Computation of Cumulative Present Values of Projects Cash Inflows (Amount in ₹)

Year	Project A		Project B	
	PV of Cash Inflows	Cumulative PV	PV of Cash Inflows	Cumulative PV
1			51,720	51,720
2	22,290	22,290	62,412	1,14,132
3	84,612	1,06,902	61,536	1,75,668
4	46,368	1,53,270	56,304	2,31,972
5	39,984	1,93,254	42,840	2,74,812

(i) Discounted Payback Period: (Refer to Working note 2)

$$\text{Project A} = 3 \text{ years} + \left[1 \text{ year} \times \frac{\text{₹}28,098}{\text{₹}46,368}\right] = 3.606 \text{ years}$$

$$\text{Project B} = 4 \text{ years} + \left[1 \text{ year} \times \frac{\text{₹}8,028}{\text{₹}42,840}\right] = 4.187 \text{ years}$$

(ii) Profitability Index = $\frac{\text{PV of Cash Inflows}}{\text{Initial Cash Outlay}}$

$$\text{Profitability Index (for Project A)} = \frac{\text{₹}1,93,254}{\text{₹}1,35,000} = 1.43$$

$$\text{Profitability Index (for Project B)} = \frac{\text{₹}2,74,812}{\text{₹}2,40,000} = 1.15$$

(iii) **Net Present Value** = ₹ 58,254 (for Project A) (Refer to Working note 1)

Net Present Value = ₹ 34,812 (for Project B) (Refer to Working Note 1)

26. (a) Distinguish between NPV and IRR.

(b) A firm has to decide whether to make a component itself or buy it in. In the make option, the capital cost of the equipment is ₹10,00,000 incurred immediately. The equipment would last for four years with no residual value. Manufacturing costs would be ₹13,00,000 in year one, ₹14,00,000 in year two, ₹17,00,000 in year three and ₹18,00,000 in year four. These costs cover everything and no other opportunities are lost if the decision to manufacture is taken. If the component is bought in, there would be no immediate outlay and the costs would be ₹17,00,000 in years one and two and ₹ 22,00,000 in years three and four. The discount rate is 15% and apart from the initial outlay all costs occur at year-end. Should the component be made in-house or bought in?

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Answer:

(a) Difference between NPV and IRR:

(i) Causes for Conflict: Higher the NPV, higher will be the IRR. However, NPV and IRR may give conflicting results in the evaluation of different projects, in the following situations -

- Initial Investment Disparity - i.e. Different Project Sizes,
- Project Life Disparity - i.e. Difference in Project Lives,
- Outflow Patterns - i.e. when Cash Outflows arise at different points of time during the Project Life, rather than as Initial Investment (Time 0) only.
- Cash Flow Disparity - when there is a huge difference between initial CFAT and later years' CFAT. A project with heavy initial CFAT than compared to later years will have higher IRR and vice-versa.

(ii) Superiority of NPV: In case of conflicting decisions based on NPV and IRR, the NPV method must prevail. Decisions are based on NPV, due to the comparative superiority of NPV, as given from the following points -

- NPV represents the surplus from the project but IRR represents the point of no surplus-no deficit.
- NPV considers Cost of Capital as constant. Under IRR, the Discount Rate is determined by reverse working, by setting NPV = 0.
- NPV aids decision-making by itself i.e. projects with positive NPV are accepted. IRR by itself does not aid decision-making. For example, a project with IRR = 18% will be accepted if $K_0 < 18\%$. However, the project will be rejected if $K_0 = 21\%$ (say $> 18\%$).
- NPV method considers the timing differences in Cash Flows at the appropriate discount rate. IRR is greatly affected by the volatility / variance in Cash Flow patterns.
- IRR presumes that intermediate cash inflows will be reinvested at that rate (IRR), whereas in the case of NPV method, intermediate cash inflows are presumed to be reinvested at the cut-off rate. The latter presumption viz. reinvestment at the cut-off rate, is more realistic than reinvestment at IRR.
- There may be projects with negative IRR/ Multiple IRR etc. if cash outflows arise at different points of time. This leads to difficulty in interpretation. NPV does not pose such interpretation problems.

(b) Statement showing evaluation of Make or Buy proposal:

Particulars	Time	PV Factor	Make		Buy	
			Amount in (₹)	PV in (₹)	Amount in (₹)	PV in (₹)
Capital Cost of Equipment	0	1	10,00,000	10,00,000	---	---
Manufacturing/Bought in Cost	1	0.8696	13,00,000	11,30,480	17,00,000	14,78,320
	2	0.7561	14,00,000	10,58,540	17,00,000	12,85,370
	3	0.6575	17,00,000	11,17,750	22,00,000	14,46,500
	4	0.5718	18,00,000	10,29,240	22,00,000	12,57,960
Present Value of Cash Outflows				53,36,010		54,68,150

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Advise: The Component should be made in house as it has lesser present value of Cash Outflows.

27. A newly formed company is setting up a project at a cost of ₹ 300 lakhs. It has to decide whether to locate the plant in a Forward Area (FA) or Backward Area (BA). Locating in Backward Area means a cash subsidy of ₹ 15 lakhs from the Central Government. Besides, the taxable profits to the extent of 20% is exempt for 10 years. The project envisages a borrowing of ₹ 200 lakhs in either case. The cost of borrowing will be 12% in Forward Area and 10% in Backward Area. However, the revenue costs are bound to be higher in Backward Area. The borrowings (principal) have to be repaid in 4 equal annual installments beginning from the end of the 4th year. With the help of following information and by using DCF Technique you are required to suggest the proper location for the Project assuming 15% to be the required rate of return on owners investment. Assume straight-line depreciation with no residual value.

Year	Profit/Loss Before Interest and Depreciation (₹ in lakhs)		Present Value Factor (at 15%)
	FA	BA	
1	(6.00)	(50.00)	0.87
2	34.00	(20.00)	0.76
3	54.00	10.00	0.66
4	74.00	20.00	0.57
5	108.00	45.00	0.50
6	142.00	100.00	0.43
7	156.00	155.00	0.38
8	230.00	190.00	0.33
9	330.00	230.00	0.28
10	430.00	330.00	0.25

Assume tax rate 35%.

Answer:

Statement showing Computation of PVCO

(₹ in lakhs)

Particulars	Time	PV Factor	Forward Area		Backward Area	
			Amount	PV	Amount	PV
Cash Outflows						
Initial Investment	0	1	100	100	100	100
Repayment of principal amount of loan	4-7	1.88	50	94	50	94
Less: Subsidies from Govt.	0	1	---	---	(15)	(15)
PVCO (A)				194		179

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Computation of PVCI Forward Area

[₹ in Lakhs]

	1	2	3	4	5	6	7	8	9	10
PBDIT	(6)	34	54	74	108	142	156	230	330	430
Less: Interest	(24)	(24)	(24)	(24)	(18)	(12)	(6)	---	---	---
CFBT ... (1)	(30)	10	30	50	90	130	150	230	330	430
Less: Depreciation $\left[\frac{300}{10 \text{ years}} \right]$	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)
PBT	(60)	(20)	0	20	60	100	120	200	300	400
Add: Carry Forward of losses as it is newly formed company	60	20	---	---	---	---	---	---	---	---
Less: Set off of losses	---	---	---	(20)	(60)	---	---	---	---	---
PBT after adjustment set off & carry forward	0	0	0	0	0	100	120	200	300	400
Less: Tax liability (35%) ... (2)	---	---	---	---	---	(35)	(42)	(70)	(105)	(140)
CFAT (1) - (2)	(30)	10	30	50	90	95	108	160	225	290
P.V. Factor	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25
PVCI (B)	(26.1)	7.67	19.8	28.5	45	40.85	41.04	52.8	63	72.5

Total PVCI = ₹ 344.99 lakhs
 (-) PVCO NPV = ₹ (194.00) lakhs
 NPV = ₹ 150.99 lakhs

Computation of PVCI Backward Area

[₹ in Lakhs]

	1	2	3	4	5	6	7	8	9	10
PBDIT	(50)	(20)	10	20	45	100	155	190	230	330
Less: Interest	(20)	(20)	(20)	(20)	(15)	(10)	(5)	---	---	---
CFBT ... (3)	(70)	(40)	(10)	0	30	90	150	190	230	330
Less: Depreciation	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)	(30)
PBT (B)	(100)	(70)	(40)	(30)	0	60	120	160	200	300
Add: Carry Forward of losses	100	70	40	30	---	---	---	---	---	---
Less: Set off losses	---	---	---	---	---	(60)	(120)	(60)	---	---
PBT after adjustment carry forward & set off	---	---	---	---	---	---	---	100	200	300
Less: Exempt Income (20%)	---	---	---	---	---	---	---	(20)	(40)	(60)

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PBT after adjustment carry forward & set off	---	---	---	---	---	---	---	80	160	240
Less: Tax liability (35%) ... (4)	---	---	---	---	---	---	---	(28)	(56)	(84)
CFAT (3) – (4)	(70)	(40)	(10)	0	30	90	150	162	174	246
PVF	0.87	0.76	0.66	0.57	0.50	0.43	0.38	0.33	0.28	0.25
PVCI	(60.9)	(30.4)	(6.60)	0	15	38.7	57	53.46	48.72	61.50

Total PVCI = ₹ 176.48 lakhs
 (-) PVCO NPV = ₹ (179.00) lakhs
 NPV = ₹ (2.52) lakhs

Advise: Location of plant in Forward Area is better.

28. (a) A Ltd. is considering the purchase of a machine which will perform some operations which are at present performed by workers. Machines X and Y are alternative models. The following details are available:

Particulars	Machine X (₹)	Machine Y (₹)
Cost of Machine	1,50,000	2,40,000
Estimated Life of Machine	5 years	6 years
Estimated Cost of Maintenance p.a.	7,000	11,000
Estimated Cost of Indirect Material, p.a.	6,000	8,000
Estimated Savings in Scrap p.a.	10,000	15,000
Estimated Cost of Supervision p.a.	12,000	16,000
Estimated Savings in Wages p.a.	90,000	1,20,000

Depreciation will be charged on straight line basis. The tax rate is 30%. Evaluate the alternatives according to:

- (i) Average Rate of Return Method, and
 - (ii) Present Value Index Method assuming cost of capital being 10%.
- (The present value of ₹ 1.00 @ 10% p.a. for 5 years is 3.79 and for 6 years is 4.354)

(b) Fair finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is ₹ 3 crores. The customer, in order to leverage his tax position, has requested a quote for a three year lease with rentals payable at the end of each year but a diminishing manner such that they are in the ratio of 3 : 2 : 1. Depreciation can be assumed to be on straight line basis and Fair Finance's marginal tax rate is 35%. The target rate of return for Fair Finance on the transaction is 10%.

Calculate the lease rents to be quoted for the lease for three years.

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Answer:

(a) Working Notes:

$$\text{Depreciation on Machine X} = \frac{\text{₹}1,50,000}{5 \text{ years}} = \text{₹} 30,000$$

$$\text{Depreciation on Machine Y} = \frac{\text{₹}2,40,000}{6 \text{ years}} = \text{₹} 40,000$$

Particulars	Machine X (₹)	Machine Y (₹)
Annual Savings:		
Wages	90,000	1,20,000
Scrap	10,000	15,000
Total Savings (A)	1,00,000	1,35,000
Annual Estimated Cash Cost:		
Indirect Material	6,000	8,000
Supervision	12,000	16,000
Maintenance	7,000	11,000
Total Cash Cost (B)	25,000	35,000
Annual Cash Savings (A – B)	75,000	1,00,000
Less: Depreciation	(30,000)	(40,000)
Annual Savings Before Tax	45,000	60,000
Less: Tax @ 30%	(13,500)	(18,000)
Annual Savings/Profit (After Tax)	31,500	42,000
Add: Depreciation	30,000	40,000
Annual Cash Inflows	61,500	82,000

Evaluation of Alternatives:

(i) Average Rate of Return Method (ARR)

$$\text{ARR} = \frac{\text{Average Annual Net Savings}}{\text{Average Investment}}$$

$$\text{Machine X} = \frac{\text{₹}31,500}{\text{₹}75,000} \times 100 = 42\%$$

$$\text{Machine Y} = \frac{\text{₹}42,000}{\text{₹}1,20,000} \times 100 = 35\%$$

Decision: Machine X is better.

[Note: ARR can be computed alternatively taking initial investment as the basis for

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computation (ARR - Average Annual Net Income/Initial Investment). The value of ARR for Machines X and Y would then change accordingly as 21% and 17.5% respectively]

(ii) Present Value Index Method

Present Value = Annual Cash Inflow × P.V. Factor @ 10%

Machine X = ₹ 61,500 × 3.79 = ₹ 2,33,085

Machine Y = ₹ 82,000 × 4.354 = ₹ 3,57,028

P.V Index = $\frac{\text{Present Value}}{\text{Investment}}$

Machine X = $\frac{₹2,33,085}{₹1,50,000} = 1.5539$

Machine Y = $\frac{₹3,57,028}{₹2,40,000} = 1.4876$

Decision: Machine X is better.

(b)

Let Lease Rent for year 3 be x.

(₹ in lakhs)

Particulars	Time	PV Factor 10%	Amount	PV
Cash Outflows				
Cost of Asset	0	1	300	300
PVCO				300
Cash Inflows				
Lease Rent (Net of Tax)	1	0.9091	1.95x	1.7727X
	2	0.8264	1.30x	1.0743X
	3	0.7513	0.65x	0.4883X
Add: Tax Saving on Depreciation	1-3	2.4869	35	87.0415
PVCI				3.3353x + 87.0415

₹ 300 Lakhs = 3.3353x + ₹ 87.0415 Lakhs

₹ 212.9585 Lakhs = 3.3353x

x = ₹ 63.85 lakhs

Hence, Lease rental

Year 1 = ₹ 191.54 Lakhs

Year 2 = ₹ 127.69 Lakhs

Year 3 = ₹ 63.85 Lakhs

29. (a) State project report. Explain the features of a project report.

(b) ZED Limited is presently financed entirely by equity shares. The current market value is ₹ 6,00,000. A dividend ₹ 1,20,000 has just been paid. This level of dividends is expected to be paid indefinitely. The company is thinking of investing in a new project involving an outlay of ₹ 5,00,000 now and is expected to generate net cash receipts of ₹ 1,05,000 per annum indefinitely. The project would be financed by issuing ₹ 5,00,000 debentures at the market interest rate of 18%. Ignoring tax consideration:

- (i) Calculate the value of equity shares and the gain made by the shareholders if the cost of equity rises to 21.6%.
- (ii) Prove that Weighted Average Cost of Capital is not affected by gearing.

Answer:

(a) Project Report:

Project Report or Feasibility Report is a written account of various activities to be undertaken by a Firm and their technical, financial, commercial and social viabilities.

Project Report states as to what business is intended to be undertaken by the entrepreneur and whether it would be technically possible, financially viable, commercially profitable and socially desirable to do such a business.

Features of a Project report

➤ **Technical Feasibility:**

This includes analysis about the technical requirements of the industry in relation to the project in hand and involves an examination of issues like suitability of plant location, adoption of appropriate technology, selection of machinery and plant etc.

➤ **Economic, Financial and Commercial Viability:**

- Economic Viability is concerned with a thorough analysis of present and future market prospects for the proposed product and involves the study of possible competitors in the market and the firm's relative cost advantages and disadvantages in relation to them.
- Financial Viability includes estimation of capital requirements and its cost, computation of operating costs, forecasting of sales revenue, arrangement of credit, measurement of profit, finding out the break-even points, assessment of fixed and variable costs, cash flow estimates, etc.
- Commercial Viability includes the estimation of the selling problems and profitability of the project.
A project must, therefore, be economically, financially and commercially viable.

➤ **Social Viability:**

- Business entities depend heavily on specialised Financial Institutions, funded or approved by Government, for procuring finance, Government or its agencies would extend assistance to a business unit only if the proposed project is socially desirable.

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- Social viability becomes necessary for performing the social responsibilities of the Firm. Therefore, at the time of preparing the project report, the social benefits of the project must be analysed well.

(b)

(i)	(Amount in ₹)
Additional Earnings from Fresh Investments	1,05,000
Less: Interest on 18% Debentures	(90,000)
Additional Earnings for Equity Shareholders from Fresh Investments	15,000
Add: Existing Earnings to be Distributed as Dividends	1,20,000
Revised Dividends	1,35,000
K_e	21.6%
Value of Equity Shares (Dividends/ K_e)	6,25,000
Less: Current Market Value of Equity Shares	(6,00,000)
Gain made by shareholders	25,000

(ii) Existing $K_e = \frac{1,20,000}{6,00,000} = 20\%$

K_o before change in capital structure = $K_e - 20\%$

Statement showing computation of WACC after change

Capital Structure	Market Value	Weights	Cost of Capital	Weighted average cost
Debt	₹ 5,00,000	0.4444	18%	8%
Equity	₹ 6,25,000	0.5556	21.6%	12%
	₹ 11,25,000	1.0000		20%

Hence, Weighted Average Cost of Capital is not affected by gearing.

30. (a) 'Fixed Costs are unrelated to output and irrelevant for decision making purpose in all circumstances' :- Justify.

(b) The Modern Chemicals Ltd. requires ₹25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹5,00,000. While deciding about the financial plan, the company considers the objective of maximising earnings per share. It has three alternatives to finance the project-by raising debt of ₹2,50,000 or ₹10,00,000 or ₹15,00,000 and the balance, in each case, by issuing equity shares. The company's shares is currently selling at ₹150, but is expected to decline to ₹125 in case the funds are borrowed in excess of ₹ 10,00,000. The funds can be borrowed at the rate of 10% upto ₹2,50,000 at 15% over ₹ 2,50,000 and upto ₹10,00,000 and at 20% over ₹10,00,000. The tax rate applicable to the company is 50%. Which form of financing should the company choose?

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Answer:

(a) Fixed Costs are unrelated to output and are generally irrelevant for decision-making purpose. However, in the following circumstances, Fixed Costs become relevant for decision-making -

- (i) When Fixed Costs are specifically incurred for any contract,
- (ii) When Fixed Costs are incremental in nature.
- (iii) When the fixed portion of Semi-Variable Cost increases due to change in level of activity consequent to acceptance of a contract.
- (iv) When Fixed Costs are avoidable or discretionary,
- (v) When Fixed Costs are such that one cost is incurred in lieu of another (the difference in costs will be relevant for decision-making.)

(b) Calculation of Earning per share for three alternatives to finance the project

Particulars	I	II	III
Earnings Before Interest and Tax	5,00,000	5,00,000	5,00,000
Less: Interest on Debt	(25,000)	(1,37,500)	(2,37,500)
Earnings Before Tax	4,75,000	3,62,500	2,62,500
Less: Tax @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
Earnings After Tax: (A)	2,37,500	1,81,250	1,31,250
Number of Equity shares: (B)	15,000	10,000	8,000
Earnings per share: (A)/(B)	15.833	18.125	16.406

Decisions: The earning per share is higher in alternative (ii) i.e., if the company finance the project by raising debt of ₹ 10,00,000 and issue equity shares of ₹ 15,00,000. Therefore the company should choose this alternative to finance the project.

Working Note (i)

Computation of Interest under each option

(Amount in ₹)

Particulars	I	II	III
Interest on Debt	25,000	1,37,500	2,37,500
	(10% on ₹ 2,50,000)	(10% on ₹ 2,50,000)	(10% on ₹ 2,50,000)
		(15% on ₹ 7,50,000)	(15% on ₹ 7,50,000)
			(20% on ₹ 5,00,000)

Working Note (ii)

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Computation of Number of Equity Shares under each option

(Amount in ₹)

Particulars	I	II	III
Equity Financing (A)	₹ 22,50,000	₹ 15,00,000	₹ 10,00,000
Market Price per share: (B)	₹ 150	₹ 150	₹ 125
Number of Equity Share: (A)/(B)	15,000	10,000	8,000