PAPER-14: Advanced Financial Management

Time Allowed: 3 hours   **Full Marks:** 100

This paper contains 5 questions. All questions are compulsory, subject to instruction provided against each question. All workings must form part of your answer.
Assumptions, if any, must be clearly indicated.

Question No. 1. (Answer **all** questions. Each question carries **2 marks**)

(a)   A company is considering Projects X and Y with following information: **[2]**

Project	Expected NPV (₹)	Standard deviation (₹)
X	1,22,000	90,000
Y	2,25,000	1,20,000

Which project will you recommend based on coefficient of variation as a measure of risk?

Answer to (a):

$$CV = \frac{SD}{ENPV}$$

$$CV_X = \frac{90,000}{1,22,000} = 0.738$$

$$CV_Y = \frac{1,20,000}{2,25,000} = 0.533$$

On the basis of Co-efficient of Variation (C.V). Project Y appears to be less risky and hence should be accepted.

(b) Define Non-financial Intermediaries?   **[2]**

Answer to (b):

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, 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) ?   **[2]**

Answer to (c):

Expected rate of return: (By applying CAPM)

$Re = R_t + \beta_t (R_m - R_t)$

$\quad = 12\% + 1.6 (18\% - 12\%)$

$\quad = 12\% + 9.6\% = 21.6\%$

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

$R0 = D_t/P_0 + g$

$0.216 = 2.50/(P_0 - 0.08)$

Or, $P_0 = 2.50/(0.216 - 0.08)$

$= 2.50/0.136 = ₹18.38$

(d) What do you mean by Reverse Book Building? **[2]**

Answer to (d):

It is method of buy-back of securities. It is an efficient price discovery mechanism adopted when the company aims to buy the Shares from the public and other Shareholders. This is generally done when the company wishes to delist itself from the trading exchanges.

(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? **[2]**

Answer to (e):

Amount placed in call = ₹52 crores

Interest = 5.65% p.a.

Amount receivable next day = Principal + Interest for a day

$$= ₹52 \text{ Crores} + 52 \text{ crores} \times \frac{1}{365} \times \frac{5.65}{100}$$

$$= ₹52,00,80,493$$

(f) In September 30, 2013, a six-month Put on VINTEX LTD.'s stock with an exercise price of ₹75 sold for ₹6.82. The stock price was ₹70.00. The risk-free rate was 6% per annum. How much would you be willing to pay for a CALL on Vintex Ltd.'s stock with same maturity and exercise price?
[Given. PVIF (6%, ½ year) = 0.9709] and PVIF (6%, 1 year) = 0.9434] **[2]**

Answer to (f):

Based on put call parity theorem,

$C - P = S - PV (EP)$ or, $C = P + S - PV(EP)$.

Thus, C (call) = 6.82 + 70 - 75 × 0.9709

$\quad\quad\quad\quad = 76.82 - 72.82 = ₹4.00$

Thus, Price of Six month call = ₹4.00

(g) A treasury bill is maturing on 28-June- 2014 is trading in the market on 3rd July 2013 at a price of ₹92.8918. What is the discount rate inherent in this price? **[2]**

Answer to (g):

The formula for calculation of yield of a T- Bill is $Y = \left(\dfrac{F-P}{P}\right) \times \dfrac{365}{M} \times 100$

Here P = 92.8918, F = 100, M = 360 days [period from 03/07/13 to 28/06/14 – remember exclude the maturity date]

$Y = \left(\dfrac{100-92.8918}{92.8918}\right) \times \dfrac{365}{360} \times 100 = 7.76\%$

(h) Mr. Mohit is willing to purchase a 5 years ₹ 1000 par value PSU bond is having a coupon rate of 9%. His required rate of return is 10%. How much Mr. Mohit should pay to purchase the bond if it matures at par?
[Given: PVIFA (10%, 5 years) = 3.791 and PVIF (10%, 5 years) = 0.621]
[Given: PVIFA (9%, 5 years) = 3.890 and PVIF (9%, 5 years) = 0.650]   **[2]**

Answer to (h):

If the Bond matures at par Bn = ₹1,000.
Each interest = ₹90(1,000 × 0.09), Kd = 10%
Bo = ₹90 × 3.791 + 1,000 × 0.621
    = ₹962.19

(i) Define Out-of-Pocket Cost?   **[2]**

Answer to (i):

These are costs that entail current or near future cash outlays for the decision at hand. Such costs are relevant for decision - making, as these will occur in near future. This cost concept is a short-run concept and is used in decisions on fixing Selling Price in recession, Make or Buy, etc. Out-of-Pocket costs can be avoided or saved if a particular proposal under consideration is not accepted.

(j) Mr. Kumar is a fund manager of an equity fund is expected to provide risk premium of 10% and standard deviation of returns of 16%. Miss Ankita, a client of Mr. Kumar chooses to invest ₹70,000 in equity fund and ₹30,000 in T-Bills. If T – Bills are trading at 7% p.a., the expected return and standard deviation of return on the portfolio of Miss Ankita will be.   **[2]**

Answer to (j):

Expected return on Equity fund = 7.00 + 10.00= 17%
Expected return on Portfolio of Miss Ankita:
0.70 × 17 + 0.30 × 7 = 14%

Expected Standard deviation of the return on Port folio
= 0.70 × 0.16 + 0.30 × 0
= 11.20%

Question No. 2. (Answer **any three** questions. Each question carries **8 marks**)

2 (a). A has invested in three mutual fund schemes as per details given below:

Particulars	MFA	MFB	MFC
Date on investment	1.12.13	1.1.14	1.3.14
Amount of investment	₹50000	₹ 1 lakh	₹50000
NAV at entry date	₹ 10.50	₹ 10.00	₹ 10.00
Dividend received up to 31.3.04	₹950	₹1500	Nil
NAV as on 31.3.04	₹ 10.40	₹10.10	₹9.80

Required:
What is the effective yield on per annum basis in respect of each of the three schemes to Mr. A up to 31.03.14? [8]

Answer to 2 (a):

Particulars	MFA	MFB	MFC
Date on investment	1.12.13	1.1.14	1.3.14
Amount of investment	₹50000	₹ 1 lakh	₹50000
NAV at entry date	₹ 10.50	₹ 10.00	₹10.00
Dividend received up to 31.3.14	₹950	₹1500	Nil
NAV as on 31.3.14	₹ 10.40	₹10.10	₹9.80
Number of units issued	50000/10.5 = 4762	1 lakh/10 = 10000	50000/10 = 5000
Dividend per unit	950/4762 = 0.20	1500/10000 = 0.15	Nil
Capital Gains per unit	(10.4-10.5) = -0.10	(10.10-10.00) = +0.10	(9.80-10) = -0.20
Total	0.10	0.25	-0.20
Yield	0.10/10.5 = 0.95%	0.25/10 = 2.5%	-0.2/10 = -2%
Yield per annum = Yield x (12/months of investment)	2.85%	10%	-24%

2(b)(i). Satendra invested ₹50000 in debt-oriented fund when the NAV was ₹16.10, and sold the units allotted when the NAV was ₹ 17.10 after one year. Assume that there existed an entry load of 2% and no exit load. He received ₹ 2 per unit as dividend which is taxable at 30% during the year. Ignore capital gains tax. What is the after tax rupee return from this investment? [5]

2(b)(ii). NBFC are not being compulsorily registered with RBI. - Justify. [3]

Answer to 2(b)(i):

Satendra invested ₹50000, when NAV was ₹16.10 and the sale price was = 16.10 x 1.02 = ₹ 16.4220. At this price he was issued 3044.70 (50000/16.422) units. On this he received dividend =

3044.7 x 2 = ₹6089.40. However, dividends are taxable at 30%. His post tax receipt - 4262.58. Now if he sells after a year when the NAV is ₹17.10, he gets full value as there is no exit load.

Rupee return in value
= (Post Tax Div. + (Repurchase Price - Sale Price) x No. of Units
= 4262.58 + (17.10 - 16.422) x 3044.7
= 6326.89
Rupee return in %
= 6326.89/50000
= 12.65%

Answer to 2(b)(ii):

In terms of Section 45-IA of the RBI Act, 1934, no Non-banking Financial company can commence or carry on business of a non-banking financial institution without a) obtaining a certificate of registration from the Bank and without having a Net Owned Funds of ₹ 25 lakhs (₹ two crore since April 1999). However, in terms of the powers given to the Bank. to obviate dual regulation, certain categories of NBFCs which are regulated by other regulators are exempted from the requirement of registration with RBI viz. Venture Capital Fund/Merchant Banking companies/Stock broking companies registered with SEBI, Insurance Company holding a valid Certificate of Registration issued by IRDA, Nidhi companies as notified under Section 620A of the Companies Act, 1956, Chit companies as defined in clause (b) of Section 2 of the Chit Funds Act, 1982, Housing Finance Companies regulated by National Housing Bank, Stock Exchange or a Mutual Benefit company.

2(c)(i). State five important regulations prescribed by SEBI for the investments that can be made by a Mutual Fund. [5]

2(c)(ii). The unit price of TSS Scheme of a mutual fund is ₹ 10. The public offer price (POP) of the unit is ₹ 10.204 and the redemption price is ₹ 9.80. Calculate: (1) Front-end Load, and (2) Back-end Load. [1^1/$_2$+1^1/$_2$]

Answer to 2(c)(i):

SEBI REGULATIONS FOR INVESTMENTS OF A MUTUAL FUND: The investments of a mutual fund are governed by a set of regulations of the SEBI and the five import; ones are as under:

(i) In all the schemes taken together, a mutual fund shall not own more than 10% of the company's paid up capital;
(ii) A scheme shall not invest more than 15% of the NAV in debt instruments issued by a single issuer which are rated not below investment grade by an authorized credit rating agency;
(iii) Barring certain exceptions, a scheme shall not invest more than 10% of its NAV in the equity shares or equity related instruments of one company;
(iv) A scheme shall not invest more than 5% of its NAV in unlisted equity shares or equity related instruments in case of an open ended scheme and 10% of its NAV in case of close ended scheme;
(v) Mutual funds shall mark all investments to market.

Answer to 2(c)(ii):

(1) Calculation of Front-end Load (%)
We know that Sale Price = NAV (1 + Front-end Load %)
Since, Unit Price = ₹ 10.00, we have NAV = ₹10. We are given,
Sale Price = ₹ 10.204
Therefore we have Front-end Load% = 10.204/10 - 1 = 2.04%

(2) Repurchase Price = NAV (1- Back-end Load %)
Since, Unit Price = ₹ 10.00, we have NAV = ₹ 10. We are given, Repurchase Price = ₹9.80
Therefore we have Back-end Load% = 1 - 9.8/10 = 2%

2(d)(i). The RBI offers 91 -day T-Bill to raise ₹15000 Crores. The following bids have been received.

Bidder	Bid rate	Amount (₹ Crores)
A	98.95	18,000
B	98.93	7,000
C	98.92	10,000

(1) **What is the yield for each of the price at which the bid has been made?**
(2) **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?** **[3+2]**

2(d)(ii). Distinguish between 'Inter Corporate Deposits' and 'Public Deposits'. **[3]**

Answer to 2(d)(i):

(1) $\text{Yield} = Y = \left(\dfrac{F-P}{P}\right) \times \dfrac{365}{M} \times 100$ where, M = 91 days for all.

A = 4.26% [Price P = 98.95]
B = 4.34% [Price P = 98.93]
C = 4.38% [Price P = 98.92]

(2) As this is a yield based auction, and since the entire amount of ₹ 5,000 Crores can be sourced at the lowest yield of ₹ 4.26% itself, only A's bid would be accepted for ₹ 15,000 Crores.

Answer to 2(d)(ii):

Inter-corporate Deposits: (i) Short term finance; (ii) Deposits made by one company to another company and are subject to the provisions of the Companies Act 1956; (iii) Rate of interest varies depending upon amount involved and time period; and (iv) the risk is very high.

Public Deposits: (i) Both short term and medium term finance; (ii) Deposits from public and shareholders, subject to the rules prescribed by RBI; (iii) The maximum amount that can be raised, maturity period, and procedures as per conditions laid down by the RBI; (iv) These deposits are unsecured loans and are used for working capital requirements.

Question No. 3. (Answer **any two** questions. Each question carries **10 marks**)

3(a)(i). Suppose a dealer Rupam quotes 'All-in-cost' for a generic swap at 8% against six month LIBOR flat. If the notional principal amount of swap is ₹5,00,000,

(1) Calculate Semi-Annual fixed payment.

(2) Find the first floating rate payment for (1) above if the six month period from the effective date of swap to the settlement date comprises 183 days and that the corresponding LIBOR was 6% on the effective date of swap.

(3) In 2 above, if settlement is on 'Net' basis, how much the fixed rate payer would pay to the floating rate payer?

Generic swap is based on 30/360 days basis. **[2+2+2]**

3(a)(ii). Write down the benefits of Rolling Settlement. **[4]**

Answer to 3(a)(i):

Computation of Factors

Factor	Notation	Value
Notional Principal	P	5,00,000
Time	N	180 days
All in Cost Rate	R	0.08

(1) Computation of Semi Annual Fixed Rate Payment

Semi-Annual Fixed Rate Payment = P X (N ÷ 360) X R

= 5,00,000 x (180 ÷ 360) x 0.08

= 5,00,000 x 0.5 x 0.08 = ₹20,000/-

(2) Computation of Floating Rate Payment

Floating Rate Payment = P x (N ÷ 360) x LIBOR

Where N = Period from the effective date of SWAP to the date of Settlement

= 5,00,000 x (183 ÷ 360) x 0.06

= 5,00,000 x (0.5083) x 0.06 = ₹15,250.

(3) Computation of Net Amount

Net Amount to be paid by the Person Requiring Fixed Rate Payment = Fixed Rate Payment Less Floating Rating Payment = ₹20,000 - ₹15,250 = ₹4,750.

Answer to 3 (a)(ii):

(1) In rolling settlements, payments are quicker than in weekly settlements. Thus, investors benefit from increased liquidity,

(2) It keeps cash and forward markets separate,

(3) Rolling settlements provide for a higher degree of safety,

(4) From an investor's perspective, rolling settlement reduces delays. This also reduces the tendency for price trends to get exaggerated. Hence, investors not only get a better price but can also act at their leisure.

3 (b)(i). Following are the details of cash inflows and outflows in foreign currency denominations of Mac Co., an Indian export firm, which have no foreign subsidiaries —

Currency	Inflow	Outflow	Spot rate	Forward rate
US $	4,00,00,000	2,00,00,000	48.01	48.82
French Franc (F Fr)	2,00,00,000	80,00,000	7.45	8.12
UK £	3,00,00,000	2,00,00,000	75.57	75.98
Japanese Yen	1,50,00,000	2,50,00,000	3.20	2.40

(1) Determine the net exposure of each foreign currency in terms of Rupees.

(2) Are any of the exposure positions off-setting to some extent? [6+2]

3(b)(ii). A sold in June Nifty futures contract for ₹3,60,000 on June 15, For this he had paid an initial margin of ₹34,000 to his broker. Each Nifty futures contract is for the delivery of 200 Nifties. On June 25, the index was closed on 1850. How much profit / loss A has made? [2]

Answer to 3(b)(i):

(1) Computation of Net Exposure

Particulars	US $	F Fr	UK £	Japan Yen
Inflow (in Lakhs)	400.00	200.00	300.00	150.00
Less: Outflow	(200.00)	(80.00)	(200.00)	(250.00)
Net Exposure (Foreign Currency Terms)	200.00	120.00	100.00	(100.00)
Spot Exchange Rate	48.01	7.45	75.57	3.20
Net Exposure (in Rupee Terms based on Spot Exchange Rate)	9602 [200x48.01]	894 [120 x 7.45]	7557 [100 x 75.57]	(32) [100 x 3.20/10]

Particulars	US $	F Fr	UK£	Japan Yen
Forward Rate [₹ , FC]	48.82	8.12	75.98	2.40
Less: Spot Exchange Rate [₹ / FC]	48.01	7.45	75.57	3.20
Forward Premium/ (Discount)	0.81	0.67	0.41	(0.80)
Net Exposure in Rupee Terms based on extent of uncertainty represented by Premium / (Discount)	162.0 [200 x 0.81]	80.4 [120 x 0.67]	41.0 [100 x 0.41]	8.0 [(100)x (0.8)/ 10]

(2) Off Setting Position:

(a) Net Exposure in all the currencies are offset by better forward rates. In the case of USD, F Fr and UK Pound, the net exposure is receivable, and the forward rates are quoted at a premium for these currencies.

(b) In case of Japanese Yen, the net exposure is payable, and the forward rate is quoted at a discount. Therefore, a better forward rate is also offsetting the net payable in Japanese Yen.

Answer to 3(b)(ii):

Sale Price per NIFTY Future
= Contract Amount ÷ Lot size
= ₹3,60,000 ÷ 200
= **₹1,800**

Futures Price as on June 25

= ₹ 1,850

Loss on Sale of Futures Contract

= (1,850 - 1,800) × 200

= ₹**10,000.**

3(c)(i). The following quotes are available.

Spot ($/Euro)	**0.8385/0.8391**
3-m swap points	**20/30**
Spot ($/Pound)	**1.4548/1.4554**
3-m swap points	**35/25**

Find the 3-m (€/£) outright forward rates. **[5]**

3(c)(ii). What is swaps? Explain its necessity. Also state financial benefits created by swap transactions. **[2+2+1]**

Answer to 3(c)(i)

Given $/€ = 0.8385 / 0.8391   3M fwd = 0.8405 / 0.8421
(Swap points ascending order ⟶ add to find forward rates)
        $/£= 1.4548/1.4554   3M fwd = 1.4513 / 1.4529
(Swap points descending order ⟶ deduct to find forward rates)

To find € /£ (3M outright forward rates)
        Bid (€/£) = Bid (€ /$) x Bid ($/£)
We do not have a quote of € /$, instead we have $/ €.
        Bid (€ /£) = I/Ask($/€) x Bid($/£)

Substituting the values,
        Bid rate for € /£= 1/0.8421 x 1.4513 = 1.7234

Similarly Ask (€ /£)   = 1/Bid($/€) x Ask($/£)

                = 1/0.8405x1.4529 = 1.7286
∴ 3M outright forward rates (€ /£) = 1.7234 / 1.7286

Answer to 3(c)(ii):

Swaps Exchange of one obligation with another -- Financial swaps are funding technique, which permit a borrower to access one market and exchange the liability for another market / instrument - exchange one type of risk with another.

Necessity –
1. Difference in borrowers and investors preference and market access
2. Low cost device
3. Market saturation
4. Differences in financial norms followed by different countries.

Financial Benefits Created by Swap Transactions
▪ The Theory of Comparative Advantage
▪ Information asymmetries.

Question No. 4. (Answer **any two** questions. Each question carries **8 marks**)

4 (a). Stocks P and Q have the following historical returns —

Year	2009	2010	2011	2012	2013
Stock P's Return (K)	-12.24	23.68	34.44	5.82	28.30
Stock Q's Return (K)	-7.00	25.55	44.09	2.20	20.16

You are required to calculate the average rate of return for each stock during the period 2009 to 2013. assume that someone held a Portfolio consisting 50% of Stock P and 50% of Stock Q.

What would have been the realized rate of return on the Portfolio in each year from 2009 to 2013? What would been the average return on the Portfolio during the period? (You may assume that year ended on 31st March). **[3+5]**

Answer to 4 (a):

1. **Calculation of average rate of return on Portfolio during 2009-2013**

Year	Stock P's Return %	Stock Q's Return %
2009	-12.24	-7.00
2010	23.68	25.55
2011	34.44	44.09
2012	5.82	2.20
2013	28.30	20.16
Total	80.00	85.00
Average rate of return	80/5 years = 16%	85/5 years =17%

2. **Calculation of realized rate of return on Portfolio during 2009-2013**

	Stock P			Stock Q			Total
Year	Proportion	Return	Net Return	Proportion	Return	Net Return	Net Return
1	2	3	4 = 3 x 2	5	6	7 = 5 x 6	8 = 4 + 7
2009	0.50	-12.24	-6.12	0.50	-7.00	-3.50	-9.62
2010	0.50	23.68	11.84	0.50	25.55	12.78	24.62
2011	0.50	34.44	17.22	0.50	44.09	22.05	39.27
2012	0.50	5.82	2.91	0.50	2.20	1.10	4.01
2013	0.50	28.30	14.15	0.50	20.16	10.08	24.23
			40.00			**42.51**	**82.51**

Average rate of return = ₹82.51 ÷ 5 = 16.50%

4(b)(i). What are the techniques used in Industry Analysis? [2]

4(b)(ii). There are two portfolios L and M. known to be on the minimum various set for a population of three securities A, B and C. The weights for each of the portfolios are given below:

	WA	WB	WC
Portfolio L	0.18	0.63	0.19
Portfolio M	0.24	0.60	0.16

Ascertain the stock weights for a portfolio made up with investment of ₹ 3,000 in L and ₹ 2,000 in M. [4]

4(b)(iii). The risk free return is 8 per cent and the return on market portfolio is 14 per cent. If the last dividend on Share 'A' was ₹2.00 and assuming that its dividend and earnings are expected to grow at the constant rate of 5 per cent. The beta of share 'A' is 2.50. Compute the intrinsic value of share A. [2]

Answer to 4(b)(i):

Techniques Used in Industry Analysis:

(i) Regression Analysis: Investor diagnoses the factors determining the demand for output of the industry through product demand analysis. The following factors affecting demand are to be considered - GNP, disposable income, per capita consumption / income, price elasticity of demand. These factors are then used to forecast demand using statistical techniques such as regression analysis and correlation.

(ii) Input - Output Analysis: It reflects the flow of goods and services through the economy, intermediate steps in production process as goods proceed from raw material stage through final consumption. This is carried out to detect changing patterns/trends indicating growth/decline of industries.

Answer to 4(b)(ii):

Particulars	WA	WB	WC	Total
Portfolio L	0.18	0.63	0.19	
Investment in securities				
(Weight x investment)	540	1,890	570	3,000
Portfolio M	0.24	0.60	0.16	
Investment in securities				
(Weight x investment)	480	1,200	320	2,000
Total investment in securities	1,020	3,090	890	5,000
Weight in portfolio	0.204	0.618	0.178	

Weight in portfolio is computed as total securities/size of portfolio; for example weight of securities A is 1,020/5,000 = 0.204, similar for B and C.

Answer to 4(b)(iii):

Computation of Expected Return

Expected Return $[E(R_A)] = R_F + [\beta_A \times (R_M - R_F)]$

$= 0.08 + [2.5 \times (0.14 - 0.08)]$

$= 0.08 + 2.5 (0.14 - 0.08) = 0.08 + 0.15 = 0.23$

i.e., $K_e = 23\%$

Intrinsic Value of share $= D1 \div (K_e - g) = D_0 \times (1 + g) \div (K_e - g)$

$= 2 \times (1 + 0.05) \div (0.25 - 0.05) = ₹ 11.67$

The Intrinsic Value of share A is ₹ 11.67.

4(c)(i). Mention any four important factors that you would consider for investment decisions in portfolio management. **[2]**

4(c)(ii). The Capital of J Ltd, an exclusive software support service provider to B Ltd, is made up of 40% Equity Share Capital, 60% Accumulated Profits and Reserves. J does not have any other clients. The sensex yields a return of 15%. The risk-less return is measured at 6.75%.
(1) **If the shares of J Ltd carry a Beta (β_J) of 1.6, compute cost of capital, and also the beta of activity support service to B Ltd.**
(2) **If there is another client, K Ltd, accounting for 35% of Assets of J Ltd, with a Beta of 1.40, what should be the Beta of B Ltd, so that the equity beta of 1.60 is not affected? In such a case, what should be expected return from B Ltd and K Ltd?** **[(2+2)+(1+1)]**

Answer to 4(c)(i):

Factors are:
(i) Type of securities; (ii) Proportion of investment in fixed interest / dividend securities; (iii) Identification of industry (i.e., which particular industry shows potential of growth; (iv) Selection of company; (v) Objectives of portfolio; (vi) Timing and quantity of purchase of shares; (vii) Risk tolerance (i.e., conservative investors are risk-averse and aggressive investors generally dare to take risk).

Answer to 4 (c)(ii):

(1) Computation of Cost of Project & Beta of Project (Software Services to B Ltd)

Description of Factor	Measure
• Capital Structure of J Ltd	All Equity
• Nature of Capital Structure of J	Unlevered
• Beta of Equity of J Ltd [uβ]	1.60
• Project Status (Multiple or Single)	Single
• Project Beta (Beta of service to B = β_B)	To be ascertained
• Rule for Unlevered Firm with Single Project	$\beta_U = \beta_J$
• Therefore, Beta of Software Services to B Ltd	1.60

Cost of Capital

Cost of Equity (K_E)   = Return expected on Shares of J Ltd (i.e. $E(R_J)$]

     K_E = Expected Return on J under CAPM

                   = $R_F + β_J X (R_M - R_F)$]

                   = 6.75% + [1.60 x (15% - 6.75%)]

                   = 6.75% + [1.60 x 8.25%] = 6.75% + 13.20% = 19.95%

Beta of Services to B Ltd (Multiple Project Model)

Beta of J Shares Ltd ($β_J$) under Multiple Project scenario = Weighted Average of Betas of Projects

    $β_J$ = $W_B X β_B + W_K X β_K$

    1.60   = [(1- 35%) x $β_B$] + [35% x 1.40]

    1.60   = 0.65 x $β_B$ + 0.49

    0.65 $β_B$ =1.60 - 0.49

    $β_B$ =1.11 ÷ 0.65 =1.708

Beta of B Ltd ($β_B$) should be 1.708

(2) Expected Return on Project B and Project K (Under CAPM Method)

Expected Return on Project B [$E(R_B)$]

    = R_F + [$β_B$ X (R_M - R_F)]

    = 6.75% + [1.708 x (15% - 6.75%)] = 6.75% + [1.708 x 8.25%]

    = 6.75% + 14.091% = **20.841%**

Expected Return on Project K [$E(R_K)$]

    = R_F + [$β_K$ x (R_M – R_F)]

    = 6.75% + [1.40 x (15% - 6.75%)] = 6.75% + [1.40 x 8.25%]

    = 6.75% + 11.55% = 18.30%

Question No. 5. (Answer **any two** questions. Each question carries **10 marks**)

5 (a)(i). Company Z is operating an elderly machine that is expected to produce a net cash inflow of ₹ 40,000 in the coming year and ₹ 40,000 next year. Current salvage value is ₹ 80,000 and next year's value is ₹ 70,000. The machine can be replaced now with a new machine, which costs ₹ 1,50,000, but is much more efficient and will provide a cash inflow of ₹ 80,000 a year for 3 years Company Z wants to know whether it should replace the equipment now or wait a year with the clear understanding that the new machine is the best of the available alternatives and that it in turn be replaced at the optimal point. Ignore tax. Take opportunity cost of capital as 10 per cent. Advise with reasons. [3+3+2]

5(a)(ii). XYZ Ltd adopts constant WACC approach and believes that its cost of debt and overall cost of capital is at 9% and 12% respectively. If the ratio of the market value of debt to the market value of equity is 0.8, what rate of return do Equity Shareholders earn? Assume that there are no taxes. [2]

Answer to 5(a)(i):

Statement showing present value of cash inflow of new machine when it replaces elderly machine now

	₹	₹
Cash inflow of a new machine per year		80,000
Cumulative present value for 1-3 years @ 10%		2.48685
Present value of cash inflow for 3 years (₹ 80,000 x 2.48685)		1,98,948
Less: Cash outflow		
Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	80,000	70,000
N.P.V. of cash inflow for 3 years		1,28,948
Equivalent annual net present value of cash Inflow of new machine (₹1,22,152/2.48685)		51,852

Statement showing present value of cash inflow of new machine when it replaces elderly machine next year

	₹	₹
Cash inflow of a new machine per year		80,000
Cumulative present value for 1-3 years @ 12%		2.4019
Present value of cash inflow for 3 years (₹ 80,000 x 2.48685)		1,98,948
Less: Cash outflow		
Purchase cost of new machine	1,50,000	
Less: Salvage value of old machine	70,000	80,000
N.P.V. of cash inflow for 3 years		1,18,948
Equivalent annual net present value of cash Inflow (₹1,12,152/2.48685)		47,831

Advise: Since the equivalent annual cash inflow of new machine now and next year is more than cash inflow (₹ 40,000) of an elderly machine the company Z is advised to replace the elderly machine now.

Company Z need not wait for the next year to replace the elderly machine since the equivalent annual cash inflow now is more than the next year's cash inflow.

Answer to 5(a)(ii):

Constant WACC implies the use of NOI or M&M Approach. Under M&M Approach,
$K_e = K_o + $ Risk Premium.
So, **$K_e = K_0 + (K_0 - K_d)$ Equity/Debt**
On substitution, we have, **K_e** =12%+(12%-9%)×80%=**14.4%**

Alternatively,

K_e can be obtained as balancing figure as under --
(Note : Debt : Equity = 0.8 = 4:5)

Component	%	Individual Cost in %	WACC %
Debt	4/9th	$K_d = 9.00\%$	$9.00\% \times 4/9\text{th} = 4.00\%$
Equity	5/9th	$K_e = 8.00 \div 5/9\text{th} = \mathbf{14.00\%}$ (final balancing figure)	$12\% - 4\% = \mathbf{8.00\%}$ (balance figure)

5(b)(i). As an executive of a lending institution, what factors should you critically evaluate with respect to a large industrial project, from the perspectives of environmental and economic viability? **[4]**

5(b)(ii). A Production Manager is planning to produce a new product and he wishes to estimate the raw material requirement for that new product. On the basis of usage for a similar product introduced previously, he has developed a frequency distribution of demand in tonnes per day for a two month period. Used this data to simulate the raw material usage requirements for 7 days. Compute also expected value and comment on the result.

Demand Tonnes/day	Frequency No. of days
10	6
11	18
12	15
13	12
14	6
15	3

Random Number: 27, 13, 80, 10, 54, 60, 49. **[6]**

Answer to 5(b)(i):

Factors to consider for critical evaluation of a large industrial project, from the perspectives of environmental and economic viability are:

(i) Employment potential.

(ii) Utilisation of domestically available raw material and other facilities.

(iii) Development of industrially backward areas as per government policy.

(iv) Effect of the project on the environment with particular emphasis on the pollution of water and air to be caused by it.

(v) Arrangements for effective disposal of effluent as per government policy.

(vi) Energy conservation devices, etc. employed for the project.

Other economic factors that influence the final approval of a particular project are:
    Internal Rate of return (IRR) and Domestic resources Cost (DRC).

Answer to 5(b)(ii):

Demand Tonnes/day	Frequency No. of days	Probability	Cumulative Probability	Random Numbers
10	6	6÷60 = 0.10	0.10	00 - 09
11	18	18÷60 = 0.30	0.40	10 - 39
12	15	15÷60 = 0.25	0.65	40 - 64
13	12	12÷60 = 0.20	0.85	65 - 84
14	6	6÷60 = 0.10	0.95	85 - 94
15	3	3÷60 = 0.05	1.00	95 - 99
	60	1.00		

The first seven random numbers (two digits only) are simulated:

Random No.	Corresponding demand Tonnes/day
27	11
13	11
80	13
10	11
54	12
60	12
49	12
	82

Mean requirement per $\quad$ = 82 / 7 = 11.7 Tonnes

The expected value (EV) $\quad$ = (10×0.1)+(11×0.3)+(12×0.25)+(13×0.2)+(14×0.1)+(15×0.05)
$\qquad\qquad\qquad\qquad$ = 12.05 Tonnes
The difference $\qquad\qquad$ = 12.05 – 11.7 = 0.35

This indicates that the small sample size of only 7 days had resulted in some error. A much larger sample should be taken and several samples should be simulated before the simulation results are used for decision making.

5 (c). VEDAVYAS Ltd. is considering two mutually exclusive projects M and project N. The Finance Director thinks that the project with higher NPV should be chosen, whereas the Managing Director thinks that the one with the higher IRR should be undertaken, especially as both projects have the same initial outlay and length of life. The company anticipates a cot of capital of 10% and the net after-tax cash flow of the projects are as follows:

Year	0	1	2	3	4	5
Cash flows (₹)						
Project M	(4,00,000)	70,000	1,60,000	1,80,000	1,50,000	40,000
Project N	(4,00,000)	4,36,000	20,000	20,000	8,000	6,000

You are required to:
(1) Calculate the NPV and IRR of each project.
(2) State with reasons, which project you would recommended.
(3) Explain the inconsistency in the ranking of the two projects.

Present value Table is given:

Year	0	1	2	3	4	5
PVIF at 10%	1.000	0.909	0.826	0.751	0.683	0.621
PVIF at 20%	1.000	0.833	0.694	0.579	0.482	0.402

(3+4)+2+1=10]

Answer to 5 (c).

(1) Calculation of NPV and IRR

NPV of Project M:

year	Cash Flows (₹)	Discount factor (10%)	Discounted Values(₹)	Discount factor (20%)	Discounted Values (₹)
0	(4,00,000)	1.000	(4,00,000)	1.000	(4,00,000)
1	70,000	0.909	63,630	0.833	58,310
2	1,60,000	0.826	1,32,160	0.694	1,11,040
3	1,80,000	0.751	1,35,180	0.579	1,04,220
4	1,50,000	0.683	1,02,450	0.482	72,300
5	40,000	0.621	24,840	0.402	16,080
NPV			58,260		(38,050)

IRR of Project M:

At 20%, NPV is (-) 38,050 and at 10% NPV is 58,260

$\therefore$ IRR = 10 + $\dfrac{58260}{58260+38050}$x10 = 10 + $\dfrac{58260}{96310}$x10 = 10 + 6.05 = 16.05%

NPV of Project N:

year	Cash Flows (₹)	Discount factor (10%)	Discounted Values(₹)	Discount factor (20%)	Discounted Values (₹)
0	(4,00,000)	1.000	(4,00,000)	1.000	(4,00,000)
1	4,36,000	0.909	3,96,324	0.833	3,63,188
2	20,000	0.826	16,520	0.694	13,880
3	20,000	0.751	15,020	0.579	11,580
4	8,000	0.683	5,464	0.482	3,856
5	6,000	0.621	3,726	0.402	2,412
NPV			37,054		(5,084)

IRR of Project M:

At 20%, NPV = (-) 5,084 and at 10% NPV = 37,054

$\therefore$ IRR = 10 + $\dfrac{37054}{37054+5084}$x10 = 10 + $\dfrac{37054}{42138}$x10 = 10 + 8.79% = 18.79%

(2) Both the projects are acceptable because they generate the positive NVP at the company's cost of capital at 10%. However, the company will have to select PROJECT M because it has higher NPV. If the company follows IRR method, then PROJECT N should be selected because of higher internal rate of return (IRR). But when NPV and IRR give contradictory results, a project with higher NPV is generally preferred because of higher return in absolute terms. Hence, Project M should be selected.

(3) The inconsistency in the ranking of the projects arises because of the difference in the pattern of the cash flows. Project M's major cash flow occur mainly in the middle three years whereas project N generated the major cash flow in the first year itself.