Dates	Interest Rate
31st March, 2013	8.75%
31st March, 2014	10.00%
31st March, 2015	10.50%
31st March, 2016	7.75%

(i) Advise how borrower can hedge the risk arising out of expected rise in the rate of interest when he is interested in pegging his interest cost at 8.50% p.a. and if option on Interest Rate is available at 0.75% p.a.

(ii) Assume that the premium negotiated by both the parties at the above-mentioned rate which is to be paid on upfront basis and the actual rate of interest on the respective due dates happens to as follows:

Dates	Interest Rate
31st March, 2013	10.20%
31st March, 2014	11.50%
31st March, 2015	9.25%
31st March, 2016	8.25%

EVALUATE how the settlement will be executed on the respective interest due dates.

(Exam Nov – 2017, SM TYK – 07, RTP May – 2022 & MTP March – 22)

Solution:

As borrower does not want to pay more than 8.5% p.a., on this loan where the rate of interest is likely to rise beyond this, hence, he has hedge the risk by entering into an agreement to buy interest rate caps with the following parameters:

- Notional Principal: ₹ 40,00,000/-
- Strike rate: 8.5% p.a.
- Reference rate: the rate of interest applicable to this loan
- Calculation and settlement date: 31st March every year
- Duration of the caps: till 31st March 2016
- Premium for caps: negotiable between both the parties

To purchase the caps this borrower is required to pay the premium upfront at the time of buying caps. The payment of such premium will entitle him with right to receive the compensation from the seller of the caps as soon as the rate of interest on this loan rises above 8.5%. The compensation will be at the rate of the difference between the rate of none of the cases the cost of this loan will rise above 8.5% calculated on ₹ 40,00,000/-. This implies that in none of the cases the cost of this loan will rise above 8.5%. This hedging benefit is received at the respective interest due dates at the cost of premium to be paid only once.

The premium to be paid on 1st October 2012 is 30,000/- (₹ 40,00,000 × 0.75/100). The payment of this premium will entitle the buyer of the caps to receive the compensation from the seller of the caps whereas the buyer will not have obligation. The compensation received by the buyer of caps will be as follows:

On 31st March 2013

The buyer of the caps will receive the compensation at the rate of 1.70% (10.20 - 8.50) to be calculated on ₹ 40,00,000, the amount of compensation will be ₹ 68,000/- (40,00,000 × 1.70/100).

On 31st March 2014

The buyer of the caps will receive the compensation at the rate of 3.00% (11.50 – 8.50) to be calculated on ₹ 40,00,000/-, the amount of compensation will be ₹ 1,20,000/- (40,00,000 × 3.00/100).

On 31st March 2015

The buyer of the caps will receive the compensation at the rate of 0.75% (9.25 – 8.50) to be calculated on ₹ 40,00,000/-, the amount of compensation will be ₹ 30,000 (40,00,000 × 0.75/100).

On 31st March 2016

The buyer of the caps will not receive the compensation as the actual rate of interest is 8.25% whereas strike rate of caps is 8.5%. Hence, his interest liability shall not exceed 8.50%.

Thus, by paying once the premium upfront buyer of the caps gets the compensation on the respective interest due dates without any obligations.

Question – 17

XYZ Limited borrows £ 15 Million of six months LIBOR + 10.00% for a period of 24 months. The company anticipates a rise in LIBOR, hence it proposes to buy a Cap Option from its Bankers at the strike rate of 8.00%. The lump sum premium is 1.00% for the entire reset periods and the fixed rate of interest is 7.00% per annum. The actual position of LIBOR during the forthcoming reset period is as under:

Reset Period	LIBOR
1	9.00%
2	9.50%
3	10.00%

You are required to show how far interest rate risk is hedged through Cap Option.

For calculation, work out figures at each stage up to three decimal points and amount nearest to £. It should be part of working notes.

(SM TYK – 03)

Solution:

(i) Calculation of Amortization of Premium

Premium Amount = €1,50,00,000 × 1% = €1,50,000

Rate of discount = 7% p.a.

6 months = 3.5%

Cumulative factor = 3.5%, 4 Period

= 3.671

$$\text{Amortization Amount} = \frac{£\ 1,50,000}{3.671(\text{PVAF, } 3.5\%)}$$

= £ 40,861

Statement showing effective interest Rate 8% ↑

Period	Rate (LIBOR)	Interest paid to Bank (L + 10%)	Cap Receipt	Premium	Effective Interest
I	9.00	£14,25,000	(£75,000)	£40,861	£13,90,861
II	9.50	£14,62,500	(£1,12,500)	£40,861	£13,90,861
III	10.00	£1,50,000	(£1,50,000)	£40,861	£13,90,861
		£43,87,500			£41,72,583

Interest saved due to cap (43,87,500 – 41,72,583) = £ 2,14,917

(6) T. BOND FUTURE

Question – 18

In March 2020, XYZ bank sold some 7% interest rate futures underlying notional 7.50% coupon bonds. The exchange provides following details of eligible securities that can be delivered:

Security	Quoted Price of Bond	Conversion Factor
7.96 GOI 2023	1037.40	1.0370
6.55 GOI 2025	926.40	0.9060
6.80 GOI 2029	877.50	0.9195
6.85 GOI 2026	972.30	0.9643
8.44 GOI 2027	1146.30	1.1734
8.85 GOI 2028	1201.70	1.2428

Recommend the Security that should be delivered by the XYZ bank if future settlement price is 1,000.

(MTP April – 2021)

Solution:

Bond	Future Value	Conversion Factor	Future Value × Conversion Factor	Price	Gain/Loss
7.96%	1,000	1.037	1037	1037.40	(0.40)
6.55%	1,000	0.9060	906	926.40	(20.40)
6.80%	1,000	0.9195	919.50	877.50	42.00
6.85%	1,000	0.9643	964.30	972.30	(8)
8.44%	1,000	1.1734	1173.40	1146.30	27.10
8.85%	1,000	1.2428	1242.80	1201.70	4.11

Bond 6.80% GOI 2029 Bond should be delivered due to maximum profit.

QUESTIONS FROM NOV-2024 ATTEMPT

PORTFOLIO MANAGEMENT

Question – 01 (a)

Following is the data regarding Three Securities.

Stock	Expected Return (%)	Std. Deviation	Correlation with the Market return
A	19%	2.50	0.840
B	13.50%	2.00	0.540
C	11.00%	0.80	0.975
Market risk	-	1.20	-
Market rate of return	14.00%	-	-
Risk tree rate	9.00%	-	-

(i) Advise which of the above stocks are over, under or correctly valued in the market ?

(ii) What will be strategy you would like to recommend ?

(6 Marks)

MUTUAL FUND

Question – 02 (a)

Mr. X invested ₹ 1,00,000 at a face value of ₹ 10 per unit in a dividend reinvestment plan in a mutual fund during its initial public offering on 1st July, 2022. On 31st March, 2023, the mutual fund declared a dividend of 10%. At that time Mr. X calculated his holding period return to be 115%.

On 31st March, 2024 the mutual fund declared a dividend of 20% and Mr. X redeemed all his investment and calculated his holding period returns to be 193.134%.

You are required to calculate

(i) The NAVs as on 31/03/2023 and 31/03/2024.

(ii) Calculate the total units redeemed.

(6 Marks)

Question – 06 (a)

A portfolio Manager (PM) has three mutual funds in his portfolio. Following are the details of these three mutual fuds:

Particulars	Growth Fund	Balanced Fund	Regular Fund	Market
Average Return (%)	7.5	6.3	5.4	---
Variance	---	---	---	50.41
Sharpe Ratio	-0.15	-0.36	-0.48	---
Treynor's Ratio	-2	-3	-4.80	---

The yield on 182 days Treasury bill is 9 per cent annum.

You are required to calculate

(i) Variance of the Funds.

(ii) Coefficient of Determination of the Funds.

(8 Marks)

DERIVATIVES

Question – 04 (a)

On January 1, 2023 an investor has a portfolio of 5 securities as given below:

Security	Price (₹)	No. of Shares	Beta
A	612.65	3000	?
B	344.20	5000	1.15
C	454.45	6000	0.40
D	775.10	10000	0.95
E	781.05	3000	0.85

Portfolio beta is 0.859.

The cost of capital to the investor is 10.5% p.a.

You are required to calculate:

(i) The beta of Security A.

(ii) The theoretical value of the Nifty futures for February, 2023. Current value of Nifty 6,500.

(iii) The number of contract of Nifty the investor needs to sell to get a full hedge until February, for his portfolio, if the current value of Nifty is 6,500 and Nifty futures have a minimum trade lot requirement of 200 units. Assume that the Futures are trading at their value.

(iv) What will be new beta if 4 Future contracts are sold to the investors?

No. of days in a year be traded as 365 days

Given: In (1.105) = 0.0998, $e^{0.015858}$ = 1.01598 and $e^{0.01668}$ = 1.01682

(6 Marks)

Question – 05 (c)

Mohan buys 10,000 shares of X Ltd. @ ₹ 25 per share whose beta value is 1.5 and sells 5,000 shares of A Ltd. @ ₹ 40 per share having a beta value of 2. He obtains a complete hedge by buying 25 Nifty Futures. He closes out his position at the closing price of the next day when the share of X Ltd. has fallen by 4% and Nifty Futures has dropped by 2.50%. In the process he suffered a loss of ₹ 16,625.

You are required to determine

(i) The value of the Nifty future

(ii) Initial cash outlay

(iii) Cash inflow at the close out

(iv) Percentage Gain/loss to shares of A Ltd. at the time of closure.

(4 Marks)

INTEREST RATE RISK MANAGEMENT

Question – 03 (a)

XY Ltd. is planning to expand its operations in view of growing demand for its products. For this purpose, it is considering to borrow an amount of ₹ 100 crores for a period of 3 months in the coming 6 months time from now. The current rate of interest is 8% per annum but due to inflation it may go up in 6

months time. The company wants to hedge itself against the likely increase in interest rate.

The company's Bankers quoted an FRA (Forward Rate Agreement) at 8.20% per annum.

You are required to calculate due to FRA:

(i) The actual interest rate if the Banker pays to XY Ltd. an amount of ₹ 9,78,952.52

(ii) The actual interest rate if XY Ltd. will pay to the Banker a sum of ₹ 9,80,872.98

(6 Marks)

Question – 04 (c)

MN Bank entered into a Plain Vanila Swap through an OIS (Overnight Index Swap) on a principal of ₹ 5 crores and agreed to receive MIBOR overnight floating rates for a fixed payment on the principal. The swap was entered into on Monday 2nd August and was to commence on 3rd August and run for a period of 7 days.

Respective MIBOR rates for Tuesday to Monday were

8.00%, 8.25%, 8.15%, 7.90%, 7.95%, 8.15%.

MN Bank received ₹ 275 net of settlement.

Working is to be rounded off. Bank does not accept decimal values.

You are required to calculate the fixed rate and Interest under both legs when Sunday is holiday.

(4 Marks)

Normal Probability Distribution Table

Number of Standard Deviations From Mean (Z)	Area to the Left or Right (One Tail)	Number of Standard Deviations From Mean (Z)	Area to The Left or Right (One Tail)
0.00	0.5000	1.55	0.0606
0.05	0.4801	1.60	0.0548
0.10	0.4602	1.65	0.0495
0.15	0.4404	1.70	0.0446
0.20	0.4207	1.75	0.0401
0.25	0.4013	1.80	0.0359
0.30	0.3821	1.85	0.0322
0.35	0.3632	1.90	0.0287
0.40	0.3446	1.95	0.0256
0.45	0.3264	2.00	0.0228
0.50	0.3085	2.05	0.0202
0.55	0.2912	2.10	0.0179
0.60	0.2743	2.15	0.0158
0.65	0.2578	2.20	0.0139
0.70	0.2420	2.25	0.0122
0.75	0.2264	2.30	0.0107
0.80	0.2119	2.35	0.0094
0.85	0.1977	2.40	0.0082
0.90	0.1841	2.45	0.0071
0.95	0.1711	2.50	0.0062
1.00	0.1557	2.55	0.0054
1.05	0.1469	2.60	0.0047
1.10	0.3570	2.65	0.0040
1.15	0.1251	2.70	0.0035
1.20	0.1151	2.75	0.0030
1.25	0.1056	2.80	0.0026
1.30	0.0986	2.85	0.0022
1.35	0.0885	2.90	0.0019
1.40	0.0808	2.95	0.0016
1.45	0.0735	3.00	0.0013
1.50	0.0668		