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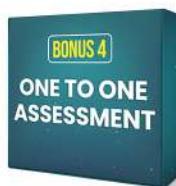
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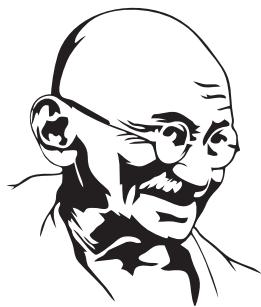
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Mahatma Gandhi



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CMA Final Strategic Financial Management
Divya Jadi Booti



Preface

This is a compilation from the new syllabus of the Institute of Cost Accountants of India for the subject of **Strategic Financial Management**. Entire module of Institute has been covered in this book. The effort has been made to structure the material for ease of conceptual learning. Some solutions have been modified to keep them consistent with all other solutions and for others we referred the solution given by the institute.

The explanation of all the solutions here, have been given in the class and it is very important that this study material should not be referred in isolation, (i.e., without the class)

In exam, the paper comprises of three types of questions, based on - **MCQ, Theories (Short notes)** and **Practical Questions**. You need to prepare the MCQ's and detailed theories directly from the institute material. **Everything is important for your exam and comprehensive preparation is required to pass the examination**. Please remember that in order to get full confidence in the subject, you have to solve this material **at least 3 times** after you've learnt with us in the classes.

We have segregated here the topics as per the relevant concepts and have given immense effort along with our team to ensure that there are limited errors in this book.

All due care has been taken to eliminate the errors. However, some errors may have gone unnoticed and we would be happy if you bring it to our notice by sending us an email to **care@sjc.co.in**

We would like to thank our editorial team (Sayantan, Anirban) for their consistent effort to help me to bring this compilation for you.

Wish you All the Best and Happy Learning 😊

Satish Jalan

- Chartered Accountant (AIR - 27 in Inter)
- Company Secretary (AIR 3 - Inter, AIR 5 - Final)
- Chartered Management Accountant (CIMA, UK)
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- St. Xavier's College Alumnus, Kolkata





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Bird's Eye View

Sl. No	Chapter name	Term		
		Jun'23	Dec'23	Jun'24
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	Total	112	98	98
	MCQ	20	30	30

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Chapter 1

Investment Decisions, Project Planning and Control

1.1

Measuring Cash Flows, Discounted Cash Flow Technique for Project Evaluation

1.2

NPV and IRR - Conflict and Resolution, The Modified Internal Rate of Return (MIRR), Comparing Projects with Unequal Lives, The Concept of Abandonment Value, Modified Accelerated Cost Recovery System (MACRS)

1.3

Inflation Adjusted Cash Flow Forecasting in Capital Budgeting

1.4

Capital Rationing for Divisible and Non – divisible Projects (with Application of Integer Programming)

1.5

Social Cost Benefit Analysis



1.1

Measuring Cash Flows, Discounted Cash Flow Technique for Project Evaluation

No questions have been asked yet from this chapter!

1.2

NPV and IRR - Conflict and Resolution, The MIRR, Comparing Projects with Unequal Lives, The Concept of Abandonment Value, MACRS

(Q)1

Jun'23 MTP Set 1

Zenith Power. Ltd. is considering a proposal to replace one of its machines. In this connection, the following information is available:

The existing machine was purchased 3 years ago for ₹ 20 Lakh. It was depreciated 20 per cent per annum on reducing balance basis. It has remaining useful life of 5 years, but its maintenance cost is expected to increase by ₹ 1 Lakh per year from the end of sixth year of its installation. Its present realizable value is ₹ 12 Lakh. The company has several machines having 20% depreciation.

The new machine costs ₹30 Lakh and is subject to the same rate and basis of depreciation. On sale after 5 years, it is expected to realize ₹18 Lakh. With the new machine, the annual pre-tax operating costs (excluding depreciation) are expected to decrease by ₹2 Lakh. In addition, the machine would increase productivity on account of which net pre-tax revenues would increase by ₹3 Lakh annually (reckoned at year end). The tax rate applicable to the company is 40% and the cost of capital is 10 per cent.

Advise the company on the choice of the machine from a financial perspective on the basis of NPV.

PV Factors (10%)

Year	1	2	3	4	5
PV Factor	0.909	0.826	0.751	0.683	0.621

Present an incremental analysis of using the existing machine versus replacing the machine with a new one. **Present** annual discounted cash flows in your answers with separate calculation showing annual discounted cash flows on account of incremental depreciation without netting off capital asset outflows or inflows. **Calculations** are to be presented to the nearest rupee. P.V. factors with above decimal places should be used. [16]



Reference

NPV, incremental analysis & annual discounted cash flows

What's New
Answer

Existing Machine	(Amount in ₹)
Cost	20,00,000
Depreciation 20%, year 1	4,00,000
	16,00,000
Depreciation 20%, year 2	3,20,000
WDV	12,80,000
Depreciation 20%, year 3	2,56,000
WDV at Y0 =	10,24,000

Base for incremental depreciation

Cost of New Machine	30,00,000
Less: WDV of existing machine	10,24,000
Difference	19,76,000

Depreciation at end of the Year

		PV	Disc. Values
Year 1	3,95,200	0.909	3,59,237
Year 2	3,16,160	0.826	2,61,148
Year 3	2,52,928	0.751	1,89,949
Year 4	2,02,342	0.683	1,38,200
Year 5	1,61,874	0.621	1,00,524
			10,49,058
Tax Shield 40%			4,19,623

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Expenses				(1,00,000)	(1,00,000)	(1,00,000)
Revenue		3,00,000	3,00,000	3,00,000	3,00,000	3,00,000
Net Revenue		3,00,000	3,00,000	2,00,000	2,00,000	2,00,000
Net Revenue after Tax		1,80,000	1,80,000	1,20,000	1,20,000	1,20,000
Cost of New Machine	(30,00,000)					

Resale – old Machine	12,00,000					
Resale – New Machine						18,00,000
Cash Flows other than Depreciation	(18,00,000)	1,80,000	1,80,000	1,20,000	1,20,000	19,20,000
PV Factor	1	0.909	0.826	0.751	0.683	0.621
Discount Annual C/F	(18,00,000)	1,63,620	1,48,680	90,120	81,960	11,92,320
						(1,23,300)

PV of Cash Flows (Other than Depreciation) (1,23,300)

Depreciation Impact + 4,19,623

Net Impact + 2,96,323

Hence it is beneficial to go in for the new machine.

Q2

Jun'23 MTP Set 2

Q Ltd. has two projects under consideration, A and B, each costing ₹60 lacs. The projects are mutually exclusive. The life of Project A is four years and of Project B is three years. The salvage value is zero for both the projects. Depreciation is charged uniformly for A over four years and 100% depreciation is available for B at the end of the first year. The tax rate is 40% and the hurdle rate for cash flow evaluation is 15%. The cash inflows before tax for A and B are given below:

(Figs. ₹ lacs)

At the end of the year	Project A	Project B
1	30	25
2	55	60
3	60	65
4	25	Nil

Find the NPV of A and B. **Comment** on your preference. Is the NPV the most appropriate measure for your decision? **Why?** (Use PV factors up to 3 decimal points, show annual discounted cash flows for each project in ₹ lacs, up to two decimal places.)

Reference

NPV

What's New



Answer
Project A

End of Year	0	1	2	3	4
Cash Outflow	-(60)				
Cash inflows		30	55	60	25
Cash inflows after tax		18	33	36	15
Depreciation tax shield		6	6	6	6
Effective cash flows after tax and depreciation shield		24	39	42	21
PV factor	1.0	0.870	0.756	0.658	0.572
PV of Cash inflows		20.88	29.48	27.64	12.01
Total of PV of inflows				90.01	
PV of outflows				- (60.00)	
NPV				+30.01	

Project B

End of Year	0	1	2	3	4
Cash Outflow -(60)					
Cash inflows		25	60	65	
Cash inflows after tax		15	36	39	
Depreciation tax shield		24			
Effective cash flows after tax and depreciation shield		39	36	39	
PV factor	1.0	0.870	0.756	0.658	0.572
PV of Cash inflows		33.93	27.22	25.66	
Total of PV of inflows				86.81	
PV of outflows				- (60.00)	
NPV				+26.81	

NPV of Project A is higher, but the project lives are unequal. 12 lacs of A's PV in the 4 years has been in favour of A compared to B. Hence, choice based on NPV is not appropriate.

Equal annual inflows of A = $90.01 / 2.856 = 31.52$ (PV Annuity 15%, 4 years = 2.856)

Equal annual cash inflows of B = $86.81 / 2.284 = 38.00$ (PV Annuity 15%, 3 years = 2.284) Since B yields higher equated annual inflows, B is the better choice. This measure is appropriate for projects with unequal lives.

Q 3

Jun'24

BATECH Ltd., is a manufacturer of computers. It wants to introduce Artificial Intelligence (AI) while manufacturing computers. The estimated annual saving from introduction of the Artificial Intelligence is as follows:

- (i) Reduction of five employees with annual salaries of ₹ 1,50,000 each
- (ii) Reduction of ₹ 1,50,000 in production delays caused by inventory problems
- (iii) Reduction in lost sales ₹ 1,25,000 p.a.
- (iv) Gain due to timely billing ₹ 1,00,000 p.a.

The purchase price of the system for installation of Artificial Intelligence is ₹ 10,00,000 and installation cost is ₹ 50,000. 80% of the purchase price will be paid in the year of purchase and remaining will be paid in next year.

The estimated life of the system is 5 years and it will be depreciated for Income Tax purposes on a straight line basis. However, the operation of the new system requires two computer specialists with annual salaries of ₹ 2,50,000 per person.

In addition to above, annual maintenance and operating cost for five years are as below:

(Amount in ₹)

Year	1	2	3	4	5
Maintenance & Operating Cost	1,00,000	90,000	80,000	70,000	60,000

Maintenance and operating cost are payable in advance.

The Company's tax rate is 30% and its required rate of return is 15%.

Given : PV Factor :

Year	1	2	3	4	5
PVIF _(15%)	0.870	0.756	0.658	0.572	0.497

Required:

- (i) **Assess** the Net Present Value (NPV) of the Project.
- (ii) **Advise** whether the Company should introduce Artificial Intelligence (AI) or not. [7]

 Reference NPV - Implement AI or Not	What's New
--	-------------------



Answer

- (i) Net Present Value (NPV) of the Project = ₹ 4,18,279
- (ii) **Advise:** Since the NPV is positive (i.e. ₹ 4,18,279) BATECH Ltd. is advised to introduce artificial intelligence (AI) while making computers.

1.3

Inflation Adjusted Cash Flow Forecasting in Capital Budgeting

Q1

Dec'23

PRANTICK Ltd. is considering the replacement of its existing machine with a new machine. The purchase price of the new machine is ₹ 36,40,000 and its expected life is 8 years. The company follows straight line method of depreciation on the original investment (Scrap value is not considered for the purpose). The other expenses to be incurred for the New Machine are as under:

- (i) Installation charges ₹ 14,000
- (ii) Consultant fees paid for his advice to buy new machine ₹ 7000
- (iii) Additional working capital required (will be released after 8 years) ₹ 23,800

The written down value of the existing machine is ₹ 1,06,400 and its cash salvage value is ₹17,500. The dismantling of the existing machine would cost ₹ 6,300. The annual earnings (before tax but after depreciation) from the new machine would amount to ₹ 4,41,000. The company's marginal tax rate applicable is 35%. Its cost of capital is 13%.

[Given: PVIF (13%, 8 yrs) = 0.376 and PVIFA (13%, 8 yrs) = 4.80] Present figures nearest to rupee.

Required:

- (i) **Analyse** the annual cash savings and present value of cash inflows.
- (ii) **Advise** on the viability of the proposal. [7]

Reference  Viability of the Proposal	What's New
---	-------------------

Answer

- (i) Annual Cash Savings = ₹ 744275
Present Value of Cash inflows = ₹ 3625989
NPV of the Proposal = ₹ (58811)



(ii) **Advice:**

Since Net present Value (NPV) of Project is Negative (-₹ 58811), it is not viable. So the replacement of the existing Machine with a new replacement should not be considered.

1.4

Capital Rationing for Divisible and Non – divisible Projects (with Application of Integer Programming)

Q1**June'23 MTP Set 1**

PQR Ltd. has a capital budget of ₹ 20,000,000 for the year. From the following information relating to six independent proposals, **recommend** the projects to be selected if (i) the projects are divisible and (ii) projects are indivisible in order to maximise the NPV.

Proposal	Investment (₹)	NPV (₹)
I	8,500,000	5,000,000
II	3,500,000	2,600,000
III	6,000,000	2,000,000
IV	4,000,000	2,500,000
V	6,000,000	5,000,000
VI	8,000,000	(2,500,000)

[7]

Reference

Capital Rationing

What's New
Divisible &Indivisible

Answer

- (i) If the projects are divisible

Projects are ranked according to PI and arranged in descending order.

Proposal	Investment (₹)	NPV (₹)	PV of Inflows (₹)	PI	Rank
I	85,00,000	50,00,000	1,35,00,000	1.59	4
II	35,00,000	26,00,000	61,00,000	1.74	2
III	60,00,000	20,00,000	80,00,000	1.33	5
IV	40,00,000	25,00,000	65,00,000	1.63	3
V	60,00,000	50,00,000	1,10,00,000	1.83	1



Projects are selected based on their ranking up to the availability of fund.

Proposal	Investment (₹)	Cumulative Investment (₹)
V	60,00,000	60,00,000
II	35,00,000	95,00,000
IV	40,00,000	1,35,00,000
I	85,00,000	2,20,00,000
III	60,00,000	2,80,00,000

Only ₹ 65,00,000 can be invested in project I.

NPV of the project = $65/85 \times 50,00,000 = ₹ 38,23,529$

So, the selected projects are V, II, IV and part of I.

- (ii) If the projects are indivisible (by trial-and-error method)

Feasible Sets	Investments (₹)	NPV (₹)
V, II, I	1,80,00,000	1,26,00,000
V, IV, I	1,85,00,000	1,25,00,000
V, II, IV, III	1,95,00,000	1,21,00,000
I, II, IV	1,60,00,000	1,01,00,000
V, IV, III	1,60,00,000	95,00,000

The combination of projects V, II and I provides the maximum NPV and hence may be undertaken.

1.5

Social Cost Benefit Analysis

Q1

Dec'23 MTP Set 1

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

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

The company has an offer for sale of Machine – R at ₹1,00,000, but the cost of dismantling and removal will amount to ₹30,000. As the company has not yet commenced operations, it wants to sell Machine – R and purchase Machine – S.

Nine Gems Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available. The cost of capital may be assumed at 15%. P.V. factors for five years are as follows:

Year	P.V. Factors
1	0.8696
2	0.7561
3	0.6575
4	0.5717
5	0.4972

- (i) Advise whether the company should opt for the replacement.
- (ii) Suggest if there be any change in your view, if Machine-R has not been installed but the company is in the process of selecting one or the other machine?

Support your view with necessary workings.

[7]



Reference
Replacement Decision
What's New
Answer
(i) Replacement of Machine – R:
Incremental cash out flow

Particulars	₹	₹
Cash outflow on Machine – S		2,50,000
Less: Sale value of Machine – R	1,00,000	
Less: Cost of dismantling and removal	30,000	70,000
Net outflow		1,80,000
Incremental cash flow from Machine – S		
Annual cash flow from Machine – S		
$[(1,50,000 \times ₹6) - (1,50,000 \times ₹3) - 1,80,000]$		2,70,000
Annual cash flow from Machine – R		
$[(1,50,000 \times ₹6) - (1,50,000 \times ₹3) - 2,00,000]$		2,50,000
Net incremental cash in flow		20,000

Present value of incremental cash inflows

$$= ₹ 20,000 \times (0.8696 + 0.7561 + 0.6575 + 0.5717 + 0.4972)$$

$$= ₹ 20,000 \times 3.3523$$

$$= ₹ 67,046$$

$$\text{NPV of Machine – S} = ₹ 67,046 - ₹ 1,80,000 = (-) ₹ 1,12,954.$$

₹ 2,00,000 spent on Machine – R is a sunk cost and hence it is not relevant for deciding the replacement.

Decision: Since Net present value of Machine –S is in the negative, replacement is not advised. If the company is in the process of selecting one of the two machines, the decision is to be made on the basis of independent evaluation of two machines by comparing their Net present values.

(ii) **Independent evaluation of Machine- R and Machine –S**

Particulars	Machine- R	Machine- S
Units produced	1,50,000	1,50,000
Selling price per unit (₹)	6	6
Sale value	9,00,000	9,00,000
Less: Operating Cost (exclusive of depreciation)	2,00,000	1,80,000
Contribution	7,00,000	7,20,000
Less: Fixed cost	4,50,000	4,50,000
Annual Cash flow	2,50,000	2,70,000
Present value of cash flows for 5 years	8,38,075	9,05,121
Cash outflow	2,00,000	2,50,000
Net Present Value	6,38,075	6,55,121

As the NPV of Cash inflow of Machine-S is higher than that of Machine-R, the choice should fall on Machine-S.

Note: As the company is a zero tax company for seven years (Machine life in both cases is only for five years), depreciation and the tax effect on the same are not relevant for consideration.

(Q)2

Jun'23

SRISTI Ltd., a manufacturing company, has a machine Z which is ten years old and is badly in need of an overhaul. The overhaul will have the following costs:

	₹
(i) Motor and Generator	17,50,000
(ii) Electronic equipments	5,00,000
(iii) Painting and other parts	2,50,000

These expenses can be capitalised and depreciated for tax purposes over the next five years with no salvage value on a straight line basis. Post overhaul, the operating costs would be as follows in the first year:

	₹
Fuel	17,50,000
Labour and Benefits	15,00,000
Maintenance	7,50,000
Others	5,00,000

These costs increase at 5% p.a. with inflation.



Machine Z has zero book value with old parts (i) to (iii) but can be sold as it is for ₹2,00,000 and the difference between these values will be charged to tax at 25% which is also the corporate tax rate, expected to be valid for the next five years.

Installation of a brand new set of parts instead of overhaul of items (i) to (iii) above would mean a cost of ₹40,00,000 with depreciation similar to overhauling. This replacement will result in the following costs from the first year with annual increase of 5%:

	₹
Fuel	20,00,000
Labour and Benefits	12,00,000
Maintenance	5,00,000
Others	3,00,000

Overhauling or replacement will be done within a month and will not impact the annual production.

There is no scrap value expected after the end of five years, by when the production will stop whether parts are overhauled or replaced.

The cost of capital for evaluating such decisions at 10% p.a., cash flows and tax savings occur at year ends are considered.

Required:

Analyse the above information to determine the following:

- (i) Total Net Present Value (NPV) of the proposal for overhauling of the machine Z,
- (ii) Total Net Present Value (NPV) of the proposal for replacing new parts of Machine Z, and
- (iii) Advise the company as to which proposal (overhauling or replacing parts) will be preferable to the company with reasons.

(Present figure to the nearest Rupee)

[Given: PV factors @ 10%]

Year	1	2	3	4	5
PV (10%)	0.909	0.826	0.751	0.683	0.621

[$5 + 4 + 1 = 10$]

Reference

NPV

What's New

Overhaul or Replace

Answer

- (i) Total Net Present Value (NPV) of the proposal for overhauling of the machine

$$Z = ₹-16031705$$

- (ii) Total Net Present Value (NPV) of the proposal for replacing new parts of Machine

$$Z = X - 15554944$$

- (iii) Advice: Since net present value of cash out flow of replacing parts for machine is lower than the net present value of cash outflow of overhauling machine z, it is better to replace the parts of Machine Z resulting in decline of outflow by ₹ 476761.

Q3

MTP Jun'24 Set 1

X Ltd. an existing profit-making company, is planning to introduce a new product with a projected life of 8 years. Initial equipment cost will be ₹120 lakhs and additional equipment costing ₹10 lakhs will be needed at the beginning of third year. At the end of the 8 years, the original equipment will have resale value equivalent to the cost of removal, but the additional equipment would be sold for ₹1 lakhs. Working Capital of ₹15 lakhs will be needed. The 100% capacity of the plant is of 4,00,000 units per annum, but the production and sales- volume expected are as under:

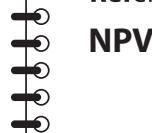
Year	Capacity in percentage
1	20
2	30
3-5	75
6-8	50

A sale price of ₹100 per unit with a profit-volume ratio of 60% is likely to be obtained. Fixed Operating Cash Cost are likely to be ₹16 lakhs per annum. In addition to this the advertisement expenditure will have to be incurred as under:

Year	1	2	3-5	6-8
Expenditure in ₹ lakhs each year	30	15	10	4

The company is subject to 40% tax, straight-line method of depreciation, (permissible for tax purposes also) and taking 15% as appropriate after-tax Cost of Capital, **should** the project be accepted? [7]

Reference



NPV

What's New



Answer
Computation of initial cash outlay (₹ in lakhs)

Equipment Cost (at year 0)	120
Working Capital (at year 0)	15
	135

Calculation of cash inflows

Year	1	2	3-5	6-8
Sales (in units)	80,000	1,20,000	3,00,000	2,00,000
	₹	₹	₹	₹
Contribution @ ₹ 60 p.u.	48,00,000	72,00,000	1,80,00,000	1,20,00,000
Fixed cost	16,00,000	16,00,000	16,00,000	16,00,000
Advertisement	30,00,000	15,00,000	10,00,000	4,00,000
Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Profit/(loss)	(13,00,000)	26,00,000	1,37,50,000	83,50,000
Tax @ 40%		Nil	55,00,000	33,40,000
Profit/(loss) after tax	(13,00,000)	15,60,000	82,50,000	50,10,000
Add: Depreciation	15,00,000	15,00,000	16,50,000	16,50,000
Cash Inflow	2,00,000	30,60,000	99,00,000	66,60,000

Computation of PV of Cash Inflow (₹)

Year	CIF (₹)	PV Factor @ 15%	(₹)
1	2,00,000	0.8696	1,73,920
2	30,60,000	0.7561	23,13,666
3	99,00,000	0.6575	65,09,250
4	99,00,000	0.5718	56,60,820
5	99,00,000	0.4972	49,22,280
6	66,60,000	0.4323	28,79,118
7	66,60,000	0.3759	25,03,494
8	66,60,000	0.3269	21,77,154
WC	15,00,000	0.3269	4,90,350
SV	(1,00,000)	0.3269	(32,690)
			2,75,97,362
PV of COFO			1,35,00,000
Additional Investment = ₹ 10,00,000 × 0.7561			7,56,100
NPV			1,33,41,262

Recommendation: Accept the project in view of positive NPV.



Q4

MTP Dec'24 Set 1

Techtronics Ltd., an existing company, is considering a new project for manufacture of pocket video games involving a capital expenditure of ₹ 600 lakhs and working capital of ₹150 lakhs. The capacity of the plant is for an annual production of 12 lakh units and capacity utilisation during the 6-year working life of the projects expected to be as indicated below:

Year	Capacity Utilisation
1	33.33%
2	66.66%
3	90%
4-6	100%

The average price per unit of the product is expected to be ₹200 netting a contribution of 40%. Annual fixed costs, excluding depreciation, are estimated to be ₹480 lakhs per annum from the third year onwards; for the first and second year it would be ₹240 lakhs and ₹360 lakhs respectively. The average rate of depreciation for tax purposes is 33.33% on the capital assets. No other tax reliefs are anticipated. The rate of income-tax may be taken at 50%.

At the end of the third year, an additional investment of ₹100 lakhs would be required for working capital. The company, without taking into account the effects of financial leverage, has targeted for a rate of return of 15%. You are **required** to analyse whether the proposal is viable, giving your working notes and analysis.

Terminal value for the fixed assets may be taken at 10% and for the current assets at 100%. Calculation may be rounded off to lakhs of rupees. For the purpose of your calculations, the recent amendments to tax laws with regard to balancing charge may be ignored. [7]

Reference	What's New
 NPV	

Answer

Evaluation of Expansion decision under NPV method:

Step 1:

	₹ in lakhs
Calculation of PV of cash outflow	
Cost of fixed asset	600
Cost of Working capital	150
Additional WC required $100 \times PVF(3 \text{ yrs } 15\%) = (100 \times 0.66)$	66
PV of cash outflow	816



Step 2:

Calculation of PV of operating cash inflow for six years (working notes) = ₹826 lakhs

Step 3:
Calculation of PV of terminal cash inflow

₹ in Lakhs
Salvage value of terminal cash inflow {600×10/100}
60
Less: Tax on profit at 50% [60-53] ×50/100
4
Add: WC recovered [100%] [100+150]
250
306

Its present value = $306 \times PVF(6 \text{ years } 15\%) = 306 \times 0.432 = 132$ lakhs

Step 4:
Calculation of NPV

₹ in Lakhs
PV of total cash inflows [Recurring + Terminal i.e., 826+132]
958
Less: Outflow
816
NPV
142

Comment: As NPV is positive, it is advised to implement the new project. Working Notes:

Calculation of Operating Cash Inflows

Year	Production	Contribution	Fixed Exp.	Depreciation	PBT	PAT	CIAT	PV at 15%	PV
1	400	320	240	200	(120)	(60)	140	0.870	121.80
2	800	640	360	133	147	74	207	0.756	156.49
3	1080	864	480	89	295	148	237	0.658	155.95
4	1200	960	480	59	421	210	269	0.572	153.87
5	1200	960	480	40	440	220	260	0.497	129.22
6	1200	960	480	26	454	227	253	0.432	109.29

PV of operating cash inflows for 6 years = ₹826.62



Chapter 2

Evaluation of Risky Proposals for Investment Decisions

2.1

Risk Analysis in Capital Budgeting - Certainty Equivalent Approach, Risk Adjusted Discount Rate, Expected NPV, Standard Deviation of NPV and Use of Normal Distribution, Decision Tree Analysis, Options in Capital Budgeting

2.2

Sensitivity Analysis

2.3

Scenario Analysis

2.4

Monte Carlo Simulation



2.1

Risk Analysis in Capital Budgeting - Certainty Equivalent Approach, Risk Adjusted Discount Rate, Expected NPV, Standard Deviation of NPV and Use of Normal Distribution, Decision Tree Analysis, Options in Capital Budgeting

(Q)1
June'23 MTP Set 1

Delta Corporation is considering an investment in one of following two mutually exclusive proposals:

Project A: requiring initial outlay of ₹ 1,80,000.

Project B: requiring initial outlay of ₹ 1,60,000.

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

Year	Project A		Project B	
	Cash in flow	Certainty Equivalents	Cash in flow	Certainty Equivalents
1	92,000	0.8	92,000	0.9
2	1,02,000	0.7	92,000	0.8
3	1,12,000	0.5	1,02,000	0.6

Analyse the above information to determine the following:

- (i) **Which** Project should be acceptable to the Company?
 - (ii) **Which** Project is riskier and why? Explain.
 - (iii) If the company uses the risk adjusted discount rate method, **which** project would be discounted with higher rate?
- [10]

Reference

 **Risk Adjusted Discount Rate**




What's New



Answer**Determination of NPV****Project-A**

Year	Cash inflow (₹)	Certainty equivalent	Adjusted cash in flow (₹)	P.V. Factor @ x5%	Total P.V. (₹)
1	92,000	0.8	73,600	0.9524	70,097
2	1,02,000	0.7	71,400	0.9070	64,760
3	1,12,000	0.5	56,000	0.8638	48,373
					1,83,230

$$NPV = ₹(1,83,230 - 1,80,000) = ₹3,230$$

Project B

Year	Cash inflow (₹)	Certainty equivalent	Adjusted cash in flow (₹)	P.V. Factor @ 5%	Total P.V. (₹)
1	92,000	0.9	82,800	0.9524	78,859
2	92,000	0.8	73,600	0.9070	66,755
3	1,02,000	0.6	61,200	0.8638	52,865
					1,98,479

$$NPV = ₹(1,98,479 - 1,60,000) = ₹38,479$$

- (i) Project B should be preferred as its NPV is greater.
- (ii) Project A is riskier because its certainty equivalent is lower.
- (iii) Project A being riskier would be discounted with higher rate.

Q2**June'23 MTP Set 2, Dec'23 MTP Set 1**

A firm has an investment proposal, requiring an outlay of ₹ 40,000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 25,000 and 0.6 probability that cash inflow after tax will be ₹ 30,000. The probabilities assigned to cash inflows after tax for the year 2 are as follows:

The Cash inflow year 1	₹ 25,000		₹ 30,000	
The Cash inflow year 2		Probability		Probability
	₹ 12,000	0.2	₹ 20,000	0.4
	₹ 16,000	0.3	₹ 25,000	0.5
	₹ 25,000	0.5	₹ 30,000	0.1

The Firm uses a 12% discount rate for this type of investment.



- (i) **Tabulate** the NPVs for each path of the decision tree (diagram not essential)
- (ii) **What** net present value will the project yield if the worst outcome is realized? **What** is the probability of occurrence of this NPV.
- (iii) **What** will be the best outcome and the probability of that occurrence?
(12% Discount factor for 1 year is 0.8929 and for 2 year is 0.7972)

Reference

Decision Tree, NPV & Pb of Worst and Best Outcome

What's New
Answer

- (i) **The net present value of each path at 12% discount rate is given below:**

Path	Cash inflow year 1*discount factor year 1	cash inflow year 2*discount factor year 2	Total inflow	cash outflow	NPV
1	₹ 25000*.8929=22323	12000*.7972=9566	31889	40000	-8111
2	₹ 25000*.8929=22323	16000*.7972=12755	35078	40000	-4922
3	₹ 25000*.8929=22323	25000*.7972=19930	42253	40000	2253
4	₹30000*.8929=26787	20000*.7972=15944	42731	40000	2731
5	₹30000*.8929=26787	25000*.7972=19930	46717	40000	6717
6	₹30000*.8929=26787	30000*.7972=23916	50703	40000	10703

Statement showing Expected Net Present Value

Path	NPV @12%	Joint probability	Expected NPV
1	-8111	0.08	-648.88
2	-4922	0.12	-590.64
3	2253	0.2	450.60
4	2731	0.24	655.44
5	6717	0.3	2015.1
6	10703	0.06	642.18
			2523.8

- (ii) If the worst outcome is realized, the Net Present Value which the project will yield is ₹ 8111(negative). The probability of occurrence of this NPV is 8%
- (iii) The best outcome will be path 6 when NPV is higher i.e., ₹10703(positive). The probability of occurrence of this NPV is 6%

Q3

Jun'23

SOYAN Ltd. has an investment proposal, requiring an outlay of ₹ 1,60,000. The investment proposal is expected to have two years economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹ 1,00,000 and 0.6 probability that cash inflow after tax will be ₹ 1,20,000. The probabilities assigned to cash inflow after tax for the year 2 are as follows:

Cash inflow year-1	₹ 1,00,000		₹ 1,20,000	
Cash inflow year-2 with probabilities	₹ 48,000	0.2	₹ 80,000	0.4
	₹ 64,000	0.3	₹ 1,00,000	0.5
	₹ 88,000	0.5	₹ 1,20,000	0.1

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

Required:

- (i) **Represent** the SOYAN Ltd.'s proposed investment project as a Decision Tree.
- (ii) **Calculate** the expected Net Present Value (NPV) giving the break up of each path of the decision tree.
- (iii) **Calculate** the NPV that the project will yield, if the worst outcome is realised and **analyse** probability.
- (iv) **Analyse** the probability of having a negative NPV.
- (v) **Suggest** as to whether the project should be accepted or not.

(Present figures to the nearest rupee)

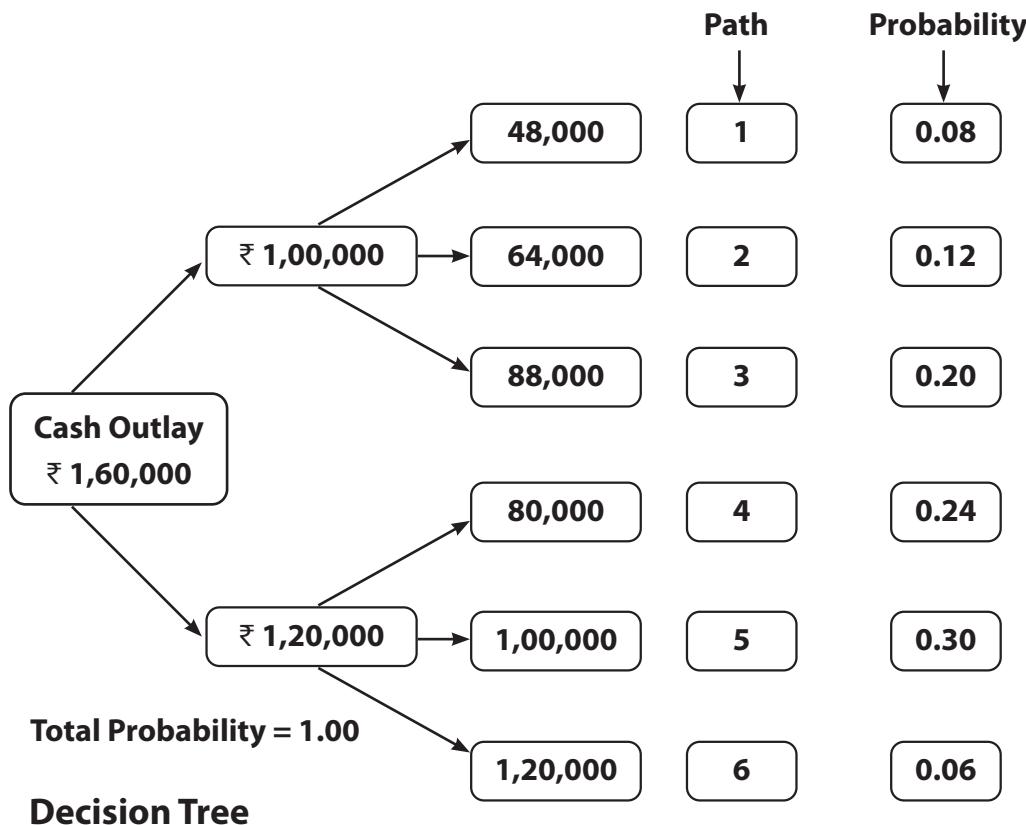
Given: P.V. Factors at 10%.

Year	1	2	3
PV Factor	0.909	0.826	0.751

Reference

- **Decision Tree - Expected NPV, Worst Outcome NPV, Pb of negative NPV**

What's New


Answer

(Q)4
MTP Dec'24 Set 1

A firm has an investment proposal, requiring an outlay of ₹40,000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year 1, there is a 0.4 probability that cash inflow after tax will be ₹25,000 and 0.6 probability that cash inflow after tax will be ₹30,000. The probabilities assigned to cash inflows after tax for the year 2 are as follows:

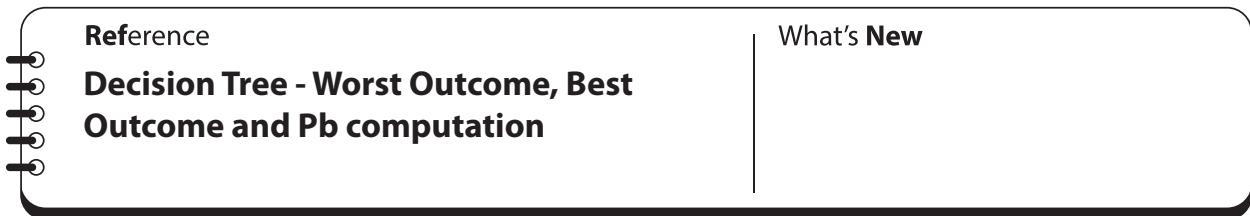
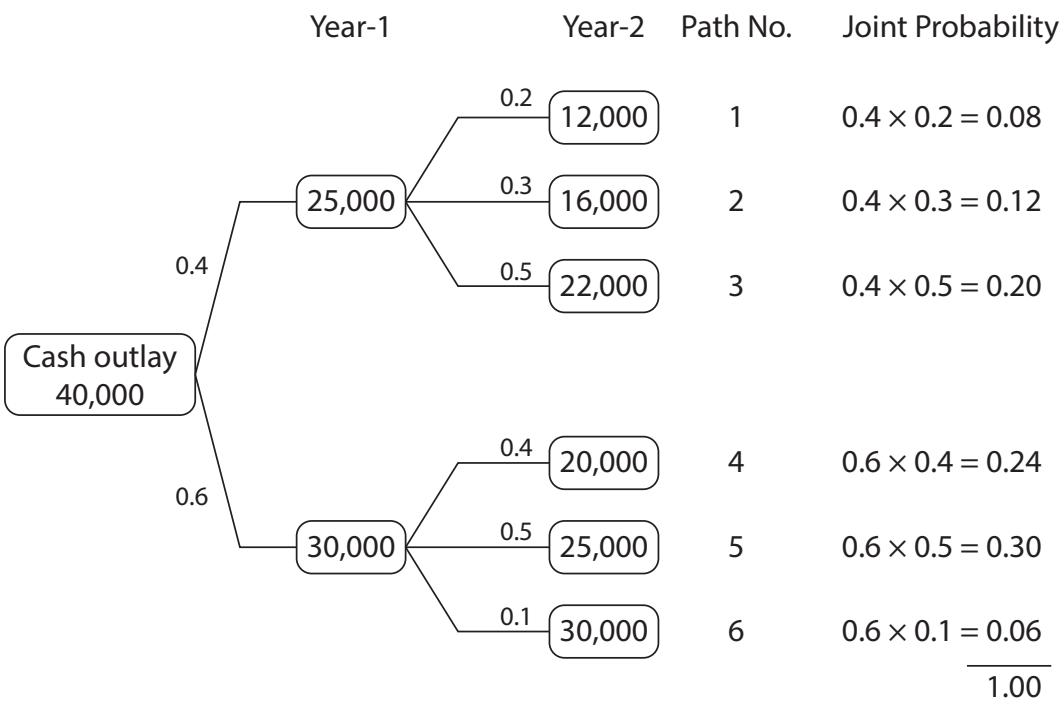
The Cash inflow year 1	₹25,000		₹30,000	
The Cash inflow year 2		Probability		Probability
	₹12,000	0.2	₹20,000	0.4
	₹16,000	0.3	₹25,000	0.5
	₹22,000	0.5	₹30,000	0.1

The firm uses a 12% discount rate for this type of investment.

- (i) **Construct** a decision tree for the proposed investment project.
- (ii) **Compute** the net present value that the project will yield if worst outcome is realized. Compute the probability of occurrence of this NPV.
- (iii) **Determine** the best occurrence and the probability of that occurrence?

(iv) **Analyse** whether project be accepted?

[7]


Answer


- (i) The decision tree given above shows that there are six possible outcomes each represented by a path. The net present value of each path at 12% discount rate is given below:

(Fig in ₹)

Path	(Cash inflow year 1 × discount factor year 1)	(Cash inflow year 2 × discount factor year 2)	Total Cash inflow	Cash outflow	Net present value
	(a)	(b)	(c) = (a) + (b)	(d)	(e) = (c) - (d)
	₹	₹	₹	₹	₹
1	$(₹25,000 \times 0.8929) = 22,323$	$(₹12,000 \times 0.7972) = 9,566$	31,889	40,000	-8,111
2	$(₹25,000 \times 0.8929) = 22,323$	$(₹16,000 \times 0.7972) = 12,755$	35,078	40,000	-4,922



3	$(₹25,000 \times 0.8929) =$ 22,323	$(₹22,000 \times 0.7972) =$ 17,538	39,861	40,000	-139
4	$(₹30,000 \times 0.8929) =$ 26,787	$(₹20,000 \times 0.7972) =$ 15,944	42,731	40,000	2,731
5	$(₹30,000 \times 0.8929) =$ 26,787	$(₹25,000 \times 0.7972) =$ 19,930	46,717	40,000	6,717
6	$(₹30,000 \times 0.8929) =$ 26,787	$(₹30,000 \times 0.7972) =$ 23,916	50,703	40,000	10,703

Statement showing the expected Net Present Value

Path	Net present value @ 12% (Refer above) (₹)	Joint probability (Refer above)	Expected Net present Value (₹)
			(a) × (b)
1	- 8,111	0.08	- 648.88
2	- 4,922	0.12	- 590.64
3	-139	0.20	-27.80
4	2,731	0.24	655.44
5	6,717	0.30	2,015.10
6	10,703	0.06	642.18
			2,045.40

- (ii) If the worst outcome is realized the Net present value which the project will yield is ₹8,111 (negative). The probability of occurrence of this Net present value is 8%.
- (iii) The best outcome will be path 6 when Net present value is higher i.e., ₹10,703 (positive). The probability of occurrence of this Net present value is 6%.
- (iv) Yes, the project will be accepted since the Expected Net Present Value is positive.

2.2

Sensitivity Analysis

No questions have been asked yet from this chapter !



2.3

Scenario Analysis

(Q)1

Postal Test Paper

S Ltd. is a company that specializes in building tracks for high-speed trains. The company is in the process of bidding for a new interstate train project. The chief bidding engineer has come up with a net present value estimate of ₹814.5 Crore. His inputs include the company's weighted average cost of capital of 8%, cash inflows of ₹2,000 crore which are expected at the end of 3rd year, annual expenditures for year 1, 2 and 3 of ₹300 crore per year. As the chief investment officer, you have made the following predictions:

For the best-case scenario, you predicted a WACC of 6.5%, cash inflows of ₹2,100 crore at the end of 2nd year and cash outflows of ₹400 crore at the end of 1st year and ₹500 crore at the end of second year. For the worst-case scenario, you predicted a WACC of 9%, cash inflows of ₹1,200 crore at the end of 4th year and cash outflows of ₹200 crore at the end of each year for 4 years. The initial investment is 0 in all scenarios.

Find the best-case scenario and worst-case scenario.

[6]

Reference	What's New
<ul style="list-style-type: none"> Best-Case Scenario and Worst-Case Scenario 	

Answer

The summary of different scenarios are as follows:

Particulars	Base-Case	Best Case	Worst Case
WACC	8%	6.5%	9%
Cash Inflow	₹2000 crore at the end of 3rd year	₹2100 crore at the end of 2nd year	₹1,200 crore at the end of 4th year
Cash Outflow	₹300 crore per year for first 3 years	₹400 crore at the end of 1st year and ₹500 crore at the end of 2nd year	₹200 crore at the end of each year for 4 years

NPV with the most likely figure (base-case) = ₹814.5 Crore (given)

$$\text{NPV under best-case scenario} = \frac{-400}{(1+6.5\%)^1} + \frac{2,100 - 500}{(1+6.5\%)^2} - 0 = ₹ 1,035 \text{ Crore}$$

$$\text{NPV under worst-case scenario} = -200 \times \text{PVIFA}(9\%, 4) + \frac{1,200}{(1+9\%)^4} - 0 = ₹ 202 \text{ Crore}$$

From this scenario analysis, we find that the net present value of the project is expected to be between ₹202 crore and ₹1,035 crore with the most likely figure to be ₹814.5 crore.

Thus, NPV is likely to vary within the range ₹202 crores to ₹1,035 crore.

(Q)2

Jun'24

SAZIC Ltd., is a company that specializes in building plant and machinery for the Chemical Industry. The company is in the process of bidding for a new Chemical Project (BICHEM Ltd.). The Chief bidding Engineer has come up with a Net Present Value (NPV) estimate of ₹ 8,365.90 Lakh. His inputs include the company's Weighted Average Cost of Capital (WACC) of 9%, Cash inflows of ₹ 21,000 Lakh which are expected at the end of 3rd year, annual expenditures for the year 1, 2 and 3 of ₹ 3,100 Lakh per year. The Chief Investment Analyst (CIA) of the company has made the following predictions :

For the Best-Case Scenario, the CIA predicted a WACC of 7.5%, Cash inflows of ₹ 22,000 Lakh at the end of 2nd year and Cash outflows of ₹ 4,200 Lakh at the end of 1st year and ₹ 5,200 Lakh at end of 2nd year.

For the Worst-Case Scenario, he predicted a WACC of 10% , Cash inflows of ₹ 12,600 Lakh at the end of 4th year and Cash outflows of ₹ 2,100 Lakh at the end of each year for 4 years.

The initial investment is 0 (NIL) in all Cases.

[**Given:** PVIF (7.5%, 1 to 2 yrs) = 0.930, 0.865, PVIF (9%, 3 yrs) = 0.772 and PVIFA (9%, 3 yrs) = 2.531, PVIF (10%, 4yrs) = 0.683 and PVIFA (10%, 4 yrs) = 3.170.]

Required:

- (i) **Analyse** the Best-Case Scenario and Worst-Case Scenario.
- (ii) **Suggest** and comment on the finding of (i).

[7]

 Reference Best Case Scenario and Worst Case Scenario	What's New
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Answer

- (i) NPV under Best Case Scenario = ₹ 10,626 Lakh NPV under Worst Case Scenario = ₹ 1,948.80 Lakh
- (ii) From the Scenario analysis, it is revealed that Net present value (NPV) of the said project is expect to be between ₹ 1,948.80 Lakh and ₹ 10,626 Lakh with the Base Case Scenario, (most likely) to be ₹ 8,365.90 Lakh. Hence, NPV is likely to vary within the range ₹ 1,948.80 Lakh to ₹ 10,626 Lakh

2.4**Monte Carlo Simulation****Q1****Dec'23**

PONS Ltd., an Indian Company is trying to decide which of the 3 mutually excluded projects to undertake. Each of the projects could lead to varying net profits which are classified as outcomes 1, 2 and 3. It has constructed the following pay-off table or matrix (a conditional profit table).

Net profit if outcomes turns out to be:

Outcomes	Probability	Project X	Project Y	Project Z
		Net Profit ₹	Net Profit ₹	Net Profit ₹
1 (worst)	0.2	40,000	60,000	80,000
2 (most likely)	0.5	65,000	55,000	80,000
3 (best)	0.3	90,000	1,10,000	1,00,000

Required:

- (i) **Evaluate** the expected value (EV) of the three projects. X, Y and Z.
- (ii) **Which** project should be undertaken?
- (iii) If the minimax regret rule is applicable, **identify** the profitable project. [7]

Reference

Expected Value of the three Projects - Minimax Regret

What's New**Answer**

- (i) Expected Value of the Project:
 $X = ₹ 67500$
 $Y = ₹ 72500$
 $Z = ₹ 86000$
- (ii) Since Expected Value (EV) of Profit of Project Z (₹ 86000) is higher than the other Project X with EV of Profit (₹ 67500) and Project Y with EV of Profit (₹ 72500) Project Z should be undertaken.
- (iii) Project Z should be identified if the Minimax regret rule is applicable.



NOTES

Chapter 3

Leasing Decisions

3.1

Lease Financing – Evaluation of Lease vs. Buy Options

3.2

Break-Even Lease Rental Determination and Implicit Rate

3.3

Cross Border Leasing, Sale and Lease Back



3.1

Lease Financing – Evaluation of Lease vs. Buy Options

No questions have been asked yet from this chapter !

3.2

Break-Even Lease Rental Determination and Implicit Rate

(Q1)

June'23 MTP Set 1, Postal Test Paper

XY Manufacturing Ltd. desires to acquire a diesel generating machine set costing ₹ 40 lakh which has an economic life of 10 years at the end of which the asset is not expected to have any residual value. The company is considering two alternatives: (A) taking the machine on lease (B) purchasing the asset outright by raising a loan. Lease payments are equal annual amounts and have to be made in advance and the lessor requires the asset to be completely amortized over its useful period. The loan carries an interest 16% p.a. The loan has to be paid in 10 equal annual instalments becoming due at the beginning of the first year. Average rate of income tax is 50%. It is expected that the operating costs would remain the same under either method. The company allows straight line method of depreciation and the same is accepted for tax purposes.

Assume tax benefits at the end of the respective years and for end of year zero, tax benefit may be considered at the end of the first year. Use 8% discount rate for p.v. factors.

Prepare a statement showing discounted values of annual cash flows to the nearest rupee under alternative (B), only for end of years 0 to 2 and year 10. What should be the maximum annual lease rental for which the lease option may be preferred if you are given that the present value under the loan option is ₹ 26,57,029?

The present value of an annuity of one Rupee:

Year	8%
1 to 9	6.247
1 to 10	6.71

Present value of Rupee one at 8%

Year	0	1	2	3	4	5	6	7	8	9	10
PV	1.00	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500	0.463

[9]



Reference

**Discounted Values of Annual Cash Flow,
Maximum lease rental**

What's New
Answer
Schedule of Debt Payment

Year end	Loan Instalment	Loan at the beginning of the year	Interest on loan (Col. 3 x 0.16)	Principal Repayment (Col.2 - Col.4)	Principal Outstanding at the end of the year (Col.3 - Col.5)
	₹	₹	₹	₹	₹
1	2	3	4	5	6
0	7,13,394	40,00,000	0	7,13,394	32,86,606
1	7,13,394	32,86,606	5,25,857	1,87,537	30,99,069
2	7,13,394	30,99,069	4,95,851	2,17,543	28,81,526
10	7,13,394	6,14,994 (7,13,394/1.16)	98,400	6,14,994	0

Annual instalment of Loan = ₹40,00,000 / 5.607 (PV factor making payment in 0 year = Factor for cash flow at time 0 + Annuity factor for 9 years at 16% = 1 + 4.607) = ₹ 7,13,394

PV of Cash Outflows under Buying Alternative

Depreciation = 40,00,000 / 10 = 4,00,000

Year End	Loan Instalment	Tax Advantage		Net Cash Outflows	PV factor at after tax cost	Total PV
		On Interest (0.5)	On Depreciation (0.5)			
	₹	₹	₹	₹	₹	₹
1	2	3	4	5	6	7
0	7,13,394	0	-	7,13,394	1.000	7,13,394
1	7,13,394	2,62,928	2,00,000	2,50,465	0.926	2,31,931
2	7,13,394	2,47,926	2,00,000	2,65,468	0.857	2,27,506
10	0	0	2,00,000	(2,00,000)	0.463	(92,600)

Let x be the equal annual lease rental (L.R.).

P.V. of L.R. = PV for year 0 + PV for yrs 1-9 - PV for year 10

$$= (x) \times 1 + (x-0.5x) \times 6.247 - (0.5x) \times 0.463$$



$$= 1x + 3.1235x - 0.2315x$$

$$= 3.892x$$

Lease will be preferred if $3.892x < 26,57,029$, i.e., $x < ₹ 6,82,690$

So, the maximum lease rental should be ₹ 6,82,689.

Q2

Dec'23 MTP Set 1

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 in 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 12%.

Calculate the lease rents to be quoted for the lease for three years. [7]

 <p>Reference</p> <p>Lease Rental Structures - Lessor's View</p>	<p>What's New</p> <p>Step rental</p>
--	--

Answer

Capital sum to be placed under Lease

Particulars	₹ in lakhs
Cash Down price of machine	300.00
Less: PV of depreciation tax shield $[100 \times 0.35 \times \text{PVIFA}(12\%, 3 \text{ years})]$	84.06
$= 35 \times 2.4018]$	215.94

If the normal annual lease rent per annum is x, then cash flow will be:

Year	Post-tax cash flow	P.V. of post-tax cash flow
1	$3x \times (1 - .35) = 1.95x$	$1.95 \times (1/1.12) = 1.7411x$
2	$2x \times (1 - .35) = 1.3x$	$1.30 \times [(1/(1.12)^2)] = 1.0364x$
3	$x \times (1 - .35) = 0.65x$	$0.65 \times [1/(1.12)^3] = 0.4626x$ $= 3.2401x$

Therefore $3.2401x = 215.94$ or, $x = ₹66.6409$ lakhs



Year-wise rentals are as follows:

		(₹ in lakhs)
Year 1	3×66.6409 lakhs	199.9227
Year 2	2×66.6409 lakhs	133.2818
Year 3	1×66.6409 lakhs	66.6409

(Q)3

Postal Test Paper

ABC finance, a leasing company, has been approached by a prospective customer intending to acquire a machine whose Cash Down price is ₹6 crores. The customer, in order to leverage his tax position, has requested a quote for a four-year lease with rentals payable at the end of each year but in a diminishing manner such that they are in the ratio of 4: 3: 2: 1. Depreciation can be assumed to be on straight line basis and ABC Finance's marginal tax rate is 30%. The target rate of return for ABC Finance on the transaction is 10% p.a. The asset has no salvage value. [6]

Reference



Break-Even Lease Rental: Lessor Viewpoint

What's New

Step Rental

Answer

Applicable discount rate = $10(1-0.3) = 7.0\%$ p.a.

Cost of the asset = ₹6 crores.

Depreciation under SLM = ₹6 crores \div 4 years = ₹1.5 crores.

PV of depreciation tax shield

$$= ₹1.5 \text{ crores} \times 0.30 \times \text{PVIFA}(7\%, 4 \text{ years})$$

$$= ₹1.5 \text{ crores} \times 0.30 \times 3.387$$

$$= ₹1.52415 \text{ crores}$$

Let the amount to be quoted by ABC Finance (i.e., break-even lease rental) is ₹X for fourth year.

So, Present value of after lease rental revenue will be:

Year	Post-tax Rental	PVIF @7%	PV of post-tax rental
1	$4X \times (1-0.3)$	0.935	2.618X
2	$3X \times (1-0.3)$	0.873	1.8333X
3	$2X \times (1-0.3)$	0.816	1.1424X



4	X × (1-0.3)	0.763	0.5341X
Total		3.387	6.1278X

Conditionally, $6.1278X = 6,00,00,000 - 1,52,41,500$

or, $X = 73,04,171$

So, the lease rentals to be quoted are ₹2,92,16,684, ₹2,19,12,513, ₹1,46,08,342 and ₹73,04,171

Q4

Postal Test Paper

Majestic Transport needs a machine for which it is considering the following two options:

- (i) Buy the asset for ₹6,00,000 by borrowing the amount @12% interest and repaying the same together with interest in 4 equal annual instalments.
- (ii) Acquiring the asset on lease with a payment of annual lease rentals for 4 years.

The firm follows straight line method of depreciation and is under the income tax bracket of 30%. Life of the asset is 4 years.

If Majestic Transport is willing to opt for equal annual plan for lease rental, **what** will be the lease rental payable? [10]

Reference	What's New
    Lease Rental Payable	Equal Annual Plan

Answer

Applicable discount rate = $12(1-0.3) = 8.4\% \text{ p.a.}$

Buy Option

Annual instalment = $6,00,000 \div \text{PVIFA}(12\%, 4) = 6,00,000 \div 3.037 = ₹1,97,564$

Calculation of interest tax shield

(Figures in ₹)

Opening outstanding	Interest @12%	Instalment	Principal	Closing Outstanding	Tax savings	PVIF @ 8.4%	PV of tax savings
6,00,000	72,000	1,97,564	1,25,564	4,74,436	21,600	0.9225	19,926
4,74,436	56,932	1,97,564	1,40,632	3,33,804	17,077	0.8510	14,533
3,33,804	40,056	1,97,564	1,57,508	1,76,296	12,017	0.7851	9,435
1,76,296	21,268	1,97,564	1,76,296	0	6,380	0.7242	4,620
Total							48,514



Calculation of depreciation tax shield

(Figures in ₹)

Depreciation	Tax savings	PVIF @ 8.4%	PV of tax savings
1,50,000	45,000	0.9225	41,513
1,50,000	45,000	0.8510	38,295
1,50,000	45,000	0.7851	35,330
1,50,000	45,000	0.7242	32,589
			1,47,727

Present value of cash flow under buy option

Particulars	₹
Present value of instalments ($1,97,564 \times 3.2828$)	6,48,563
Less. Interest tax shield	48,514
Less. Depreciation tax shield	1,47,727
Total	4,52,322

Determination of lease rental payable under Equated Annual Plan

Let the (break-even) lease rental is ₹ X.

Applicable discount rate = $12(1-0.3) = 8.4\% \text{ p.a.}$

So, Present value of after-tax lease rental

$$= ₹ X \times (1 - \text{tax rate}) \times \text{PVIFA} (8.4\%, 4 \text{ years})$$

$$= ₹ X \times (1 - 0.30) \times 3.2828$$

$$= ₹ 2.29796X$$

$$\text{Conditionally, } 2.29796X = 4,52,322$$

$$\text{So, } X = 1,96,836$$

So, the maximum amount the lessee will be willing to pay for accepting the lease under an equal periodic plan (i.e., BELR) is ₹ 1,96,836.

(Q)5
Jun'24

FONTS (LS) Ltd., is in the business of providing automobiles on wet lease to Corporate Clients. The company is considering a new model of battery run Tesla car for which a good number of enquiries is received. The cost of the vehicle is ₹ 25 Lakh. Its operating, maintenance and insurance costs are expected to be ₹ 5 Lakh in the first year. Thereafter it will be subject to inflation annually @ 6 per cent in the second

and third year and @ 4 per cent during fourth to sixth year. The useful life of the vehicle is six years. The net salvage value of the vehicle at the end of sixth year will be ₹ 10 Lakh. Depreciation

for Tax purposes will be 40 per cent under Written Down Value (WDV) method. Marginal tax rate applicable is 35 per cent. Its cost of capital is 8 per cent. Assume that the cost of negotiation and lease administration is NIL.

[Given: PVIF (8%, 1 to 6 yrs) = 0.926, 0.857, 0.794, 0.735, 0.681, 0.630 and PVIFA (8%, 6 yrs) = 4.623].

Required:

Analyse and assess the minimum annual lease rental that the company should quote. [7]

Reference**Minimum Annual Lease Rental****What's New****Answer**

Lease Rental (after Tax) = ₹ 6,59,764

Lease Rental (before tax) = ₹ 10,15,022

So, PONTs Ltd. should quote ₹ 10,15,022 for Annual Lease Rental.

Cross Border Leasing, Sale and Lease Back

(Q)1

Jun'23

MUNIT LTD. (ML) manufactures musical instruments. The Company exports around 60 per cent of its output. Customers are dispersed around the Country and there is no concentration in one particular area. MUNIT LTD.'s. turnover has been growing at around 20 per cent per annum over the past 5 years and it now needs to consider extending its premises or moving to a new location. The present premises are rented from the Local Government Authority. The rental agreement is due for renewal on January 1, 2023. The Company Spent ₹ 20 Lakh on renovations to the property three years ago to provide a more suitable manufacturing environment for its products. The renovations are structural and could not be removed if MUNIT LTD. decides to relocate.

The company is considering three alternatives:

1. **Renegotiate** the rental agreement and extend the existing premises with the approval of the Land lords;
2. **Buy** a much larger property which is available a few kilometres from the current premises and which is around 20 years old; or
3. **Build** a new factory and office premises in an 'enterprise zone' approximately 150 kilometres away.

The information available on these three alternatives is as follows:

Alternative 1 : Rent and extend the existing Premises:

The rental terms would be ₹ 30 Lakhs per annum in real terms as at January 1, 2023. Rent will be payable at the end of each of the years 2023-2027. Rates are included with the rental payments. The agreement allows for an increase the annual payments in Line with inflation of 5 per cent per annum. Extensions to the premises would cost 57 Lakh (nominal) payable at the end of 2023. The extension costs can be written off, for tax purposes, in the year in which they are incurred. The local Authority (the Land Lord) has indicated it would be willing to purchase the extension from MUNIT Ltd. (ML) at the original nominal Cost at the end of 2027.

Alternative 2 : Buy Larger Property:

The purchase costs are ₹ 150 Lakh payable on January 1, 2023. Rates will be fixed at ₹ 15 Lakh per annum payable at the end of each year from 2023 to 2032 inclusive. Renovations and Removal costs payable at the end of the first year (2023) are estimated at ₹ 45 Lakh nominal.

The Company thinks these premises will be large enough until the end of 2032. After that, it may have to sell or move again, as there is no possibility of extending these premises. Depreciation for tax purposes are available on the full purchase cost of new premises at 4 percent straight line. The realizable value of the premises at the end of 10 years is estimated as ₹ 300 Lakh nominal.

Note : Assume the application of indexation allowance at the time of sale will **result** in there being no balancing charge or balancing allowance.

Alternative 3 : Build new Factory and Office Premises:

The land will Cost ₹ 60 Lakh which will be paid at January 1, 2023. Building Costs are estimated at ₹ 75 Lakh to be paid at the end of 2023. While building is in Progress, the Company will remain in its existing premises at an agreed annual rent of ₹ 30 Lakh payable at January 1, 2023. No Rates will be payable on the new premises for the years 023 to 2025 inclusive. From 2026 onwards they are expected to be ₹ 9 Lakh per annum payable at the end of each year. The company estimates that 50% of the work force will relocate. Removal and relocation costs at the end of 2023 will be ₹ 15 Lakh. Recruitment and Training Costs of the new staff are estimated as ₹ 21 Lakh, also payable at the end of 2023. All costs in this alternative are in nominal terms. The cost of the buildings being in an enterprise zone, will attract 100 per cent first year depreciation.

For the purposes of evaluation, a 15 year life of the Land and buildings from the Commencement of the evaluation under this alternatives.

Additional Information :

1. The starting date for the evaluation is January 1, 2023
2. The Company pays tax at 33 per cent. This rate is not expected to change.
3. Tax relief is available on 100 per cent of all expanses and Costs except Land in alternative-3.,and building in alternative—2, which attract depreciation as indicated,
4. The Company is quoted on the National Stock Exchange (NSE) and which has a Debt : Equity Ratio of 1 : 3. The Cost of Debt before Tax is 10% and the cost of Equity of 15-10%.

Note: (Inflation Index figures are to rounded off to 3 decimal places. Show calculation in ₹ Lakh upto 2 decimal places and use PV factors upto 3 decimal places).

Required:

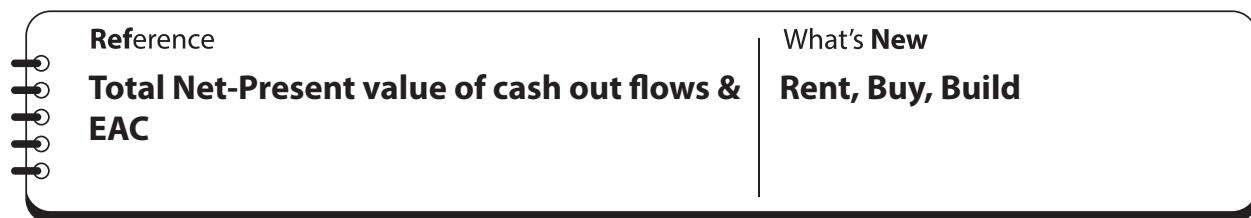
- (i) **Evaluate** the Total Net-Present value of Cash Out Flows of Alternative-1 (Rent and extend the existing Premises)
- (ii) **Assess** the value of Equivalent Annual Cost of Alternative-2 (Buy larger property locally)
- (iii) **Present** the Total Net present value (outflows) of Alternative-3 (Build new factory and office Premises)
- (iv) **Which** alternative (Project) would you recommend for acceptance of the Company (ML) and why?

Given:



PV Factor Table								Annuity Factor Table		
Year end Rate	1	2	3	4	5	10	15	5	10	15
12%	0.893	0.797	0.712	0.636	0.567	0.322	0.183	3.605	5.650	6.811
13%	0.885	0.783	0.693	0.613	0.543	0.295	0.160	3.517	5.426	6.462
14%	0.877	0.769	0.675	0.592	0.519	0.270	0.140	3.433	5.216	6.142

[4 + 4 + 6 + 2 = 16]



Answer

Equivalent Annual Costs (EAC):

- (i) Alternative-1 = ₹ 26.76 lakh
- (ii) Alternative-2 = ₹ 24.32 lakh
- (iii) Alternative-3 = ₹ 26.58 lakh
- (iv) Alternative-2: (Buy larger property, locally) may be recommended for acceptance to the company, since this alternative-2 looks most attractive which show the lowest equivalent annual cost (₹ 24.32 lakh) as stated supra.

Q2

Dec'23

ROTN Ltd. has decided to go in for a new model of Mercedes Car. The cost of the vehicle is 40 lakhs. The company has two alternatives: (i) taking the car on finance lease or (ii) borrowing and purchasing the car.

BMN Limited is willing to provide the car on finance lease to ROTN Ltd. for five years at an annual rental of ₹ 8.75 lakhs, payable at the end of the year.

The vehicle is expected to have useful life of 5 years, and it will fetch a net salvage value of 10 lakhs at the end of year five. The depreciation rate for tax purpose is 40% on written down value basis. The applicable tax rate for the company is 35%. The applicable before tax borrowing rate for the company is 13.8462%.

The present value interest factor at different rates of discount are as under:

Rate of Discount	Y-1	Y-2	Y-3	Y-4	Y-5
0.138462	0.8784	0.7715	0.6777	0.5953	0.5229
0.09	0.9174	0.8417	0.7722	0.7084	0.6499



Required:

- (i) **Assess** the Net present value of cash out flows if car is acquired on Financial ledger.
- (ii) **Justify** the Net advantage of leasing for ROTN Ltd. (Present figures nearly to rupee). [7]

 Reference
NPV

What's New

Net Advantage of leasing**Answer**

- (i) Net Present Value of Cash Outflows = ₹ 3790482

(ii) **Justification:**

Since the Net present Value (NPV) of Leasing is lower than the cost of purchase and Net Benefit of Leasing amounts to ₹ 209518, ROTN Ltd. should opt for Leasing.

Q3**MTP Jun'24 Set 1**

Beta Ltd is considering the acquisition of a personal computer costing ₹50,000. The effective life of the computer is expected to be five years. The company plans to acquire the same either by borrowing ₹50,000 from its bankers at 15% interest p.a. or on lease. The company wishes to know the lease rentals to be paid annually, which match the loan option. The following further information is provided to you:

- The principal amount of loan will be paid in five annual equal instalments.
- Interest, lease rentals, principal repayment are to be paid on the last day of each year.
- The full cost of the computer will be written off over the effective life of computer on a straight-line basis and the same will be allowed for tax purposes
- The company's effective tax rate is 40% and the after-tax cost of capital is 9%
- The computer will be sold for ₹1,700 at the end of the 5th Year. The commission on such sales is 9% on the sale value.

You are required to **compute** the annual lease rentals payable by Beta Ltd, which will result in indifference to the loan option. [7]

 Reference
Break Even Lease Rental

What's New



Answer
Computation of Net Cash outflow if the Asset is Purchased by Borrowing

Year	Principal repayment (₹)	Interest (₹)	Installment (₹)	Tax savings on interest (₹)	Tax savings on dep (₹)	Net cash outflow (₹)	PV @ 9%	Present value (₹)
1	10,000	7,500	17,500	3,000	4,000	10,500	0.91743	9,633
2	10,000	6,000	16,000	2,400	4,000	9,600	0.84168	8,080
3	10,000	4,500	14,500	1,800	4,000	8,700	0.77218	6,718
4	10,000	3,000	13,000	1,200	4,000	7,800	0.70843	5,526
5	10,000	1,500	11,500	600	4,000	6,900	0.64993	4,485

Present Value of Total outflow of cash ₹34,442

Less: Present value of terminal cash inflows:

Sale value of asset	₹ 1,700	
(-) Commission	₹ 153	₹ 1,547
(-) Tax on profit @ 40%		₹ 619
		₹ 928
Its Present value ₹ (928 × 0.64993)	₹ 603	
Net cash outflow = 34,442 – 603	<hr/> ₹ 33,839	

Since we are required to find the annual lease rental payable, which will result in indifference to loan option. The present value of net cash outflow will be the same in each case.

Computation of break-even lease rent:

Let X be the break-even lease rent Present value of cash inflows:

Lease rent	₹X
(-) Tax saving (X @ 40%)	₹ 0.4X
Lease rent after tax per year	₹ 0.6X
Present value of lease rental for five years = (0.6X) × (3.8896) =	33,839
or, X =	₹14,500.
So, the required annual lease rental is	₹14,500.



Q4

MTP Dec'24 Set 1

HB Finance Ltd is considering to enter the computer leasing business. Mainframe computers can be purchased for ₹2,00,000 each and, in turn, be leased out at ₹ 50,000 per year for 8 years with the initial payment occurring at the end of first year. You may ignore taxes and depreciation.

- Estimate** the annual before tax expenses and internal rate of return (IRR) for the company.
- What** should be the yearly lease payment charged by the company in order to earn a 20 percent annual compounded rate of return before expenses and taxes?
- Assume that the firm uses the straight-line method of depreciation, there is no salvage value, the annual expenses are ₹ 20,000, and the tax rate is 35%. **Calculate** the yearly lease payment in order to enable the firm to earn 20 percent after tax annual compound rate of return.
- Further, assume that computer has a resale value of ₹ 40,000. **Determine** the revised lease rental to enable the firm to earn 20 per cent.

[7]

Reference

Exp, IRR, Lease Rental under different Situation

What's New**Answer**

- Cost of Asset = ₹2,00,000
Life = 8 years
Lease Rent = ₹50,000 p.a.
 $50,000(PVCF_{8\text{ yr}, \text{IRR}})$ = ₹2,00,000
PVCF8yr, IRR = 4
IRR = 18.63%

- Calculation of yearly lease rent to be charged to earn 20% return

Let the yearly lease rent be X

$$\text{So, } X \times PVCF8\text{yr, 20\%} = 2,00,000$$

$$X = 2,00,000/3.8372$$

$$X = ₹ 52,120$$

- Let X be the yearly lease rent

Computation of cash inflows per annum

Lease rent	X
------------	---



(-) annual expenses	20,000
(-) Depreciation	25,000
PBT	X - 45,000
PAT @ (1-35%)	0.65X – 29,250
CIAT	0.65X – 4,250
Cash inflows after tax	
Present value for 8years @ 20%	$= (0.65X - 4250) \times 3.8372 = 2,00,000$
Yearly lease rent X	= ₹ 86,725

(iv) Present value of cash outflows: Cost of computer 2,00,000

Present value of recurring cash inflows

Lease rent	X
(-) annual expenses	20,000
(-) Depreciation	20,000
PBT	X – 40,000
PAT @ (1-35%)	0.65X - 26,000
CIAT	0.65X- 6000
Present value for 8years @ 20%	$= (0.65X-6,000) \times 3.872$

Present value of terminal cash inflows:

Resale value	= ₹40,000
Its present value $(40,000 \times 0.23257)$	= ₹9,303 At 20%,
Inflows = Outflows	
$(0.65x - 6,000) \times 3.8372 + 9303$	= 2,00,000;

Revised lease rent, X = ₹85,687

Q5

MTP Dec'24 Set 1

What are the objectives of Cross Border Leasing?

[4]

Reference

Cross Border Leasing

What's New

Answer

Objectives of Cross Border Leasing:

- **Overall Cost of Financing:** A major objective of cross-border leases is to reduce the overall cost of financing through utilization of tax depreciation allowances by the lessor in order to reduce its taxable income. The tax savings are passed through to the lessee as a lower cost of finance. The basic prerequisites are relatively high tax rates in the lessor's country, liberal depreciation rules and either very flexible or very formalistic rules governing tax ownership.
- **Security:** The lessor is often able to utilize non-recourse debt to finance a substantial portion of the equipment cost. The debt is secured, among other things, by a mortgage on the equipment and by an assignment of the right to receive payments under the lease.
- **Accounting Treatment:** Depending on the structure, in some countries, the lessor can utilize very favourable "Leveraged Lease" Financial Accounting treatment for the overall transaction.
- **Repossession:** In some countries, it is easier for a lessor to repossess the leased equipment following a default by Lessee because the lessor is an owner and not a mere secured lender.



NOTES

Chapter **4**
Securitisation

4.1

Definition and Concept and Benefits of
Securitization

4.2

Participants in Securitization

4.3

Mechanism and Problems of Securitization

4.4

Securitization Instruments



4.1

Definition and Concept and Benefits of Securitization

Q1**Dec'23 MTP Set 1****Discuss** the benefits of Securitization.**Reference****Benefits of Securitization****What's New****Answer**

The driving force behind securitization has been the need for banks to realize value from the assets they hold on their balance sheet. Typically, these assets are residential mortgages, corporate loans, and retail loans such as credit card loans. A financial institution securitizes part of its balance sheet for three main reasons:

- (a) Funding the assets that it owns
- (b) Balance sheet capital management
- (c) Risk management and credit risk transfer. These are discussed below.

(a) Funding the assets that it owns

Banks can use securitization to (1) support rapid asset growth, (2) diversify their funding mix and reduce cost of funding, and (3) reduce maturity mismatches. Banks aim to optimize their funding between a mix of retail, interbank, and wholesale sources. Securitization is a prime component in this mix. Securitization also helps a bank to reduce its funding costs. This is because the securitization process separates the credit rating of the originating institution from the credit rating of the issued notes. Typically, most of the notes issued by special purpose vehicles (SPVs) will be more highly rated than the bonds issued by the originating bank directly. Finally, bank often funds long-term assets, such as residential mortgages, with short-asset liabilities, such as bank account deposits or interbank funding. This funding "gap" can be mitigated via securitization, as the originating bank receives funding from the sale of the assets, and the economic maturity of the issued notes frequently matches that of the assets.

(b) **Balance sheet capital management**

Banks use securitization to improve balance sheet capital management. Securitization provides (1) regulatory capital relief, in some cases (depending on the form of the transaction), (2) "economic" capital relief, and (3) diversified sources of funding.

(c) **Risk Management and Credit risk transfer**

Once assets have been securitized, the credit risk exposure on these assets for the originating bank is reduced considerably. This is because assets have been sold to the SPV. Securitization can also be used to remove nonperforming assets from banks' balance sheets. This will remove credit risk as well as a potentially negative sentiment from the balance sheet apart from freeing up regulatory capital as before. Further, if any of the securitized NPA starts performing again, or there is a recovery value obtained from defaulted assets, the originator will receive any surplus profit made by the SPV.

Securitization is beneficial from the view point of investors also. The potential attractions include:

- (a) Ability to diversify into sectors of exposure that might not be available in the regular bond markets (for example, residential mortgages or project finance loans).
- (b) Access to different (and sometimes superior) risk-reward profiles.
- (c) Access to sectors that are otherwise not open to them.

Q2

Jun'23

Enumerate what are the features of Securitization.

[6]

Reference	What's New
 Features of Securitization	

A n s w e r

The features of Securitization are enumerated below:

- (i) **Creation of financial instruments** - The process of securities can be viewed as process of creation of additional financial product of securities in market backed by collaterals.
- (ii) **Bundling and Unbundling** - When all the assets are combined in one pool it is bundling and when these are broken into instruments of fixed denomination it is unbundling.
- (iii) **Tool of Risk Management** - In case of assets are securitized on on-resource basis, then securitization process acts as risk management as the risk of default is shifted.



- (iv) **Structured Finance** - In the process of securitization, financial instruments are tailor structured to meet the risk return trade off profile of investor, and hence, these securitized instruments are considered as best examples of structured finance.
- (v) **Trenching** - Portfolio of different receivable or loan or asset are split into several parts based on risk and return they carry called "Tranche". Each Trench carries a different level of risk and return.
- (vi) **Homogeneity** - Under each tranche the securities issued are of homogenous nature and even meant for small investors who can afford to invest in small amounts.

4.2

Participants in Securitization

(Q)1**Dec'23**

Briefly **append** primary participants in the process of securitization (any four). [4]

Reference	What's New
<ul style="list-style-type: none"> ● Primary Participants of securitization ● ● ● ● 	

Answer

The following are the Primary participants in the process of Securitization:

(i) **Originator:**

An originator actually creates a Securitized assets.

(ii) **Arranger:**

An originator usually appoints a financial Institution to design and set up the Securitization Structure. It is known as arranger.

(iii) **Special purpose Vehicle (SPV):**

This is an entity established by the originator to specifically purchase the assets.

(iv) **Investor:**

In a Securitization process, typically, financial Institution, Insurance companies, Pension Funds, Hedge Funds, companies are the investor.

(v) **Services :**

SPV appoints the Services to administer and collect the underlying receivables.

(vi) **Rating Agencies:**

Rating Agencies rate Securities.

(vii) **Enhancement Provider:**

They provide credit enhancement to the asset – backed securities.

(viii) **Regulators :**

The Regulators issue various regulations that guides securitization process.



4.3

Mechanism and Problems of Securitization

No questions have been asked yet from this chapter !

4.4**Securitization Instruments**

No questions have been asked yet from this chapter !

(Q1

June'23 MTP Set 2; Jun'24

Describe various types of securities issued by a SPV in securitization transactions.

OR

There are different types of Securities issued by the Special Purpose vehicle (SPV) in Securitization Transactions."— In this context, **append** any four Securities issued by SPV

Reference	What's New
 Types of Securities in Securitization	

A n s w e r

Different type of securities issued by the special purpose vehicle (SPV) in securitization transactions are as follows:

- (a) **Pass Through Certificates:** In case of a pass-through certificate, payments to investors depend upon the cash flow from the assets backing such certificates. That is to say, as and when cash (principal and interest) is received from the original borrower by the SPV, it is passed on to the holders of certificates at regular intervals and the entire principal is returned with the retirement of the assets packed in the pool.
- (b) **Pay Through Certificates:** Pay through certificates has a multiple maturity structure depending upon the maturity pattern of underlying assets. Thus, the SPV can issue two or three different types of securities with different maturity patterns like short term, medium term and long term. Thus, these have a greater flexibility with varying maturity pattern needed by the investors.
- (c) **Preferred Stock Certificates:** These are issued by a subsidiary company against the trade debts and consumer receivables of its parent company. In other words, subsidiary



companies buy the trade debts and receivables of parent companies to enjoy liquidity. Generally, these stocks are backed by guarantees given by highly rated merchant banks and hence they are also attractive from the investor's point of view. These instruments are generally short term in nature.

- (d) **Asset Backed Commercial Papers:** This type of structure is mostly prevalent in mortgage-backed securities. Under this the SPV purchases portfolio of mortgages from different sources (various lending institution) and they are combined into a single group on the basis of interest rate, maturity dates and underlying collaterals.

They are then transferred to a Trust which in turn issued mortgage-backed certificate to the investors. These are also of short term in nature.

- (e) **Interest Only Certificates:** In case of these certificates, payments are made to investors only from the interest incomes earned from the assets securitized. f. Principal Only Certificates: As the very name suggest payment are made to the investors only from the repayment of principal by the original borrower. These certificates enable speculative dealings since the speculators know well that the interest rate movements would affect the bond value immediately. When interest rate increases, the bond value will decline and vice-versa.

Chapter 6

Equity and Bond Valuation and Evaluation of Performance

6.1

Equity Valuation - Discounted Cash Flow Based Valuation, Relative Valuation using Multiples and Weights

6.2

Bond Valuation - Prices & Yields



6.1

Equity Valuation - Discounted Cash Flow Based Valuation, Relative Valuation using Multiples and Weights

(Q)1
June'23 MTP Set 1

- (i) **Discuss** the key determinants of price-earnings multiple. [6]
- (ii) A company has an EPS of ₹10 for the current year and a DPS of ₹4. The earning A mutual fund has an NAV of ₹50. The growth rate during the past four years was 4% and earnings are expected to grow at 2% a year in the long run. Currently the shares of the company are trading at 7 times its earnings. If the required rate of return is 14%, **compute** an estimate of the P/E ratio. Also **calculate** the long run growth rate implied by the current P/E ratio. [5]

Reference	What's New
Key determinants of Price Earnings Multiple	

Answer

- (i) The P/E ratio can be derived from the dividend discount model which is the foundation of valuation for common stocks.

As per the constant growth version of dividend discount model. The value of a stock or

$$P = D_1 / (k - g)$$

Dividing both sides of the equation by expected earnings E_1 , we get,

$$P/E_1 = \frac{D_1 / E_1}{k - g}$$

If the growth rate is assumed to depend on the return on equity (ROE), then

$$g = ROE (1 - D_1 / E_1)$$

$$\text{Then, } P / E_1 = \frac{D_1 / E_1}{K - ROE \left(1 - \frac{D_1}{E_1}\right)}$$

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Thus, P/E ratio depends on the dividend payout, discount rate and return on equity.

The following relationship should hold, other things being equal:

- The higher the expected payout ratio, the higher the P/E ratio.
- The higher the expected growth rate (g), the higher the P/E ratio.
- The higher the required rate of return (k), the lower the P/E ratio.

(ii) EPS current year = ₹4.00; expected growth rate = 2%; required rate of return = 14%

$$\text{We know that, } P_0 = \frac{D_0(1+g)}{k-g} = \frac{4(1+0.02)}{0.14-0.02} = ₹34$$

$$\text{P/E ratio} = \text{Price} / \text{EPS} = 34/10 = 3.4$$

$$P_0 / E = \frac{D_0 / E \times (1+g)}{k - g}$$

$$\text{or, } 7 = \frac{4/10(1+g)}{0.14 - g}$$

$$\text{Solving for 'g' we get, } g = 0.078378 = 7.84\%$$

So, implied growth rate is 7.84%.

(Q)2

Dec'23 MTP Set 1

Consider the equity share of India Incorporated

D_0 = Current dividend per share ₹ 3.00

n = Duration of the period of super normal growth = 5 years

g_a = Growth rate during the period of super normal growth = 25%

g_n = Normal growth rate after super normal growth period is over = 7%

k = Investor's required rate of return = 14%

Calculate the price of the Equity Share under Multiple Growth Rate Model.

[7]

Reference

Multiple Growth Rate Model

What's New



Answer

The following are the steps involved:

Step I. Dividend stream during super normal growth period.

$$D_1 = ₹ 3.00 (1.25); \quad D_2 = ₹ 3.00 (1.25)^2; \quad D_3 = ₹ 3.00 (1.25)^3$$

$$D_4 = ₹ 3.00(1.25)^4 \text{ and } D_5 = ₹ 3.00(1.25)^5$$

The present value of the above stream of dividends is

$$\frac{3.00(1.25)}{(1.14)} + \frac{3.00(1.25)^2}{(1.14)^2} + \frac{3.00(1.25)^3}{(1.14)^3} + \frac{3.00(1.25)^4}{(1.14)^4} + \frac{3.00(1.25)^5}{(1.14)^5}$$

$$= ₹ (3.29 + 3.61 + 3.96 + 4.34 + 4.76)$$

$$= ₹ 19.96$$

Step II. The price of the shares at the end of 5 years, applying the constant growth model at that point of time will be :

$$P_5 = \frac{D_6}{k-g} = \frac{D_5(1+g_n)}{k-g_n} = \frac{3.00(1.25^5)(1.07)}{0.14-0.07} = ₹ 140$$

$$\text{Discounted value of this price} = \frac{₹ 140}{0.14-0.07} = ₹ 140$$

Step III. The sum of Steps I and II is

$$₹ 19.96 + ₹ 72.71 = ₹ 92.67$$

(Q) 3

Dec'23

FIZZLE Limited's earnings and dividends have been growing at a rate of 18 per cent per annum. This growth rate is expected to continue for 4 years. After that the growth rate will fall to 12 per cent for the next 4 years. Thereafter, the growth rate is expected to be 6 per cent forever. The last dividend per share was ₹ 2.00 and the investors' required rate of return on FIZZLE's equity is 15 per cent.

Required:

Assess the value of Equity share using a 3-step procedure. [7]

Reference

Value of equity share using a 3-step Procedure

What's New

A n s w e r

Value of Equity Share is = ₹ 40.32

Q4**Jun'24**

The earnings and dividend on equity share of RAXON Ltd., have been growing at a rate of 10% per annum for 4 years. After four years the growing rate of dividend is expected to decline linearly to 7%. After six years, the growing rate will fall and stabilize at 7% forever (infinitely). The last dividend per share was ₹ 3 and the investors' required rate of return on the stock of RAXON Ltd. is 16%.

Required:

Analyze and **assess** how much the value per share of RAXON Ltd.'s equity stock should be. (using Three-Phase Model)

P.V. Factor:

Year	1	2	3	4	5	6	7	8	9	10
PVIF (16%, Yrs.)	0.862	0.743	0.641	0.552	0.476	0.410	0.354	0.305	0.263	0.227

[7]

**A n s w e r**

The present value per share of Raxon Ltd's equity will be ₹ 40.13



6.2

Bond Valuation - Prices & Yields

(Q)1

Jun'23 MTP Set 2

XY Ltd. is expected to pay a dividend of ₹ 8.00 at the end of first year, a dividend of ₹ 14.00 at the end of second year, a dividend of ₹ 22.00 at the end of third year. from fourth year onwards, the dividends are expected to grow at a constant growth rate of 4%. if the required rate of return is 14%, **compute** the value of the stock.

Reference



Value of the stock

What's New

Two Phase

A n s w e r

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{D_3(1+g)}{(1+k)^3(k-g)}$$

$$= 8/1.14 + 14/(1.14)^2 + 22/(1.14)^3 + 22.88/[(1.14)^3 \times (0.14 - 0.04)]$$

$$= ₹ 187.08$$

Therefore, the price of the share is ₹187.08 through DDM (dividend discount model).

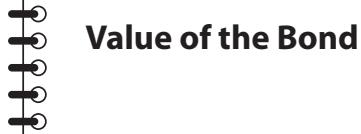
(Q)2

Jun'23 MTP Set 2

A ₹ 100 par value bond bears a coupon rate of 14 percent and matures after five years. Interest is payable semi-annually.

Compute the value of the bond if the required rate of return is 16 percent.

Reference



Value of the Bond

What's New

Answer

In this case the number of half-yearly periods is 10, the half-yearly interest payment is ₹ 7, and the discount rate applicable to a half-yearly period is 8 percent. Hence, the value of the bond is:

$$\begin{aligned}
V &= 7 \text{ PVIFA (8%, 10)} + 100 \text{ PVIF (8%, 10)} \\
&= 7 \text{ PVIFA (8%, 10)} + 100 \text{ PVIF (8%, 10)} \\
&= 7 (6.710) + 100 (0.463) \\
&= 46.97 + 46.30 \\
&= ₹ 93.27
\end{aligned}$$

(Q)3

Jun'23

SROICLltd., AAA rated company has issued, fully convertible bonds on the following terms, year ago:

Face value of Bond	₹ 1,000
Coupon (Interest Rate)	8.5%
Time to Maturity (remaining)	3 years
Interest Payment	Annual, at the end of year
Principal Repayment	At the end of bond maturity
Conversion ratio (Number of shares per bond)	25
Current market price per share	₹ 45
Market price of convertible bond	₹ 1,175

AAA rated company can issue plain vanilla bonds without conversion option at an interest rate of 9.5%.

Required:

Analyse the above data to calculate the following:

- (i) Straight Value of Bond
- (ii) Conversion Value of the Bond
- (iii) Conversion premium
- (iv) Percentage of downside risk
- (v) Conversion Parity Price

Given:

Year	1	2	3	4
PVIF 0-095, t:	0.9132	0.8340	0.7617	0.6956

$$[2 + 14 + 2 + 24 + 1 = 8]$$



Reference
Convertible Bond
What's New
Answer

- (i) Straight Value of Bond = ₹ 974.96
- (ii) Conversion Value of the Bond = ₹ 1,125
- (iii) Conversion premium = ₹ 2
- (iv) Percentage of downside risk = 20.52%
- (v) Conversion Parity Price = ₹ 47

(Q)4
Dec'23 MTP Set 1

AB Ltd. is expected to pay a dividend of ₹ 4.00 at the end of first year, a dividend of ₹ 7.00 at the end of second year, a dividend of ₹ 11.00 at the end of 3rd year. From 4th year onwards, the dividends are expected to grow at a constant growth rate of 4%. If the required rate of return is 14%, **compute** the present value of the stock. [7]

Reference
Present value of the stock
What's New
Two Phase
Answer

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \frac{D_3(1+g)}{(1+k)^3(k-g)}$$

Substituting these values:

$$\begin{aligned} P_0 &= \frac{4}{(1.14)} + \frac{7}{(1.14)^2} + \frac{11}{(1.14)^3} + \frac{11.44}{(1.14)^3(0.14 - 0.04)} \\ &= 3.509 + 5.39 + 7.415 + 77.22 \\ &= ₹ 93.54 \end{aligned}$$

Therefore, the price of the share is ₹ 93.54 through DDM (dividend discount model)

(Q)5
Dec'23

Following information is related to the Convertible Bond of SONT A Ltd. which is currently priced at ₹ 1,060 per Bond:

- Conversion Parity Price = ₹ 53
- Conversion Premium = 10.41667%
- Percentage of Downside Risk with respect to Straight Value of Bond = 12.766%

Required:

- (i) **Calculate** No. of shares on Conversion.
- (ii) **Analyse** Current Market Price Per Share of SONTA Ltd.
- (iii) **Assess** the Straight Value of Bond.

[7]

 Reference Convertible bond	What's New
---	-------------------

Answer

- (i) No. of Shares on Conversion = 20
- (ii) The current market price of Share of SONTA Ltd. shall be = ₹ 48 per share
- (iii) Straight Value of Bond = ₹ 940 per Bond

(Q)6
MTP Jun'24 Set 1

For the first four years, India Incorporated is assumed to grow at a rate of 10%. After four years, the growth rate of dividend is assumed to decline linearly to 6 percent. After 7 years, it is assumed to grow at a rate of 6% infinitely. The next year dividend is ₹2.00 per share and the required rate of return is 14%.

Find the value of the stock.

[7]

 Reference Value of Stock	What's New Two Phase
---	---------------------------------------



Answer

$$P_0 = \sum_{t=1}^A \frac{D_0 (1+g_a)^t}{(1+k)^t} + \sum_{t=A+1}^B \frac{D_{t-1} (1+g_b)^t}{(1+k)^t} + \frac{D_B (1+g_n)}{k - g_n (1+k)^B}$$

Where

$$D_0 = 2.00; \quad g_a = 0.10; \quad g_n = 0.06;$$

$$k = 0.14; \quad D_B = \text{declining rate of return from } 10\% \text{ to } 6\%, \text{ i.e. } 0.09, 0.08, 0.07, 0.06.$$

B = 7 years (the beginning of phase III)

$$\begin{aligned} \text{Step I} &= \sum_{t=1}^A \frac{D_0 (1+g_a)^t}{(1+k)^t} = \frac{2}{(1.14)} + \frac{2(1.1)}{(1.14)^2} + \frac{2(1.1)^2}{(1.14)^3} + \frac{2(1.1)^3}{(1.14)^4} \\ &= 1.754 + 1.693 + 1.633 + 1.576 \\ &= ₹6.656 \end{aligned}$$

$$\begin{aligned} \text{Step II} &= \sum_{t=A+1}^B \frac{D_{t-1} (1+g_b)^t}{(1+k)^t} \\ &= \frac{2(1.1)^3 (1.09)}{(1.14)^5} + \frac{2(1.1)^3 (1.09)(1.08)}{(1.14)^6} + \frac{2(1.1)^3 (1.09)(1.08)(1.07)}{(1.14)^7} = ₹4.27 \end{aligned}$$

$$\text{Step III} = \frac{D_B (1+g_n)}{k - g_n (1+k)^B} = \frac{2(1.1)^3 (1.09)(1.08)(1.07)(1.06)}{(0.14 - 0.06) \times 2.5023} = ₹17.761$$

Step IV Add all the above components (I + II + III)

$$= ₹(6.66 + 4.27 + 17.76) = ₹28.69$$

The present value of the stock is ₹28.69

Conclusion: We have moved from constant growth model to two-phase growth model and three - plus growth model, with each model, the number of variables and complexity of computation have increased. If growth models are over simplified, inadequate information would be provided by the forecasts. If they are too complex, the results or forecasts made by the computation are likely to be inaccurate. Hence, the analyst has to trade off between manageability and accuracy. Estimating year- by-year growth rate into an infinite future is quite impossible. At the same time, giving a simple average growth rate for the future is not fully dependable. The analyst has to strike a balance between the complexity and manageability of the known information for predicting the value of the stock.

Q7

Jun'24

The following is the parameter pertaining to 8% fully convertible (into equity shares) debentures issued by DAZIN Ltd. at ₹ 1,000:

Market Price of 8% Debenture (₹)	1,200
Conversion Ratio (No. of shares)	25
Straight Value of 8% Debentures (₹)	1,000
Market Price of equity shares on the date of conversion (₹)	40
Expected Dividend per share (₹)	1

Required:

Analyse and assess the following:

- (i) Conversion Value of Debenture
- (ii) Market Conversion Price
- (iii) Conversion Premium per share
- (iv) Ratio of Conversion Premium
- (v) Premium over Straight Value of Debenture
- (vi) Favourable Income Differential per share

[7]

Reference	What's New
 Convertible Debenture	

A n s w e r

- (i) Conversion Value of Debenture = ₹ 1,000
- (ii) Market Conversion Price = ₹ 48
- (iii) Conversion Premium per share = ₹ 8
- (iv) Ratio of Conversion Premium = 0.2 i.e. 20 %
- (v) Premium over Straight Value of Debenture = 20 %
- (vi) Favourable Income Differential per share = ₹ 2.20



Q8
MTP Dec'24 Set 1

Akai Ltd's latest annual dividend of ₹1.25 a share was paid yesterday and maintained its historic 7% annual rate of growth. You plan to purchase the stock today because you believe that the dividend growth rate will increase to 8% for the next three years and the selling price of the stock will be ₹40.00 per share at the end of that time.

- (i) **Calculate** how much should you be willing to pay for the share if you require a 12% return?
- (ii) **Compute** the maximum price you should be willing to pay for the stock if you believe that the 8% growth rate can be maintained indefinitely and you require a 12% return?
- (iii) If the 8% rate of growth is achieved, **what** will be the price at the end of year 3, assuming the conditions in part (ii)? [7]

 Reference Price based on Expected Returns	What's New
--	-------------------

Answer

- (i) Projected dividends for next 3 years:

$$\text{Year 1 } (\text{₹}1.25 \times 1.08) = \text{₹}1.35$$

$$\text{Year 2 } (\text{₹}1.35 \times 1.08) = \text{₹}1.46$$

$$\text{Year 3 } (\text{₹}1.46 \times 1.08) = \text{₹}1.58$$

Required rate of return = 12%

Growth rate of dividends = 8%

The present value of stock is:

$$V = \frac{1.35}{1.12} + \frac{1.46}{(1.12)^2} + \frac{1.58}{(1.12)^3} + \frac{40}{(1.12)^3}$$

$$= 1.21 + 1.16 + 1.12 + 28.47 = \text{₹}31.96$$

- (ii) Growth rate = 8%

Required rate of return = 12%

$$V = \frac{1.35}{0.12 - 0.08}$$

$$= \text{₹}33.75$$

(iii) Assuming all the above assumptions remain the same, the price at the end of year 3 will be:

$$\begin{aligned} P_3 &= \frac{D_A}{k-g} \\ &= \frac{1.25 \times (1.08)^4}{0.12 - 0.08} \\ &= ₹42.52 \end{aligned}$$



NOTES

Chapter **7****Mutual Fund****7.1**

Meaning, Advantages and Disadvantages, Structure and Types

7.2

Regulations

7.3

Computation of NAV

7.4

Evaluation of Performance and Movements in Security Values and NAVs of Mutual Funds for Investment Decisions: Perspective of AUM Managers and Individual Investors

7.5

ETF, REIT, InvIT



7.1

Meaning, Advantages and Disadvantages, Structure and Types

No questions have been asked yet from this chapter !

7.2 **Regulations**

No questions have been asked yet from this chapter !



7.3

Computation of NAV

(Q)1

June'23 MTP Set 1

A mutual fund has an NAV of ₹ 12.50 per unit at the beginning of the year. At the end of the year the NAV increases to ₹ 13.40. In the meanwhile, the Fund distributes ₹ 1.55 as dividend.

Calculate the fund's rate of return during the year. Assuming that the investor had 240 units and that the distributions have been reinvested at an average NAV of ₹ 12.80, find out the rate of return. [5]

Reference

Fund's Rate of Return

What's New

Answer

Return for the year (all changes on a per unit basis)

Change in price (13.40 - 12.50)	₹ 0.90
Dividend received	₹ 1.55
Total Return	₹ 2.45

Holding Period Return = $2.45 / 12.50 \times 100 = 19.6\%$

(ii) When all distributions are reinvested into additional units of the fund (at NAV of ₹12.80).

Dividend per unit = ₹ 1.55

Total receipt from 240 units = $1.55 \times 240 = ₹ 372$

Additional unit acquired $₹ 372 / ₹ 12.80 = 29.06$ Units

Value of (240 + 29.06) = 269.06 units held at end of year = $269.06 \times 13.40 = ₹ 3,605.40$

Price paid for 240 units at beginning of year = 240 units $\times 12.50 = ₹ 3,000$

Holding period return would be = $(3605.40 - 3000) / 3000 = 20.18\%$

(Q2)

June'23 MTP Set 2

A Mutual Fund made an issue of 10,00,000 units of ₹ 10 each on 01.01.2016. No entry load was charged. It made the following investments after incurring initial expenses of ₹ 2 lacs.

Particulars	₹
50,000 Equity Shares of ₹ 100 each @ ₹ 160	80,00,000
7% Government Securities	8,00,000
9% Debentures (unlisted) of ₹ 100 each	5,00,000
10% Debentures (Listed) of ₹ 100 each	5,00,000
Total	98,00,000

During the year, dividends of ₹ 12,00,000 were received on equity shares, interest on all types of debt securities was received as and when due. At the end of the year, equity shares and 10% debentures are quoted at 175% and 90% of their respective face values. Other investments are quoted at par.

- (i) **Find out** the Net Asset Value (NAV) per unit given that the operating expenses during the year amounted to ₹ 5,00,000.
- (ii) Also **find out** the NAV, if the Mutual Fund had distributed a dividend of ₹ 0.90 per unit during the year to the unit holders.

Reference	What's New
 NAV	

Answer

Given the total initial investments is ₹98,00,000, out of the issue proceeds of ₹1,00,00,000. Therefore, the balance of ₹ 2,00,000 is considered as Issue Expenses.

Computation of Closing Net Asset Value

Particulars	Opening value of Investments (₹)	Capital Appreciation (₹)	Closing value of investments (₹)	Income (₹)
Equity Shares	80,00,000	7,50,000	87,50,000	12,00,000
7% Govt. Securities	8,00,000	NIL	8,00,000	56,000
9% Debentures (Unlisted)	5,00,000	NIL	5,00,000	45,000
10% Debentures (Listed)	5,00,000	(-)50,000	4,50,000	50,000
Total	98,00,000	7,00,000	1,05,00,000	13,51,000
Less: operating expenses during the period				(5,00,000)



Net Income	8,51,000
Net Fund Balance = ₹ (1,05,00,000 + 8,51,000)	1,13,51,000
Less: Dividend = (10,00,000 × 0.90)	(9,00,000)
Net Fund Balance (after Dividend)	1,04,51,000
NAV (Before considering Dividends) ₹1,13,51,000 ÷ 10,00,000	11.35
NAV (After Dividends) ₹ 1,04,51,000 ÷ 10,00,000	10.45

Q3
Dec'23

MAX (P) a mutual fund made an issue of new fund offer on 01.01.2022 of 10,00,000 units of ₹ 10 each. No entry load was charged. It made the following investments:

Particulars	₹
25,000 equity shares of PQR Ltd., ₹ 100 each@ ₹ 320	80,00,000
5% Government Securities	4,00,000
10% Non-Convertible Debentures Unlisted	5,00,000
8% Listed Debentures	10,00,000

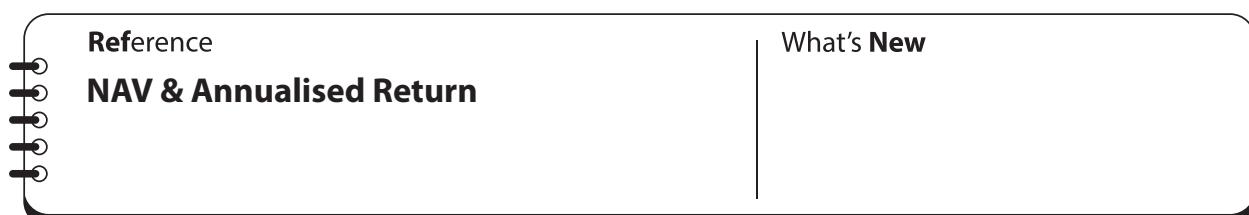
During the year, dividends of ₹ 8,00,000 were received on equity shares and interest on all types of debt securities were received. On 31st December 2022 equity shares were appreciated by 15% while Listed debentures were quoted at 20% premium.

PQR Ltd. on 15th December 2022 in its AGM declared the interim dividend of 10% bonus shares at 1: 10 with the record date of 28th December 2022.

Required:

- (i) **Calculate** the Net Asset Value (NAV) as on 31st December 2022 given that the operating expenses paid during the year amounting tot 3,00,000.
- (ii) **Assess** the NAV, if the mutual fund had distributed a dividend oft 0.50 per unit during the year to the investors.
- (iii) **Analyze** the annualised return.

[7]



Answer

- (i) NAV per Unit = ₹ 13.22
- (ii) NAV, if dividend of ₹ 0.50 is paid = ₹ 12.72
- (iii) Annualized Return = 32.20 %



7.4

Evaluation of Performance and Movements in Security Values and NAVs of Mutual Funds for Investment Decisions: Perspective of AUM Managers and Individual Investors

(Q1)

On the basis of the given information, MR. NAVIN wants to create a portfolio equally as risky as the market and is having ₹ 20,00,000 to invest:

Assets	Investment	Beta
Stock A	₹ 4,00,000	0:7
Stock B	₹ 5,00,000	1:10
Stock C	?	16
Debenture (D)	?	0

How do you recommend and interpret the risk scenario and investment in all the securities? [8]

Reference

Interpretation of Risk

What's New

Answer

Amount to be invested in Stock (C) is ₹ 7,31,200 and in Debenture is ₹ 3,68,800.

7.8
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7.5

ETF, REIT, InvIT

(Q)1

Jun'23

MS TONAM has invested in different point of time in three Mutual Funds (MFs).

The following details pertaining to MFs are given:

Particulars	MFA	MFN	MFP
Amount of Investment (8)	2,00,000	6,00,000	3,00,000
Net Assets Value (NAV) at the time of purchase (₹)	15-45	15:15	15
Dividend Received up to 31.03.2023 (₹)	10,000	0	8,000
NAV as on 31.03.2023 (₹)	15.38	15	15:30
Effective Yield per annum as on 31.03.2023 (percent)	9.60	-11:60	24.15

Assume 1 year = 365 days

Based on the above parameters, you are **required to calculate** the following:

- (i) Number of units in each scheme;
- (ii) Total NAV;
- (iii) Total Yield; and
- (iv) Number of days investment held.

[2 × 4 = 8]

 Reference

No. of Units, NAV, Yield, No. of Days

What's New

Answer

- (i) Nu. of Units in each Scheme
 - MF - A = 12,944.98
 - MF - N = 39,603.96
 - MF - P = 20,000.00
- (ii) Total NAV on 31.03.2023 = ₹ 10,99,153.19
- (iii) Total Yield = ₹ 17,153.19



Total Yield = 1.5594%

(iv) No. of days investment held

MF - A = 173 days

MF - N = 31 days

MF - P = 71 days

(Q)2

Postal Test Paper

- (i) An open-end fund has a net asset value of ₹10.80 per unit. It is sold with a front load of 6%. **What** is the offering price?
- (ii) If the offering price of an open-end fund is ₹12.50 per unit and the fund is sold with a front load of 5%, **what** is the net asset value? [4]

Reference

Offering Price with front end load

What's New

Answer

- (i) An open end fund has a Net Asset Value (NAV) of ₹ 10.80 per unit and is sold with a front load of 6%

The formula for offering price with front-end load is:

$$\text{Offering Price} = \frac{\text{NAV}}{1 - \text{Front Load}}$$

Using the values :

NAV = ₹ 10.80

Front load = 6% (or 0.06)

$$\text{Offering Price} = \frac{10.80}{1 - 0.06} = \frac{10.80}{0.94} = ₹ 11.49$$

- (ii) Rearrange the formula to solve for NAV:

$$\text{NAV} = \text{Offering Price} \times (1 - \text{Front Load})$$

Using the values :

Offering Price = ₹ 12.50

Front Load = 5% (or 0.05)

$$\text{NAV} = 12.50 \times (1 - 0.05) = 12.50 \times 0.95 = ₹ 11.88$$



Q3

MTP Jun'24 Set 1

There are two mutual funds viz. X mutual fund and Y mutual fund. Each having closed-ended equity schemes. NAV as on 31-12-2022 of equity schemes of X mutual fund is ₹70.71 (consisting 99% equity and remaining cash balance) and that of Y mutual fund is ₹62.50 (consisting 96% equity and balance in cash).

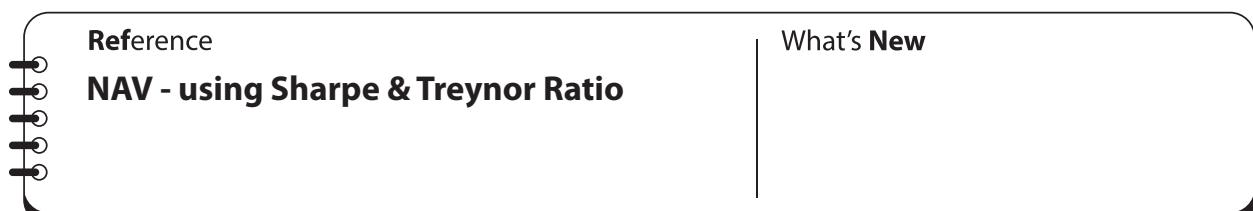
Following is the other information:

Particulars	Equity Schemes	
	X Mutual Fund	Y Mutual Fund
Sharpe ratio	2	3.3
Treynor ratio	5	15
Standard deviation	11.25	5

There is no change in portfolios during the next months and annual average cost is ₹3 per unit for the schemes of both the mutual funds. For calculation, consider 12 months in a year and ignore number of days for particular month.

Calculate NAV after one month if the market goes down by 5%.

[7]



Answer

Working Notes:

(i) Decomposition of funds in equity and cash components

	Mutual Fund X	Mutual Fund Y
NAV on 31/12/22 (₹)	70.71	62.50
(%) of Equity	99%	96%
Equity element in NAV	₹70.00	₹60.00
Cash element in NAV	₹0.71	₹2.50

(ii) Calculation of Beta

(a) 'X' mutual fund

$$\text{Sharpe ratio} = 2 = \frac{E(R) - R_f}{\sigma_x} = \frac{ER - R_f}{11.25}$$

$$\text{or } E(R) - R_f = 22.50$$



$$\text{Treynor ratio} = 15 = \frac{E(R) - R_f}{\beta_x} \text{ or } 15\beta_x = 22.50 \Rightarrow \beta_x = 22.50 / 15 \text{ or } 1.50$$

(b) 'Y' mutual fund

$$\text{Sharpe ratio} = 3.3 = \frac{E(R) - R_f}{\sigma_y} = \frac{E(R) - R_f}{5} \text{ or } E(R) - R_f = 16.50$$

$$\text{Treynor ratio} = 15 = \frac{E(R) - R_f}{\beta_y} = \frac{16.50}{\beta_y} \text{ or } \beta_y = \frac{16.50}{15} = 1.1$$

(iii) **Decrease in the value of equity**

	Mutual Fund X	Mutual Fund Y
Market goes down by	5.00%	5.00%
Beta	1.50	1.10
Equity component goes down	7.50%	5.50%

(iv) **Balance of cash after 1 month**

	Mutual Fund X	Mutual Fund Y
Cash in hand on 31-12-22	₹0.71	₹2.50
Less: expenses per month	₹0.25	₹0.25
Balance after 1 month	0.46	₹2.25

NAV after 1 month

	Mutual Fund X	Mutual Fund Y
Value of equity after 1 month		
70 ×(1 – 0.075)	₹64.75	--
60 ×(1 – 0.055)	--	₹56.70
Cash balance	0.46	2.25
Balance after 1 month	65.21	58.95

(Q)4

MTP Dec'24 Set 1

Mr. Z has invested in the three mutual funds as per the following details:

Particulars	MF X	MF Y	MF Z
Amount of investment	2,00,000	4,00,000	2,00,000
Net assets value (NAV) at the time of purchase (₹)	10.30	10.10	10.00
Dividend received up to 31/03/2023	6000	Nil	5000
NAV as on 31/03/2023	10.25	10.00	10.20
Effective yield p.a. as on 31/03/2023	9.66	11.66	24.15



Assume 1 year = 365 days

Mr. Z has misplaced the documents of his investment. Help him in computing the original investment after ascertaining the following:

- (i) Numbers of units in each scheme,
- (ii) Total net present value,
- (iii) Total yield,
- (iv) Number of days of investment held.

[7]

Reference	What's New
No. of units, NPV, Total Yield, No. of days	

Answer

(i) **Number of units in each scheme**

$$\text{MF X} = 200000/10.30 = 19417.48$$

$$\text{MF Y} = 400000/10.10 = 39603.96$$

$$\text{MF Z} = 200000/10 = 20000.00$$

(ii) **Total NAV as on 31/03/2023**

$$\text{MF X} \rightarrow 19,417.48 \times ₹ 10.25 = ₹ 1,99,029.17$$

$$\text{MF Y} \rightarrow 39,603.96 \times ₹ 10.00 = ₹ 3,96,039.60$$

$$\text{MF Z} \rightarrow 20,000.00 \times ₹ 10.20 = ₹ 2,04,000.0$$

$$\text{Total} = ₹ 7,99,068.77$$

(iii) **Total yield**

Name of Mutual Funds	Capital Yield	Dividend Yield	Total
MF X	₹1,99,029.17 - ₹2,00,000 = ₹ 970.83	₹ 6,000	₹5029.17
MF Y	₹3,96,039.60 - ₹4,00,000 = ₹ 3960.40	NIL	- ₹3960.40
MF Z	₹ 2,04,000 - ₹2,00,000 = ₹ 4000	₹ 5,000	₹ 9,000
Total			₹10,068.00

$$\text{Total Yield} = 10068.00/800000 \times 100 = 1.2568\%$$



(iv) No. of days' investment was held

Particulars	MF X	MF Y	MF Z
Let number of days will be	X	Y	Z
Initial investment	2,00,000	4,00,000	2,00,000
Yield (₹)	5029.17	-3960.40	9000
Yield (%)	2.5146	-0.9901	4.5
Period of holding (days)	$2.5146/9.66 \times 365$ = 95 days	$-0.9901/-11.66 \times 365$ = 31 days	$4.5/24.15 \times 365$ = 68 days
Date of original investment	26.12.22	28.02.23	22.01.23

Chapter 8

Portfolio Theory and Practice

8.1

Portfolio Return and Risk, Systematic and Unsystematic Risk, Diversification strategies (Naïve vs the Markowitz Model)

8.2

Optimal Portfolio, Efficient Frontier, Capital Market Line

8.3

Principles of Asset Allocation, Active and Passive Asset Allocation



8.1

Portfolio Return and Risk, Systematic and Unsystematic Risk, Diversification strategies (Naïve vs the Markowitz Model)

(Q)1

Dec'23

Following are the details of a portfolio of B0I Ltd. consisting of three shares:

Share	Portfolio Weight	Beta	Expected return in %	Total Variance
BG	0.30	0.40	12%	0.015
BZ	0.30	1.20	18%	0.035
DN	0.40	0.50	10%	0.020

Standard Deviation of Market Portfolio Returns = 14%

Covariance (BG, BZ) = 0.030

Covariance (BZ, DN) = 0.050

Covariance (DN, BG) = 0.020

Required:

Determine the following:

- (i) The Portfolio Beta,
- (ii) Residual Variance of each of the three Shares,
- (iii) Portfolio Variance using Sharpe Index Model,
- (iv) Portfolio Variance (on the basis of Modern Portfolio Theory given by Markowitz). [7]

 Reference

Portfolio beta , Residual & Portfolio Variance

What's New

**Sharpe Index Model,
Markowitz**



Answer

(i) The Portfolio Beta = 0.68

(ii) Residual Variances:

BG = 0.01186

BZ = 0.00678

DN = 0.0151

(iii) Portfolio Variance Using Sharpe Index Method = 0.01315

(iv) Portfolio Variance on the basis of Markowitz Theory = 0.0299



8.2

Optimal Portfolio, Efficient Frontier, Capital Market Line

Q1

Dec'23 MTP Set 1

From the following information, **ascertain** the risk of the portfolio —

Securities	Standard Deviation	Proportion in Portfolio
A	8%	0.30
B	12%	0.50
C	6%	0.20

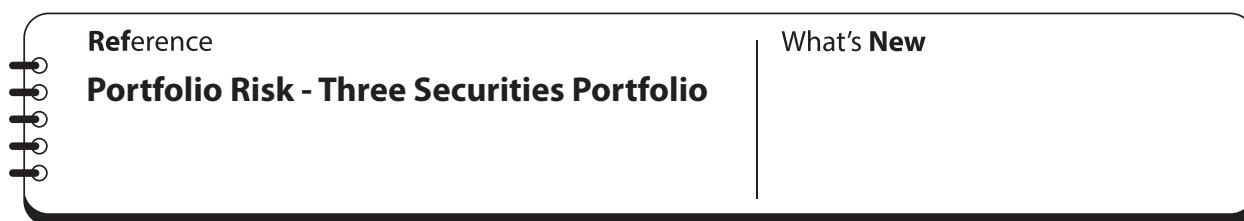
Correlation Co-efficient

$$AB = 0.50$$

$$AC = -0.40$$

$$BC = +0.75$$

[7]



Answer

Formula Approach (Alternative 1)

(i) Basic Values of Factors for Determination of Portfolio Risk

Standard Deviation of Security A	σ_A	8%
Standard Deviation of Security B	σ_B	12%
Standard Deviation of Security C	σ_C	6%
Correlation co-efficient of Securities A and B		0.50
Correlation co-efficient of Securities A and C		-0.40
Correlation co-efficient of Securities B and C		0.75

Weight of Security A	W_A	0.30
Weight of Security B	W_B	0.50
Weight of Security C	W_C	0.20

(ii) Computation of Portfolio Risk (σ_{ABC})

$$\begin{aligned}
& \sqrt{(\sigma_A^2 \times W_A^2) + (\sigma_B^2 \times W_B^2) + (\sigma_C^2 \times W_C^2) + 2(\sigma_A \times W_A \times \sigma_B \times W_B \times \rho_{AB}) + 2(\sigma_A \times W_A \times \sigma_C \times W_C \times \rho_{AC}) + 2(\sigma_B \times W_B \times \sigma_C \times W_C \times \rho_{BC})} \\
& = \sqrt{(8^2 \times 0.3^2) + (12^2 \times 0.5^2) + (6^2 \times 0.2^2) + (2 \times 8 \times 0.3 \times 12 \times 0.5 \times 0.5) + (2 \times 8 \times 0.3 \times 6 \times 0.2 \times (-4)) + (2 \times 12 \times 0.5 \times 6 \times 0.2 \times 0.75)} \\
& = \sqrt{(64 \times 0.09) + (144 \times 0.25) + (36 \times 0.04) + (14.4) + (-2.304) + (10.8)} \\
& = \sqrt{5.76 + 36 + 1.44 + 14.4 - 2.304 + 10.8} \\
& = \sqrt{66.096} \\
& = 8.13\%
\end{aligned}$$

Q2**Postal Test Paper**

Following is the data regarding six securities:

Securities	A	B	C	D	E	F
Return (%)	8	8	12	4	9	8
Risk (%) (Standard Deviation)	4	5	12	4	5	6

- (i) **Which** of the securities will be selected?
- (ii) Assuming perfect correlation, **is it** preferable to Invest 75% in Security A and 25% in Security C? [6]

Reference**Securities Selection - Feasible Portfolio****What's New****Answer**(i) **Selection of Securities**

- (a) Securities A, B and F have identical return at 8%. However, Security A has a risk of 4% only (least among A, B and F). Therefore, A should be selected (as it is the security with the least risk and highest return in its risk category).
- (b) Securities B and E have identical risk factor at 5%. However, return on Security E is more than B.



Therefore, E should be preferred over B.

Selection: A and E may be selected.

Note: Security C and B may also be selected on grounds of higher return.

(ii) **Portfolio = 75% in A and 25% in C**

Since there is a perfect correlation between A & C, Risk and Return can be averaged with proportion, computed as under

$$(a) \text{ Portfolio Return} = \text{Weighted Return} = (W_A \times R_A) + (W_C \times R_C) = (8 \times 75\%) + (12 \times 25\%) \\ = 6 + 3 = 9\%$$

$$(b) \text{ Portfolio Risk} = \text{Weighted Risk} = (W_A \times \sigma_A) + (W_C \times \sigma_C) = (4 \times 75\%) + (12 \times 25\%) \\ = 3 + 3 = 6\%$$

Recommendation: Compared to investment in Securities A and C, investment in E is better. This is because, for the same Return (i.e. 9%), Security E has a lower risk factor (at 5% against 6% for the Portfolio of A and C.)

Q3

Postal Test Paper

List the differences between Security Market Line and Capital Market Line.

[6]

Reference	What's New
<ul style="list-style-type: none"> — — — — — — Security Market Line and Capital Market Line	

Answer

Differences Between Security Market Line And Capital Market Line:

Aspect	Capital Market Line	Security Market Line
1. Risk Considered	Capital Market Line uses Standard Deviation, i.e. Total Risks across the x-axis.	Security Market Line uses Beta or Systematic Risk across the x-axis. (i.e. that part of Total Risk which is common to the whole of the market).
2. Nature of Portfolios	It uses only efficient portfolios, i.e. one which is a perfect replication of the Market Portfolio in terms of risks and rewards.	Security Market Line uses both efficient and non-efficient portfolios.

3. Combination	Every point on the Capital Market Line is a proportional combination between Risk free Rate of Return and Market Return.	It graphs all portfolios and securities which lie on and off the Capital Market Line.
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(Q)4

Dec'23

Ms. AHONA, an investor, has made investments in two mutual funds. The following information is available:

Mutual Fund	Smart	Growth
Jensen Alpha	1.32%	1.80%
Treynor's Ratio	0.086	0.093
Actual Return	10.20%	10.92%
Risk Premium	5%	5%

Required:

- (i) **Assess** the Beta (P) for both the funds
- (ii) **Determine** the Risk Free Rate
- (iii) **Identify** the Security Market Line

[7]

Reference

Beta, Risk Free Rate & Security Market line

What's New

A n s w e r

- (i) Beta for Smart M. Fund = 0.37
Beta for Growth M. Fund = 0.42
- (ii) Risk Free Rate = 0.07 i.e. 7%
- (iii) Security Market Line for Smart = $0.07 + 0.05 \beta$
Security Market Line for Growth = $0.07 + 0.05 \beta$



Principles of Asset Allocation, Active and Passive Asset Allocation

Q1
June'23 MTP Set 1

The returns on Stock PQ and market portfolio for a period of 4 years are as follows:

Year	Return on PQ (%)	Return on Market portfolio (%)
1	12	8
2	15	12
3	11	11
4	2	(-4)

You may opt to use the following additional information:

Particulars	PQ	Market
Mean Return (%)	10	6.75
Standard Deviation (%)	4.84	6.38
Covariance of stock with market = 29.75		

You are required to determine the Characteristic Line for Stock PQ. Find the expected return on PQ when market return improves to 5% in year 5 or decreases to - 8% in the 5th year. [8]

Reference
Characteristic Line, Expected Return
What's New

Answer

Characteristics line

$$y = a + \beta x$$

y = Mean return (stock PQ), x = mean return (market)

$$10 = a + 0.73 (6.75)$$

$$a = 5.0725$$



$$y = 5.0725 + 0.73x$$

So, the characteristic line is $y = 5.0725 + 0.73x$

Now, If $x = 5$

$$y = 5.0725 + 3.65$$

$$y = 8.7225$$

$$\text{or, } y = 8.72\%$$

Similarly, If $x = (-) 8$

$$y = 5.0725 + 0.73(-8)$$

$$y = 5.0725 - 5.84$$

$$y = (-)0.767\% \quad y = (-)0.77\%$$

(Q)2

Postal Test Paper

The historical rates of return of two securities over the past ten years are given.

Calculate the Covariance and the Correlation coefficient of the two securities;

Years	1	2	3	4	5	6	7	8	9	10
Security A : (Return %)	12	8	7	14	16	15	18	20	16	22
Security B : (Return %)	20	22	24	18	15	20	24	25	24	18

[10]



Reference

Covariance and the Correlation coefficient

What's New

Answer

1. Computation of Factors

Year	Return of		Deviation from Mean		Variance of		Covariance of	
	Security A (R ₁)	Security B (R ₂)	SA (R ₁ – R̄ ₁) (D ₁)	SB (R ₂ – R̄ ₂) (D ₂)	(D ₁ ²)	(D ₂ ²)	R ₁ & R ₂ [D ₁ × D ₂]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1	12	20	-2.8	-1	7.84	1	2.8	



2	8	22	-6.8	1	46.24	1	-6.8
3	7	24	-7.8	3	60.84	9	-23.4
4	14	18	-0.8	-3	0.64	9	2.4
5	16	15	1.2	-6	1.44	36	-7.2
6	15	20	0.2	-1	0.04	1	-0.2
7	18	24	3.2	3	10.24	9	9.6
8	20	25	5.2	4	27.04	16	20.8
9	16	24	1.2	3	1.44	9	3.6
10	22	18	7.2	-3	51.84	9	-21.6
	$\Sigma R_1 = 148$	$\Sigma R_2 = 210$			207.6	100	-20

	Security A	Security B
Mean	$\bar{R}_1 = \Sigma R_1 / n = 148 / 10 = 14.8$	$\bar{R}_2 = \Sigma R_2 / n = 210 / 10 = 21$
Variance	$\sigma_A^2 = \Sigma D_1^2 / n = 207.6 / 10 = 20.76$	$\sigma_B^2 = \Sigma D_2^2 / n = 100 / 10 = 10$
Standard Deviation	$\sigma_A = \sqrt{20.76} = 4.55$	$\sigma_B = \sqrt{10} = 3.162$

2. Covariance and Correlation:

Combination	Security A and B
Covariance	$Cov_{AB} = \Sigma [D_1 \times D_2] / n = -20 / 10 = -2$
Correlation	$\rho_{AB} = Cov_{AB} / \sigma_A \times \sigma_B$ $= -2 / (4.55 \times 3.162) = -0.1390$

(Q)3

MTP Jun'24 Set 1

The rates of return on the Security of company S and Market Portfolio for 10 periods are given below:

Year	1	2	3	4	5	6	7	8	9	10
Return on Security S (%)	20	22	25	21	18	-5	17	19	-7	20
Return on Market Portfolio	22	20	18	16	20	8	-6	5	6	11

- (i) Compute the beta of Security S?
- (ii) Determine the Characteristic Line for Security S?
- (iii) Analyse the Systematic and Unsystematic Risk of Security S? [7]

Reference

Beta, Characteristic Line, Systematic & Unsystematic Risk

What's New



Answer

(i) Computation of Beta of Security

Period	R _M	R _s	D _M = (R _M - \bar{R}_M)	D _s = (R _s - \bar{R}_s)	DM ²	DS ²	D _M × D _s
(1)	(2)	(3)	(4)=[(2)-12]	(5)=[(3)-15]	(6) = (4) ²	(7)=(5) ²	(8)=(4)×(5)
1	22	20	10	5	100	25	50
2	20	22	8	7	64	49	56
3	18	25	6	10	36	100	60
4	16	21	4	6	16	36	24
5	20	18	8	3	64	9	24
6	8	-5	-4	-20	16	400	80
7	-6	17	-18	2	324	4	-36
8	5	19	-7	4	49	16	-28
9	6	-7	-6	-22	36	484	132
10	11	20	-1	5	1	25	-5
	120	150			706	1148	357

Market Portfolio		Security of Company S
Mean	$\bar{R}_M = \sum R_M \div n = 120 \div 10 = 12$	$\bar{R}_M = \sum R_M \div n = 120 \div 10 = 12$
Variance	$\sigma_M^2 = \sum DM^2 \div n = 706 \div 10 = 70.6$	$\sigma_S^2 = \sum DS^2 \div n = 1148 \div 10 = 114.8$
Standard Deviation	$\sigma_M = \sqrt{70.6} = 8.40$	$\sigma_S = \sqrt{114.8} = 10.71$

Covariance and Correlation:

Combination	Market and S
Covariance	$Cov_{MS} = \sum [D_M \times D_S] \div n = 357 \div 10 = 35.7$
Beta β_S	$B_S = Cov_{MS} / \sigma_M^2 = 35.7 / 70.6 = 0.51$

(ii) Computation of Characteristic Line for Security S

Particulars	Value
$y = \bar{R}_A$	15
β	0.51
$x = \bar{R}_M$ (Expected Return on Market Index)	12

Characteristic Line for Security S = $y = \alpha + \beta x$, $\alpha = 15 - (0.51 \times 12) = 8.88\%$

$$15 = \alpha + (0.51 \times 12)$$

$$\text{Characteristic line for Security S} = 8.88 + 0.51 R_M$$

Note: It is assumed that Rates of Return for Market Portfolio and the Security given in the question is returns in excess of Risk Free Rate of Return.

(iii) Analysis of Risk into Systematic Risk and Unsystematic Risk



Particulars	Standard Deviation Approach	Variance Approach
Total Risk	10.71%	114.80%
Systematic Risk	$\beta \times \sigma_m = 0.51 \times 8.40 = 4.284\%$	$\beta^2 \times \sigma_m^2 = 0.51^2 \times 70.60 = 18.363\%$
Unsystematic Risk [Total Risk - Systematic Risk]	$10.71 - 4.284 = 6.426\%$	$= 114.80 - 18.363 = 96.437\%$

Q4

MTP Jun'24 Set 1

Subho has invested in four securities M, N, O and P, the particulars of which are as follows -

Security	M	N	O	P
Amount Invested (₹)	1,25,000	1,50,000	80,000	1,45,000
Beta (β)	0.60	1.50	0.90	1.30

If RBI Bonds carries an interest rate of 8% and NIFTY yields 14%, compute the expected return on portfolio. If investment in Security O is replaced by investment in RBI Bonds, **what** corresponding change will be there in Portfolio Beta and expected return? [7]

Reference

Portfolio Beta & Expected Return

What's New

Answer

(i) Computation of Expected Return on Portfolio (Under CAPM)

(a) Computation of Weighted Beta (Beta of the Portfolio)

Security	Amount Invested (₹)	Proportion of Investment to Total Investment	Beta of Investment	Weighted Beta
(1)	(2)	(3) = (2) ÷ 5,00,000	(4)	(5) = (3) × (4)
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
O	80,000	0.16	0.90	0.144
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		1.121

(b) Computation of Expected Return on Portfolio

$$\begin{aligned}
 \text{Expected Return } [E(R_p)] &= R_f + [\beta_p \times (R_m - R_f)] \\
 &= 8\% + [1.121 \times (14\% - 8\%)] \\
 &= 8\% + [1.121 \times 6\%]
 \end{aligned}$$



$$\begin{aligned}
&= 8\% + 6.726\% \\
&= 14.726\%
\end{aligned}$$

(ii) **Computation of Expected Return [Investment in O, replaced by RBI Bonds] (CAPM)**

(a) Computation of Weighted Beta (Beta of the Portfolio)

Security	Amount Invested (₹)	Proportion of Investment to Total Investment	Beta of Investment	Weighted Beta
(1)	(2)	(3) = (2) ÷ 5,00,000	(4)	(5) = (3) × (4)
M	1,25,000	0.25	0.60	0.150
N	1,50,000	0.30	1.50	0.450
RBI Bonds	80,000	0.16	0.00	0.000
P	1,45,000	0.29	1.30	0.377
Total	5,00,000	1.00		0.977

(b) Computation of Expected Return on Portfolio

Expected Return [E(RP)]

$$\begin{aligned}
&= R_f + [\beta_p \times (R_m - R_f)] \\
&= 8\% + [0.977 \times (14\% - 8\%)] \\
&= 8\% + [0.977 \times 6\%] \\
&= 8\% + 5.862\% \\
&= 13.862\%
\end{aligned}$$

Q5

Jun'24

MR. SANUM is advisor of MAX Mutual Fund. A study by MAX Mutual Fund has revealed the parameter in respect of three Securities as given below :

Security	Standard Deviation (%)	Correlation with Index, (p_m)
AB Ltd.	25	0.60
BM Ltd.	20	0.95
CX Ltd.	15	0.75

The standard deviation of Market Portfolio (BSE Sensex) is observed to be 15 %.

Required:

- (i) **Analyze** the Sensitivity of returns of each stock with respect to the Market.
- (ii) **Assess** the Co-variances among the various stocks.
- (iii) **Calculate** the Total risk of Portfolio consisting of all the three stocks equally.
- (iv) **Assess** the Systematic Risk of the Portfolio in (iii).

(Calculation upto 2 decimal points)

[7]



Reference

- ☰ **Beta, Covariance, Total Risk, Systematic Risk**

What's New

Answer

- (i) **Sensitivity of returns of each stock :**

AB Ltd. = 1.00

BM Ltd. = 1.27

CX Ltd. = 0.75

- (ii) **Covariance between any 2 Stocks = $\beta_1 \beta_2 \sigma_m^2$**

Stock / Beta	1.00	1.27	0.75
AB Ltd.	625	285.75	168.75
BM Ltd.	285.75	400	214.31
CX Ltd.	168.75	214.31	225

- (iii) **Total Risk (Variance) of the equally Weighted Portfolio = 287.50**

- (iv) **Systematic Risk of the Portfolio = 229.52**

Q6

Jun'24

MR. HISAN is an investor, made the following long-term investments consist of three shares and the details of his portfolio of shares are as below :

Shares	No. of Shares (Lakh)	Market Price per Share	Beta
P. Ltd.	6	250	1.4
Q. Ltd.	8	375	1.2
R. Ltd.	4	125	1.6

MR. HISAN thinks that the risk of portfolio is very high and he wants to reduce the portfolio beta to 0.91.

He is considering below-mentioned alternative strategies :

Dispose a part of his existing portfolio to acquire risk-free Securities.

or

Take appropriate position on Nifty Futures which are currently traded at ₹ 16,250 and each Nifty point is worth 100 units.

Required:

- (i) **Analyse** and **assess** portfolio beta.
- (ii) **Assess** the value of risk-free securities to be acquired.
- (iii) **Determine** the number of shares of each company to be disposed off.
- (iv) If MR. HISAN seeks to increase the Portfolio Beta to 2.275, **analyse** the proportion of market value of investments of Q. Ltd. to the Value of Total Investments plus 10% Margin on Futures. [7]

	Reference Portfolio Beta Management with Risk free Securities	What's New
---	--	-------------------

Answer

- (i) Portfolio beta = 1.30
- (ii) Risk-Free Securities to be acquired = ₹ 1,500 Lakh
- (iii) Number of Shares of each company to be disposed off:

Shares	No. of Shares to be disposed off (Lakh)
P Ltd.	1.80
Q Ltd.	2.40
R Ltd.	1.20

- (iv) Proportion of Q Ltd. = 54.67%

Q7**MTP Dec'24 Set 1**

From the following information, **ascertain** the Market Price of Risk of the portfolio :

R_m	σ_m	R_f	σ_p
18%	6%	6%	8%
20%	8%	7%	4%
22%	9%	8%	12%

Also, **determine** the expected return for each of the above cases. [7]



Reference
Market Price of risk and expected return
What's New
Answer

Formulae for Expected Return and Market Price of Risk

Expected Return on Portfolio $R_p = R_f + (\lambda \times \sigma_p)$

Market Price of Risk of Portfolio $\lambda = R_m - R_f / \sigma_m$

Expected Return and Market Price of Risk

R_m	(σ_m)	R_f	(σ_p)	$\lambda = R_m - R_f / \sigma_m$	$(R_p) = [R_f + \lambda \times \sigma_p]$
(1)	(2)	(3)	(4)	(5) = [(1)-(3)/(2)]	(6) = [(3)+(5)×(4)]
18%	6%	6%	8%	(18-6)/6=2	[6%+2×8%] =22.00%
20%	8%	7%	4%	(20-7)/8=1.625	[7%+1.625 × 4%] = 13.50%
22%	9%	8%	12%	(22-8)/9=1.556	[8%+1.556 × 12%] =26.67%

(Q)8
MTP Dec'24 Set 1

An investor is interested to construct a portfolio of securities M and N. He has collected the following information about the proposed investment:

	M	N
Expected return	20%	25%
σ	12%	16%

Co-efficient of Correlation (r) between M and N is 16. He wants to constitute only five portfolios of M and N as follows:

- (i) All funds invested in M
- (ii) 50% of funds in M and 50% in N.
- (iii) 75% of funds in M and 25% in N.
- (iv) 25% of funds in M and 75% in N.
- (v) All funds invested in N.

You are **required to calculate:**

- I. Expected return under different portfolios.
- II. Risk factor associated with these portfolios.

III. **Which** portfolio is best from the view-point of risk?

IV. **Which** portfolio is best from the view-point of return? [7]

Reference	What's New
 Expected return, Risk, Best Port Folio	

Answer

I. Expected Return under different Portfolios

Portfolio	M		N		Expected Return of Portfolio
	Probability	Return	Probability	Return	
(i)	1	0.20	0	0.25	$1 \times 0.20 + 0 \times 0.25 = 20\%$
(ii)	0.5	0.20	0.5	0.25	$0.5 \times 0.20 + 0.5 \times 0.25 = 22.50\%$
(iii)	0.75	0.20	0.25	0.25	$0.75 \times 0.20 + 0.25 \times 0.25 = 21.25\%$
(iv)	0.25	0.20	0.75	0.25	$0.25 \times 0.20 + 0.75 \times 0.25 = 23.75\%$
(v)	0	0.20	1	0.25	$0 \times 0.20 + 1 \times 0.25 = 25\%$

II. Risk factor associated with different Portfolios:

Portfolio	Computation	σ_p
(i)	$\begin{aligned} &= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M) \times (\sigma_N \times W_N \times \rho_{MN})} \\ &= \sqrt{(12^2 \times 1^2) + (16^2 + 0^2) + (2 \times 12 \times 1 \times 16 \times 0 \times 0.16)} \\ &= \sqrt{144} \\ &= 12\% \end{aligned}$	12%
(ii)	$ \begin{aligned} &= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M) \times (\sigma_N \times W_N \times \rho_{MN})} \\ &= \sqrt{(12^2 \times 0.50^2) + (16^2 + 0.50^2) + (2 \times 12 \times 0.50 \times 16 \times 0.50 \times 0.16)} \\ &= \sqrt{115.36} \\ &= 10.74\% \end{aligned} $	10.74%



(iii)	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M) \times (\sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0.75^2) + (16^2 + 0.25^2) + (2 \times 12 \times 0.75 \times 16 \times 0.25 \times 0.16)}$ $= \sqrt{108.52}$ $= 10.42\%$	10.42%
(iv)	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M) \times (\sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0.25^2) + (16^2 + 0.75^2) + (2 \times 12 \times 0.25 \times 16 \times 0.75 \times 0.16)}$ $= \sqrt{164.52}$ $= 12.83\%$	12.83%
(v)	$= \sqrt{(\sigma_M^2 \times W_M^2) + (\sigma_N^2 \times W_N^2) + 2(\sigma_M \times W_M) \times (\sigma_N \times W_N \times \rho_{MN})}$ $= \sqrt{(12^2 \times 0^2) + (16^2 + 1^2) + (2 \times 12 \times 0 \times 16 \times 1 \times 0.16)}$ $= \sqrt{256}$ $= 16\%$	16%

III. Best Portfolio from the point of view of risk:

The Best Portfolio from the point of view of risk is the one which has the least risk factor i.e., 10.42%. Portfolio (iii) [i.e., 75% of funds invested in M and 25% in N].

IV. Best Portfolio from the point of return:

Portfolio (v) [i.e., 100% funds invested in the security, N] is the best from the point of return. This Portfolio will earn a return of 25%.

Chapter 9

Asset Pricing Theories

9.1

Single Factor and Multifactor Asset Pricing Theories:
CAPM and APT

9.2

Concepts and Applications (including Levered Beta
and Unlevered Beta)



Single Factor and Multifactor Asset Pricing Theories: CAPM and APT

Q1

June'23 MTP Set 2

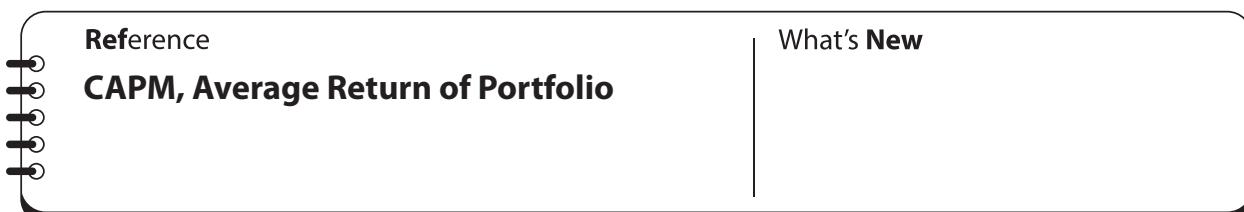
A holds the following portfolio:

Share/Bond	Beta	Initial Price	Dividend	Market price at the end of year
A Ltd.	0.9	30	3	60
B Ltd.	0.8	40	3	70
C Ltd.	0.6	50	2	150
G Bonds	0.01	1,000	140	1,010

Risk Free return is 14%

Calculate:

- (i) The expected rate of return on his portfolio using Capital Asset Pricing (CAPM)
 - (ii) The average return of his portfolio



Answer

- (i) Expected rate of return**

	Total Investment (₹)	Dividend (₹)	Capital Gain (₹)
A Ltd.	30	3	30
B Ltd.	40	3	30
C Ltd.	50	2	100
GOI Bonds	1,000	140	10
	1,120	148	170

Expected Return on Market Portfolio = $(148 + 170)/1,120 = 28.39\%$

CAPM, $E(R_p) = R_f + \beta [E(R_M) - R_f]$

A Ltd.	$14 + 0.9 (28.39 - 14)$	$= 14 + 12.95$	$= 26.95\%$
B Ltd.	$14 + 0.8 (28.39 - 14)$	$= 14 + 11.51$	$= 25.51\%$
C Ltd.	$14 + 0.6 (28.39 - 14)$	$= 14 + 8.63$	$= 22.63\%$
GOI Bonds	$14 + 0.01 (28.39 - 14)$	$= 14 + 0.14$	$= 14.14\%$

(ii) Average Return of Portfolio $= (26.95 + 25.51 + 22.63 + 14.14)/4 = 22.31\%$

Alternatively, $(0.9 + 0.8 + 0.6 + 0.01)/4 = 2.31/4 = 0.5775$

$14 + 0.5775 (28.39 - 14) = 14 + 8.31 = 22.31\%$.



9.2

Concepts and Applications (including Levered Beta and Unlevered Beta)

Q1
Dec'23 MTP Set 1

The beta coefficient of M Ltd. is 1.40. The company has been maintaining 8% rate of growth in dividends and earnings. The last dividend paid was ₹ 4.00 per share. Return on government securities is 12% and return on market portfolio is 18%. The current market price of the share of M Ltd. is ₹32.00.

Calculate be the equilibrium price per share of M Ltd.

[7]

Reference
Equilibrium Price per share (Using CAPM)
What's New
Answer

Required rate of return as per CAPM = $R_f + (R_m - R_f) \times \beta_i = 12 + (18 - 12) \times 1.40 = 20.40\%$.

Equilibrium price $D_1 = 4 \times (1 + 0.08) = 4 \times 1.08 = ₹ 4.32$ and $G = 0.08$ [E.P. = Equilibrium price].

Expected return = $[D_1/\text{E.P.}] + g$ or $20.40 = 4.32/\text{E.P.} + 0.08$

or, $(0.2040 - 0.08) \text{ E.P.} = 4.32$

or, $0.124 \text{ E.P.} = 4.32$

or, $\text{E.P.} = 4.32 / 0.124$

or, ₹ 34.84.

or equilibrium price = ₹ 34.84



Q2

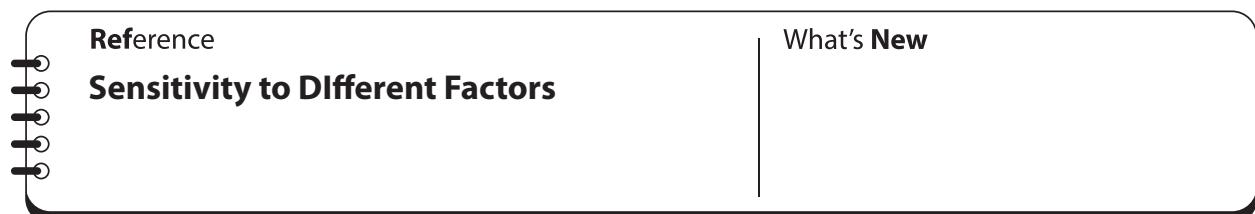
Jun'24

MR. RAUN an investor, owns a portfolio with the following characteristics and it is assumed that the security returns are generated by a two-factor model. With the information of MR. RAUN, the newly inducted trainee MS. A YANA has been asked to analyse with comments, if any.

Particulars	Security MB	Security KN	Risk-Free Security
Factor - 1 Sensitivity	0.80	1.50	0
Factor - 2 Sensitivity	0.60	1.10	0
Expected Return	15%	20%	10%

Required:

- (i) If MR. RAUN invests ₹ 1,80,000 and sells short ₹ 90,000 of Security KN and purchases ₹ 2,70,000 of Security MB, **analyse** Sensitivity of MR. RAUN's portfolio to the two factors.
 - (ii) If MR. RAUN borrows ₹ 1,80,000 at the Risk-Free rate and invests the amount, he borrows along with the original amount of ₹ 1,80,000 in Security MB and Security KN in the same proportion as described in Part (i), **analyze** the Sensitivity of the portfolio to the two factors.
 - (iii) **Assess** the expected Return premium of Factor-2. [7]



Answer

- ### (i) Portfolio Sensitivity :

Factor – 1: = 0.45

Factor – 2: = 0.35

- ## (ii) Portfolio Sensitivity :

Factor – 1: = 0.90

Factor – 2: = 0.70

- (iii) Expected Return Premium for Factor-2 = 5%

Alternative Answer

Expected Return Premium for Factor-2 is (-) 25%



NOTES

Chapter 10

Portfolio Performance Evaluation and Portfolio Revision

10.1

Conventional Performance Evaluation

10.2

Market Timing and Style Analysis



10.1

Conventional Performance Evaluation

(Q1)

June'23 MTP Set 1, Postal Test Paper

The following particulars are furnished about three mutual funds scheme A, B and C.

Particulars	Scheme A	Scheme B	Scheme C
Dividend Distributed	₹ 1.60	-	₹ 1.15
Capital Appreciation	₹ 2.77	₹ 3.33	₹ 1.79
Opening NAV	₹ 30	₹ 25.15	₹ 21.50
Beta	1.40	1.10	1.35

Analyse the performance of the schemes based on Jensen's Alpha, if government of India Bonds carry an interest rate of 6.64% and the NIFTY has increased by 12%. [8]

Reference

- **Performance of the schemes based on Jensen's Alpha**

What's New
Answer

Calculation for ranking based on Jensen's alpha

Particulars	Scheme A	Scheme B	Scheme C
Dividend Distributed	₹1.60	-	₹1.15
Add : Capital Appreciation	₹2.77	₹3.33	₹1.79
Total Return (A)	₹4.37	₹3.33	₹2.94
Opening NAV (B)	₹30	₹25.15	₹21.50
Actual Return (C) = (A) ÷ (B) × 100	14.57%	13.24%	13.67%
Beta (D)	1.40	1.10	1.35
Expected Return under CAPM [E = (RP)][E] = $R_F + B_P \times (R_M - R_F)$	14.14% [6.64 + 1.40 × (12 – 6.64)]	12.54% [6.64 + 1.10 × (12 – 6.64)]	13.88% [(6.64 + 1.35 × (12 – 6.64))]

10.2
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Divya Jadi Booti*

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8100 11 2222

Jensen's Alpha (C)-(E)	0.43% (14.57 – 14.14)	0.70% (13.24 – 12.54)	= (0.21%) (13.67 – 13.88)
Ranking	II	I	III

Schemes A and B have outperformed the market portfolio (Nifty) whereas scheme C has underperformed in comparison with the NIFTY.

Q2

June'23 MTP Set 2

Four investors, A, B, C and D have invested equal amounts of money in different combinations of funds as per their risk appetite. A has fully invested in Money Multiplier Funds, B has invested 50% in Money Multiplier and 50% in Balanced Growth Funds, C has invested 80% in Balanced Growth Funds and 20% in Safe Money Funds and D has fully invested in a fund that exactly replicates the market portfolio. The following information is given:

Fund Type	Return for the year (%)	Beta Factor
Money Multiplier (100% Equity)	24.00	1.8
Balanced Growth Funds (50% Equity and 50% Debt)	17.5	1.3
Safe Money (20% Equity and 80% Debt)	13.00	0.75

The market return is 16% and the risk-free rate is 8%. **Analyse** the above information and rank the investors' rewards using Treynor's measure.

Reference

Treynor's Measure

What's New

Answer

DETAILS	A	B	C	D
Risk free return	8	8	8	8
Fund invested	100% money multiplier	50% MM and 50% balanced growth	80% balanced growth and 20% safe money	Market
Beta	1.80	$0.5 \times 1.3 + 0.5 \times 1.8 = 1.55$	$0.8 \times 1.3 + 0.2 \times 0.75 = 1.19$	1.00
Return on portfolio	24	$0.5 \times 24 + 0.5 \times 17.5 = 20.75$	$0.8 \times 17.5 + 0.2 \times 13 = 16.6$	16



Treynor's ratio $= (R_p - R_f) / \beta$	$(24 - 8) / 1.8 = 8.89$	$(20.75 - 8) / 1.55 = 8.23$	$(16.6 - 8) / 1.19 = 7.23$	$(16 - 8) / 1 = 8$
Rank	1	2	4	3

(Q3)

Dec'23 MTP Set 1

Four friends S, T, U, and V have invested equivalent amount of money in four different funds in tune with their attitude to risk, S prefers to play aggressive and is keen on equity-funds, T is moderately aggressive with a desire to invest upto 50% of his funds in Equity, whereas U does not invest anything beyond 20% in Equity. V, however, relies more on movement of market, and prefers any fund which replicates the market portfolio.

Their investment particulars, returns therefrom and Beta of the fund are given below —

Fund Invested	Return for the year	Beta Factor
Money Multiplier Fund (100% Equity)	23.50%	1.80
Balanced Growth Fund (50% Equity – 50% Debt)	16.50%	1.25
Safe Money Fund (20% Equity and 80% Debt Funds)	12.50%	0.60

If the Market Return was 16% and the Risk Free Return is measured at 7%, **suggest** which of the four friends were rewarded better per unit of risk taken? [7]

Reference

Treynor Measure

What's New

Answer

Particulars	S	T	U	V
Risk Free Return [RF]	7%	7%	7%	7%
Fund Invested	Money Multiplier Fund	Balanced Growth Fund	Safe Money Fund	Market Portfolio
Beta of the Portfolio [β_p]	1.80	1.25	0.60	1.00
Return on Portfolio [R_p]	23.50%	16.50%	12.50%	16.00%
Treynor Measure	9.17	7.60	9.17	9.00
$[(R_p - R_f) / \beta_p]$	$[23.50 - 7] / 1.80$	$[16.50 - 7] / 1.25$	$[12.50 - 7] / 0.60$	$[16 - 7] / 1$
Ranking	1	3	1	2

Evaluation: Both S and U have earned the same Reward per unit of risk taken, which is more than the Market Reward to Risk of 9.00



Q4

Jun'24

MS AYARA, an investor is trying to analyse the performance of the four Funds. The relevant data about the Fund is given as under:

Fund	Return (%)	Variance (%) ²	Unsystematic Risk (%) ²
RE Fund	16	215	21
HE Fund	21	304	18
AE Fund	16	104	16
TE Fund	14	126	17

The variance on the returns from the Market Portfolio is 360(%)². The risk-free rate of return is 7%.

[Given: $\beta = \sqrt{\text{Systematic Risk} / \text{Market Risk (Variance)}}$

Required:

Analyse and assess the Rewards to Volatility Ratio and Rank these Portfolios using

- (i) Sharpe Measure and
- (ii) Treynor's Method.

(Calculation upto 3 decimal points)

[7]



Reference

Sharpe and Treynor Method

What's New

Answer

- (i) **Reward to Variability (Sharpe Ratio) :**

Mutual Fund	R _j	R _f	(R _j – R _f)	σ _i	Reward to Variability	Ranking
RE Fund	16	7	9	14.663	0.614	4
HE Fund	21	7	14	17.436	0.803	2
AE Fund	16	7	9	10.198	0.883	1
TE Fund	14	7	7	11.225	0.624	3



(ii) **Reward to Volatility (Treynor Ratio) :**

Mutual Fund	R_j	R_f	$(R_j - R_f)$	β_i	Reward to Volatility	Ranking
RE Fund	16	7	9	0.734	12.262	4
HE Fund	21	7	14	0.891	15.713	2
AE Fund	16	7	9	0.494	18.219	1
TE Fund	14	7	7	0.550	12.727	3

10.2

Market Timing and Style Analysis

(Q)1

Jun'23

Following is the information related to three mutual funds of BP company:

Year	ME-S	ME-T	MF-Z
1	10%	5%	14%
2	8%	10%	10%
3	12%	8%	18%

Correlation between market and mutual fund:

	MF-S	MEF-T	MF-Z
Correlation with market	0.45	0.25	0.65

Variance of the market is 9% and rate of return of government bond is 7%.

You are **required** to

- (i) Rank the Mutual Funds as per Sharpe's measure.
- (ii) Rank the Mutual Funds as per Treynor's measure.



Reference
Sharpe's & Treynor's measure

What's New

Answer

- (i) **Rank the Mutual Funds as per Sharpe's measure.**

Mutual Fund	R _p	R _r	R _p -R _r	α _p	Reward to Variability	Ranking
MF-S	10.00	7.00	3.00	1.63	1.84	2
MF-T	7.67	7.00	0.67	2.05	0.33	3
MF-Z	14.00	7.00	7.00	3.27	2.14	1



(ii) Rank the Mutual Funds as per Treynor's measure.

Mutual Fund	R_p	R_t	$R_p - R_t$	β_p	Reward to Variability	Ranking
MF-S	10.00	7.00	3.00	0.244	12.30	1
MF-T	7.67	7.00	0.67	0.171	3.92	3
MF-Z	14.00	7.00	7.00	0.709	9.87	2

Q2

MTP Jun'24 Set 1

Based on the data provided below, **compute** and compare the performance of the portfolios using the Jensen model of the differential return.

Portfolio	Realized Return on Portfolio (%)	Portfolio (β)
1	14.5	1.2
2	9.5	0.8
3	18.0	1.4

Return on market portfolio, $R_m = 12\%$

Risk-free rate of interest = 6%

[7]

Reference
Jensen Alpha

What's New

Answer

Required return based on CAPM for the three portfolios would be:

Portfolio 1: $6\% + (12\% - 6\%) \times 1.2 = 13.2\%$

Portfolio 2: $6\% + (12\% - 6\%) \times 0.8 = 10.8\%$

Portfolio 3: $6\% + (12\% - 6\%) \times 1.4 = 14.4\%$

The difference between actually realized return and return under CAPM is portfolio alpha (α) and they are as follows:

Portfolio 1 (α) = $14.5 - 13.2 = + 1.30\%$

Portfolio 2 (α) = $9.5 - 10.8 = - 1.30\%$

Portfolio 3 (α) = $18.0 - 14.4 = + 3.60\%$

The best performance is of the portfolio manager 3 having the highest value of positive alpha. The next best is portfolio 1. Portfolio 2 is underperforming as its alpha value is negative.

Chapter 13

Financial Derivatives – Instruments for Risk Management

13.1

Introduction to Financial Derivatives

13.2

Forward and Futures – Meaning and Difference, Pricing, Stock Futures, Index based Futures, Hedging through Futures

13.3

Options

13.4

Swaps

13.5

Interest Rate Derivatives – Forward Rate Agreement, Interest Rate Futures and Options, Caps, Floors and Collars



Introduction to Financial Derivatives

(Q)1**June'23 MTP Set 2**

Briefly **illustrate** various steps in a risk management process.

Reference	What's New
 Steps in a Risk Management process	

A n s w e r

A generic approach towards risk management must include the following steps:

(i) **Setting the Objectives:**

Determination of objectives is essential step in the risk management. The objective may be to protect/enhance profits or to develop competitive advantage. The objectives must be decided by the management and in this process company's risk tolerance must be taken into account.

(ii) **Identification of Risk**

The next step in the risk management process is identification of risk. Every firm faces different types of risks - based on its organizational structure, nature of business, the economic conditions, social and political factors, the status of the industry it operates. Any risk needs to be identified initially and then categorized as per its nature and character.

(iii) **Measurement and Prioritization of Risk**

Once the risks are identified, they need to be evaluated for ascertaining their significance. The significance of a particular risk depends upon the size of the loss (expected severity of consequences) that it may result in, and the probability of the occurrence of such loss (or, expected frequency). On the basis of these two factors, various risks faced by a company need to be classified as critical risks, important risks and not-so-important risks. This may be termed as risk prioritization. The severity is measured by using various risk measures.

(iv) **Development of Strategy**

Strategy setting is an important task in managing risk, as it sets a direction for the business as a whole. A strategy is essentially an action plan, which specifies the nature of risk to be

managed and the timing. It also specifies the tools, techniques and instruments that can be used to manage these risks. Besides, it also deals with tax and legal problems.

Responses to risk generally fall into the following categories:

Risk avoidance: action is taken to halt the activities giving rise to risk, such as a product line, a geographical market or a whole business unit.

Risk reduction: action is taken to mitigate the risk of likelihood or impact or both, generally via internal controls.

Risk sharing or transfer: action is taken to transfer a portion of the risk through insurance, outsourcing or hedging.

Risk acceptance: no action is taken to affect likelihood or impact.

(v) **Implementation of Strategy**

Once the policies and strategies are in place, they need to be implemented for actually managing the risks; where actual execution of risk management takes place. This includes finding the best deal in case of risk transfer, providing for contingencies - in case of risk retention, designing and implementing risk control programs, etc. It also includes eyeing for operational details, like the back-office work, to ensure compliance controls.

(vi) **Monitoring Risk**

Risk monitoring is the last major element of risk management - but certainly not the least important. The function of risk management needs to be reviewed periodically, depending on the costs involved.

Risk management is a process or cycle which works continuously and in a repetitive manner. After monitoring the risk, the process of risk identification is done because risk keeps on changing its form as various new requirements come periodically.

13.2

Forward and Futures – Meaning and Difference, Pricing, Stock Futures, Index based Futures, Hedging through Futures

(Q)1

June'23 MTP Set 1

The following data relates to DCB Ltd.'s share prices:

Current Price Per Share	₹ 180
Price per share in the futures Market - 6 months	₹ 200
Money can be borrowed from the market at	12% p.a.

Analyse, on the basis of your calculation of the theoretical minimum price of 6 months-Futures contract, whether there exists any arbitrage opportunity. [8]

Reference

Theoretical Minimum Price, Arbitrage Opportunity

What's New

Answer

(i) Theoretical Future Price

Particulars	Value
6 months future price	₹ 200
Current Stock Price (S_x)	₹ 180
Borrowing Rate (r)	12% or 0.12
Time (in years)	$6/12 = 0.5$ year
Theoretical Future Price (F_x)	$S_x \times e^{rt}$
	$180 \times e^{0.12 \times 0.5}$
	$180 \times e^{0.06}$
	$180 \times 1.06184 = ₹ 191.13$

Since the Theoretical Future Price is less than the Expected Future Price, the recommended action would be to sell in the future market.



(ii) **Cash flows to gain from Arbitrage opportunity:**

Activity Flow: Enter into a future contract to sell shares at the rate of ₹ 200 on expiry date, sell the shares at the 6 months future rate of ₹ 200, pay the amount of borrowing together with interest. $\text{₹ } 180 \times e^{0.12 \times 0.5} = \text{₹ } 191.13$

$$\text{Net gain} = 200 - 191.13 = \text{₹ } 8.87$$

Q2

June'23 MTP Set 2

A owns a portfolio in three stocks as detailed below:

Stock	No. of shares	Price ₹/share	Beta
X	4,00,000	400	1.1
Y	8,00,000	300	1.2
Z	12,00,000	100	1.3

The NSE-Midcap 100 is at 28,000 and futures price is 28,560. Assume that the index factor is 100. Advise A on the use stock index futures to

- (i) decrease the portfolio β to 0.8;
- (ii) increase the portfolio β to 1.5 ; and **determine** the number of contracts of stock index futures to be bought or sold in each case.

Reference

Cross Hedging - Portfolio Beta Management

What's New

Answer

Computation of existing portfolio beta:

Stock	Market value of stock (₹ in lakh)	Proportion	Beta of the stock	Weighted beta
X	1600	4/13	1.1	0.34
Y	2400	6/13	1.2	0.55
Z	1200	3/13	1.3	0.30
Total	5200			1.19

Value per futures contract = Index price per contract \times Lot size per futures contract = 28,000 \times 100 = ₹ 28,00,000.

- (i) **To reduce portfolio beta to 0.8, the manager should sell index futures contract.**

$$\text{Portfolio value} = \text{₹ } 5200 \text{ lakh}$$



Value per futures contract = Index price per contract × Lot size per futures contract
 $= 28,000 \times 100 = ₹ 28,00,000$

Beta of the existing portfolio = 1.19

Desired beta of the new portfolio = 0.8

No. of contracts to be sold

= Portfolio Value × (Beta of the portfolio-Desired Value of Beta)/Value of the futures Contract
 Number of Contracts = 5,200 lakhs × (1.19-0.8)/28 lakh = 72.42, say 73 contracts.

(ii) To increase the portfolio beta to 1.5 the manager should buy index futures contract.

Portfolio value = ₹ 5200 lakh

Value per futures contract = Index price per contract × Lot size per futures contract

$= 28,000 \times 100 = ₹ 28,00,000$

Beta of the existing portfolio = 1.9

Desired beta of the new portfolio = 1.5

No. of contracts to be bought = 5,200 lakhs × (1.5-1.19)/28lakh = 57.57, say 58 contracts.

Q3

Jun'23

SINJONS Ltd., an American company is under obligation to pay interests of Can\$ 10,10,000 and Can\$ 7,05,000 on 31st July and 30th September respectively. The company is risk averse and its policy is to hedge the risks involved in all foreign currency transactions. The Finance Manager of the company is thinking of hedging the risk considering two methods i.e. fixed forward or option contracts. It is now June 30. Following quotations regarding rates of exchange, US\$ per Can \$, from the company's bank were obtained:

Spot	1 Month Forward	3 Months Forward
0:9284 – 0-9288	0:9301	0:9356

Price for a Can\$ /US\$ option on a U.S. stock exchange (cents per Can \$, payable on purchase of the option, contract size Can \$ 50,000) are as follows:

Strike Price (US\$/Can\$)	Calls		Puts	
	July	Sept.	July	Sept.
0.93	1:56	2:56	0:88	1.75
0.94	1:02	NA	NA	NA
0.95	0.65	1.64	1.92	2:34

According to the suggestion of finance manager if options are to be used, one month option should be bought at a strike price of 94 cents and three month option at a strike price of 95 cents and for the remainder uncovered by the options, the firm would bear the risk itself. For this, it would use forward rate as the best estimate of spot. Transaction costs are ignored.



Required:

Recommend, **which** of the above two methods would be appropriate for the SINJONS Ltd. to hedge its foreign exchange risk on the two interest payments. [2 + 5 + 1 = 8]

Reference**Hedging - Forward & Options****What's New****Foreign Currency Risk****Answer**

Forward Market Cover

Hedge the risk by buying Can\$ in 1 and 3 months time will be:

July = US \$ 9,39,401

Sept. = US \$ 6,59,598

Option Contracts:

July Payments = 20.20

Sept. Payments = 14.10

Company would like to take out 20 contracts for July and 14 contracts for September respectively. Therefore costs, if the options were exercised, will be:

	July		September	
	Can\$	US\$	Can\$	US\$
Covered by Contracts	10,00,000	9,40,000	7,00,000	6,65,000
Balance bought at spot rate	10,000	9,301	5,000	4,678
Option Costs:		10,200		11,480
Total cost in US\$ of using Option Contract		9,59,501		6,81,158

Decision: As the firm is stated as risk averse and the money due to be paid is certain, a fixed forward contract, being the cheapest alternative in both the cases, would be recommended.

(Q)4**Dec'23 MTP Set 1**

Given the following information

BSE Index	50,000
Value of Portfolio	₹ 1,01,00,000



Risk Free Interest Rate	9% p.a.
Dividend Yield on Index	6% p.a.
Beta of Portfolio	2.0

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 45,000 in 3 months [7]

Reference	What's New
Cross Hedging - Price of Future, Gain	

Answer

(i) Computation of price of Futures Contract

Securities of	R Ltd.
Spot price [S_x]	₹ 50,000
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]	= ₹ 50,000 × e ^{(0.09 - 0.06) × 0.3333}
$TFP_x = S_x \times e^{(r-y) \times t}$	= ₹ 50,000 × e ^{0.03 × 0.3333}
	= ₹ 50,000 × e ^{0.01}
	= ₹ 50,000 × 1.0101
	= ₹ 50,505

Therefore, price of the Futures Contract is ₹50,505 or ₹50,500 (Approx)

(ii) Gain on short Futures Position

Computation of No. of Contracts to be entered into:

Particulars	Value
Portfolio Value	₹ 1,01,00,000
4-Month's futures Price per Unit of BSE Index	₹ 50,500
No. of Units per BSE Index Futures Contract	50



Value per BSE Index futures Contract [50 Units × 50,500 per unit]	₹ 25,25,000
No. of Contract to be entered [Portfolio Value × Beta of Portfolio w.r.t Index ÷ Value per BSE Index futures Contract] = [₹1,01,00,000 × 2.0 ÷ ₹25,25,000]	8 Contracts

Computation of Gain on Short Futures Position

Particulars	Value
Position	SELL
Contracted Sale Price per Unit of BSE Index	₹ 50,500
Less: Index Position in 3-Months	₹ 45,000
Gain per Unit of BSE Index Future	₹ 5,500
No. of Units per Contract	50
Gain per Contract [₹ 5,500 × 50 Units]	₹ 2,75,500
No. of Contract entered into	8
Total Gain [8 Contracts × ₹ 2,75,000 per contract]	₹ 22,00,000

Total Gain on Short Futures Position in 3 Months is ₹ 22,00,000.

(Q)5

Jun'23

Details about portfolio of shares of MR. RAJON, an investor is as below:

Shares	No. of shares (Lakh)	Price per share	Beta
A Ltd.	10	₹ 400	15
B Ltd.	6	₹ 500	1.2
C Ltd.	5	₹ 600	1.8

The investor thinks that the risk of the portfolio is very high and wants to reduce the portfolio beta to 1.125. He is considering two below-mentioned alternative strategies:

- (A) Dispose off a part of his existing portfolio to acquire risk free securities or
- (B) Take appropriate position on Nifty Futures which are currently traded at 5000 and each Nifty points is worth % 500.

You are **required to determine:**

- (i) Portfolio beta
- (ii) The value of risk free securities to be acquired
- (iii) Number of shares of each company to disposed off
- (iv) Number of Nifty contracts to be bought/sold :
- (v) Value of portfolio beta for 4% rise in Nifty

[2 + 2 + 2 + 1 + 2 = 9]



Reference
Portfolio Beta Management
What's New
Answer

- (i) Portfolio Beta = 1.5
- (ii) The value of risk free securities to be acquired = ₹ 2500 lakh
- (iii) Number of Shares of each company to be disposed off.

Shares	No. of Shares (lakhs)
A Ltd.	2.50
B Ltd.	1.50
C Ltd.	1.25

- (iv) Number of Nifty Contracts to be sold = 150 contracts
- (v) Value of portfolio beta for 4% rise in Nifty = 1.125

Q6
Dec'23

On January 1, 2023 MR. DEVAL an investor has a portfolio of 5 shares as given below:

Security	Price	No. of Shares	Beta
A	349.30	5,000	1.15
B	480.50	7,000	0.40
C	593.52	8,000	0.90
D	734.70	10,000	0.95
E	824.85	2,000	0.85

The cost of capital to the investor is 10.5% per annum.

Required:

Analyze and calculate the following:

- (i) The beta of his portfolio.
- (ii) The theoretical value of the NIFTY futures for February 2023.
- (iii) The number of contracts of NIFTY the investor needs to sell to get a full hedge until February for his portfolio if the current value of NIFTY is 5,900 and NIFTY futures have a minimum trade lot requirement of 200 units. Assume that the futures are trading at their fair value.

- (iv) The number of future contracts the investor should trade if he desires to reduce the beta of his portfolios to 0.6.

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

[Given: $\ln(1.105) = 0.0998$, $\ln(1.12) = 0.1133$, $e^{0.01641} = 1.01658$, $e^{0.015858} = 1.01598$]

(calculation upto four decimal points)

[7]

Reference	What's New
 Beta, Theoretical value, Number of Future Contracts	

Answer

- (i) Portfolio Beta = 0.849
- (ii) Theoretical Value of Future Contract = ₹ 5,994.28
- (iii) 13 or 14 contracts
- (iv) 4 contracts

Q7

Postal Test Paper

Mr. X is long on a forward contract to purchase a non-dividend paying share in 3 months. The current market price of the share is ₹70 and the three-month risk-free rate of interest is 6% p.a. continuously compounded.

Calculate the theoretical forward price. Is there any arbitrage opportunity if the actual forward price is -

- (i) ₹73 and
- (ii) ₹71?

[4]

Reference	What's New
 Theoretical Forward Price	



Answer

Given, $S_0 = ₹70$; $r = 6\%$ p.a.c.c; $t = 3$ months = $3/12$ years.

So, theoretical forward price,

$$F^* = S_0 e^{rt} = 70 \times e^{0.06 \times 3/12} = 70 \times 1.0202 = ₹71.41$$

- (i) When the three months forward price is ₹73, the arbitrageur can borrow ₹70 @ 6% for three months, buy one share at ₹70 and short a forward contract for ₹71.41. At the end of three months, the arbitrageur sells the share for ₹73, repay the loan amount of ₹71.41 and make a profit of ₹(73 – 71.41) = ₹1.59
- (ii) If the three-month forward price is ₹71, the arbitrageur can short one share, invest the proceeds of the short sale at 6 percent per annum for three months, and have a long position in a three-month forward contract. The proceeds of short sales will grow to ₹71.41 at the end of three months. The arbitrageur will pay ₹71 and take the delivery of the share under forward contract, and uses it to close its short sale position. His net gain is ₹ (71.41 – 71) = ₹0.41.

Q8

MTP Jun'24 Set 1

Decide which position on the index future gives a speculator, a complete hedge against the following transitions:

- (i) The share of Yes Limited is going to rise. He has a long position on the cash market of ₹100 Lakhs on the Yes Limited. The beta of the Yes Limited is 1.25.
- (ii) The share of No Limited is going to depreciate. He has a short position on the cash market of ₹50 Lakhs on the No Limited. The beta of the No Limited is 0.90.
- (iii) The share of Fair Limited is going to stagnant. He has short position on the cash market of ₹40 Lakhs of the Fair Limited. The beta of the Fair Limited is 0.75.

Reference	What's New
 Future - Recommendation	

Answer

- (i) **Value to be traded in Futures [Index Value]** = Hedge Ratio × Amount of Portfolio
- (ii) **Principles for deciding the Position on Index Futures [Opposite Position in relation to Stock]**

Expectation on Stock Price	Action in Stock Market	Position in Index Futures
Rise	Buy / Long	Sell/Short
Fail	Sell/Short	Buy/Long

- (iii) **Position on the Index Futures**

Sl. No.	Co.	Trend	Amount (₹)	Beta / Hedge Ratio	Index Value (₹)	Position
(a)	Yes Ltd.	Rise	100 Lakhs	1.25	1,25,00,000 [100 Lakhs × 1.25]	Short
(b)	No Ltd.	Depreciate	50 Lakhs	0.90	45,00,000 [50 Lakhs × 0.90]	Long
(c)	Fair Ltd.	Stagnant	40 Lakhs	0.75	30,00,000 [40 Lakhs × 0.75]	Long

Q 9

MTP Dec'24 Set 1

A portfolio manager owns 3 stocks :

Stock	Share owned	Stock Price (₹)	Beta
1	2 Lakh	800	1.1
2	4 Lakh	600	1.2
3	6 Lakh	200	1.3

The spot Nifty Index is at ₹2,700 and futures price is ₹2,704. Use stock index future to **analyse** the following situation -

- (i) decrease the portfolio beta to 0.8 and
- (ii) Increase the portfolio beta to 1.5. Assume the index factor is ₹100. find out the number of contracts to be bought or sold of stock index futures [7]

 Reference Portfolio Beta Management	What's New
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Answer

Computation of existing Portfolio Beta:

Security	MV of Security	Proportion	Beta of security	Weighted Beta
1	1600	4/13	1.1	0.34
2	2400	6/13	1.2	0.55
3	1200	3/13	1.3	0.30
	5200			1.19

Value per Futures Contract

= Index Price per unit × Lot Size per Futures Contract

= ₹2700 × 100 = ₹2,70,000

- (i) Activity to reduce portfolio beta to 0.8

Object: Reduce Portfolio Beta

Activity: Sell Index Futures

Beta of Existing Portfolio = $\beta_1 = 1.19$

Desired Beta of New Portfolio = $\beta_N = 0.8$

Contract size = 100 units

Value per Futures Contract = ₹2,70,000 [VF]

Value of Portfolio = ₹5200 Lakhs [VP]

No of future Contract to be sold :

$$= \text{Portfolio value} \times \frac{[\text{Beta of Portfolio} - \text{Desired value of Beta}]}{\text{Value of Future Contract}}$$

$$= V_p \times \frac{\beta_1 - \beta_N}{V_F}$$

= ₹5200 Lakhs × [(1.19 – 0.8) ÷ ₹2,70,000] = 751 Contracts

- (ii) Objective to increase portfolio beta to 1.5

Object: Increase Portfolio Beta

Activity: Buy Index Futures

Beta of Existing Portfolio = $\beta_1 = 1.19$

Desired Beta of New Portfolio = $\beta_n = 1.5$

Value per Futures Contract = ₹2,70,000 [VF]

Value of Portfolio = ₹5200 Lakhs [VP]



No of future Contract to be bought :

$$= \text{Portfolio value} \times \frac{[\text{Desired value of Beta} - \text{Beta of the Portfolio}]}{\text{Value of Future Contract}}$$

$$= V_p \times \frac{\beta_1 - \beta_N}{V_F}$$

$$= ₹5200 \text{ Lakhs} \times [(1.50 - 1.19) \div ₹270000] = 597 \text{ Contracts}$$



13.3

Options

(Q) 1

June'23 MTP Set 1

The equity share of ABC Ltd., is quoted at ₹ 210. A 3-month call option is available at a premium of ₹ 6 per share and a 3-month put option is available at a premium of ₹ 5 per share. Ascertain the net pay-offs to the option holder of a call option and a put option if (i) The strike price in both cases is ₹ 220 and (ii) The share price on the exercise days is ₹ 200, 210, 220, 230 and 240.

On the expiry day for **what** threshold values of share price will each option holder be in the money? [8]

Reference	What's New
<ul style="list-style-type: none"> ● Net Pay-Offs , Threshold Values 	

Answer

Net pay-off [call option]

Spot price on Expiry Date (SPE)	Exercise Price (EP)	Value of call [Maximum of (SPE-EP),0]	Action	Option premium	Net Pay off [call holder]
1	2	3	4	5	6 = 3-5
200	220	200-220 = - 20-----0	Lapse	6	0-6 = -6
210	220	210-220 = - 10-----0	Lapse	6	0-6 = -6
220	220	220-220 = 0-----0	Lapse	6	0-6 = -6
230	220	230-220 = 10-----10	Exercise	6	10-6 = 4
240	220	240-220 = 20-----20	Exercise	6	20-6 = 14

Net pay off [put option]

Spot price on Expiry Date(SPE)	Exercise price (EP)	Value of call [Maximum of (EP-SPE),0]	Action	Option premium	Net Pay off [call holder]
1	2	3	4	5	6 = 3-5
200	220	220-200 = 20	Exercise	5	15
210	220	220-210 = 10	Exercise	5	5



220	220	220-220 = 0	Lapse	5	-5
230	220	220-230 = - 10----0	Lapse	5	-5
240	220	220-240 = - 20----0	Lapse	5	-5

Option is gainfully exercised by (or in the money)

- (i) For call option holder, share price is more than ₹ 226
- (ii) For put option holder, share price is less than ₹ 215

Q2

June'23 MTP Set 2

An Indian exporter has sold handicraft items to an American business house. The exporter will be receiving US dollar 1 lakh in 90 days. Premium for a dollar put option with a strike price of ₹ 81.00 and a 90 days settlement is ₹ 1. The exporter anticipates the spot rate after 90 days to be ₹ 79.50.

Analyse the benefit of the exporter if it hedges its account receivable in the options market.

Reference	What's New
 Hedging	

Answer

Option	Put
Strike price	₹81 per US \$
Premium	₹ 1 per US \$
Settlement (expiration) rate	₹ 79.50

Benefit from Put option = Max [(Strike rate – Expiration rate),0] – Premium

$$= \text{Max } [(\text{₹ 81 per US \$} - \text{₹ 79.50 per US \$}), 0] - \text{₹ 1 per US \$}$$

$$= \text{₹ } (1.50 - \text{₹ } 1) \text{ per US \$} = \text{₹ } 0.50 \text{ per US \$}$$

Here, if the exporter remains un-hedged, it will receive

$$= [\text{₹ } 79.50 \text{ per US \$} \times \text{US \$ } 1,00,000] = \text{₹ } 79,50,000$$

But with hedging using Put Option, the exporter receives at the end of 90 days

$$= [(\text{₹ } 81 \times \text{US \$ } 1,00,000) - (\text{₹ } 1 \times \text{US \$ } 1,00,000)] = \text{₹ } 80,00,000$$

$$\text{Gain} = \text{₹ } 50,000$$



OR Gain = $(71 - 69.50) - 1 = 1.5 - 1 = 0.5 \text{ ₹/\$}$

$1,00,000\text{\$} \times 0.5 = 50,000 \text{ ₹}$

As there is benefit in owing the Put, so the Exporter should hedge using the Put Option.

Q3

Dec'23 MTP Set 1

Calculate the price of a European put option on a non-dividend-paying stock when the stock price is ₹ 69, the strike price is ₹ 70, the risk-free interest rate is 5% per annum, the volatility is 35% per annum, and the time to maturity is six months. [7]

 Reference Black Scholes Model	What's New
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Answer

In this case,

$$S_0 = 69, K = 70, r = 0.05, \sigma = 0.35 \text{ and } T = 0.5$$

$$d_1 = \frac{\ln(69/70) + (0.05 + 0.35^2/2) \times 0.5}{0.35\sqrt{0.5}} = 0.166$$

$$d_2 = d_1 - 0.35\sqrt{0.5} = -0.0809$$

The price of the European put is

$$70e^{-0.05 \times 0.5} N(d_2) - 69 N(-d_1)$$

$$= 70e^{-0.05} \times 0.5 \times 0.5323 - 69 \times 0.4338$$

$$= 6.40$$

Q4

Dec'23

The shares of GOXIN Ltd. are presently trading at a price of ₹ 540. After 3 months, the prices will either be ₹ 600 or ₹ 480 with respective probabilities 60% and 40%. There is a call option on the shares of GOXIN Ltd. that can be exercised only at the end of three months at an exercise price of ₹ 510. The Risk-Free Rate of interest is 6% per annum continuous compounding.

Assume no dividends in the interim period.

Required:

- (i) **Determine** the value of three months call option using the Binomial Model (Delta Method).
- (ii) **Assess** the value of the put-option under put-call parity .
- (iii) **Analyze** the expected values-of the option and the stock price at the end of three months.
[Given: $e^{-0.015} = 0.985112$, $e^{-0.03} = 0.980446$, $e^{0.015} = 1.015113$, $e^{0.03} = 1.030455$]
(calculation upto two decimal points) [7]

Reference

Call option using Binomial Model, Put Option under Put-Call Parity, Expected value of the Option & Stock Price

What's New**Answer**

- (i) Value of Call Option = ₹ 50.36
- (ii) Value of Put Option = ₹ 12.77
- (iii) Expected Value of Option = ₹ 54

Expected Value of Stock Price at the end of three months = ₹ 552

 **5**
Jun'23

MR. ZETSON is interested in purchasing equity shares of ROTEX Ltd. which are currently selling at ₹ 600 each. He expects that price of share may go upto ₹ 780 or may go down to ₹ 480 in three months. The chances of occurring such variations are 60% and 40% respectively. A call option on the shares of ROTEX Ltd. can be exercised at the end of three months with a strike price of ₹ 630.

(Ignore transaction cost. Assume no dividends in the interim period.)

Required:

- (i) **Determine** the combination of the share and option should MR. ZETSON select if he wants a perfect hedge.
- (ii) **Explain** how MR. ZETSON will be available to maintain identical position regardless of the share price.
- (iii) **Calculate** the value of call option at the beginning of the period, if the risk-free rate of return is 10% p.a.
- (iv) **Calculate** the expected return on call option. [1 + (2 × 3) = 7]



Reference

Call Option hedging using delta, Valuation of Call, Expected Return

What's New
Answer

- (i) Mr. ZETSON should purchase 0.5 share for every 1 call option.
- (ii) If price of share comes out to be ₹ 780 then value of purchased share will be:

Sale Proceeds of Investment ($0.50 \times ₹ 780$)	₹ 390
Loss on account of Short Position ($₹ 780 - ₹ 630$)	₹ 150
If price of share comes out be ₹ 480 then value of purchased share will be:	
Sale Proceeds of Investment ($0.50 \times ₹ 480$)	₹ 240

- (iii) Value of call option at the beginning of the period. = ₹ 65.85
- (iv) Expected Return on the Option: = 36.67%

Q6
MTP Jun'24 Set 1

A put and a call option each have an expiration date 6 months hence and an exercise price ₹9. The interest rate for the 6 month period is 3 percent.

- (a) If the put has a market price of ₹2 and share is worth ₹10 per share, compute the value of the call.
- (b) If the put has a market price of ₹2 and the call ₹4. determine the value of the share per share.

If the call has a market value of ₹5 and market price of the share is ₹12 per share **what** is the value of the put? [7]

Reference

Value of Put - Put Call Parity

What's New
Answer
Under Put Call Parity -

$$\rightarrow \text{Value of Call} + \text{Present Value of Exercise Price} = \text{Current Spot Price} + \text{Value of Put}$$

$$\rightarrow C + EP \times e^{-rt} = SP_0 + P$$



Case (a)	Case (b)	Case (c)
$\rightarrow C + EP \times e^{-rt} = SP_0 + P$	$\rightarrow C + EP \times e^{-rt} = SP_0 + P$	$\rightarrow C + EP \times e^{-rt} = SP_0 + P$
$\rightarrow C = SP_0 + P - EP \times e^{-rt}$	$\rightarrow SP_0 = C + EP \times e^{-rt} - P$	$\rightarrow P = C + EP \times e^{-rt} - SP_0$
$\rightarrow C = 10 + 2 - (9 \times e^{-0.03 \times (6/12)})$	$\rightarrow SP_0 = 4 + (9 \times e^{-0.03 \times (6/12)}) - 1$	$\rightarrow P = 5 + 9 \times e^{-0.03 \times (6/12)} - 12$
$\rightarrow C = 12 - (9 \div 1.01511)$	$\rightarrow SP_0 = 4 + (9 \div 1.01511) - 1$	$\rightarrow P = 5 + 8.86 - 12$
$\rightarrow C = 12 - 8.86 = 3.14$	$\rightarrow SP_0 = 11.86$	$\rightarrow P = 1.86$
Value of Call = ₹3.14	Value of Share = ₹11.86	Value of Put = ₹1.86

(Q7)**Jun'24**

The information pertaining to the Shares of MACHON Ltd. is available below :

Current Market Price (₹)	432
Strike Price (₹)	462
Maximum Price (₹) expected in next 3 months' time	537
Minimum Price (₹) expected in next 3 months' time	390
Continuously Compounded Rate of Interest (p.a.) (%)	9%
e^{rt}	1.0228

Required:

- (i) **Assess** the 3 months call option by using Binomial Method and Risk Neutral Method.
- (ii) **Justify** that the Calculated value under both the models are same.


Answer

- (i) Call Option Value using Binomial Model:
Call Option = ₹ 25.85
Value of Call Option using Risk Neutral Model:
Call Option = ₹ 25.86
- (ii) Since Value of Call Option (₹ 25.85) under Binomial Model is almost equal to the valuation Call Option (₹ 25.86) under Risk Neutral Model it is justified that value of Call option under both Models is almost same.



Q8
MTP Dec'24 Set 1

Given the following:

Strike price	₹200
Current stock price	₹185
Risk free rate of interest	5% p.a

i. Calculate the theoretical minimum price of a European put option after 6 months.

ii. If European put option price is ₹5, then how can an arbitrageur make profit.

[7]

 Reference Price of Option	What's New
--	-------------------

Answer

(i) Computation of Theoretical Minimum Price

Particulars	Value
Exercise price	₹200
Current Stock Price	₹185
Risk Free Rate of Return (r)	5% or 0.05
Time (in years)	$6 \div 12 = 0.5$
Theoretical Minimum Price	$\begin{aligned} &= \text{Present Value of Exercise Price} - \text{Current Stock Price} \\ &= 200 \times e^{-rt} - 185 \\ &= 200 \times e^{-0.05 \times 0.5} - 185 \\ &= 200 \times 0.9753 - 185 \\ &= 195.0612 - 185 = 10.0612 \end{aligned}$

Inference: Since the Value of Put Option is more than the price of the Put Option, it is under priced and the recommended action will be to Buy the Put Option.

(ii) Cash Flows to make Profit for the Arbitrageur Activity Flow:

- Arbitrageur can borrow the amount required to buy the Put Option and Stock at the rate of 5% p.a. for 6 months.
- Buy Put Option.
- Take the opposite position and buy stock at spot price.
- At the end of six months, exercise the Put option and realise the receipts.
- Pay the amount of Borrowing together with Interest.



Particulars	Time	₹
1. Borrow at the rate of 5% for 6 months [185+5]	T ₀	190
2. Buy Put Option	T ₀	(5)
3. Buy Stock at Spot Price	T ₀	(185)
4. Exercise the Put Option and realise the Sale Proceeds	T ₁	200
5. Repay the amount of Borrowing together with Interest $[190 \times e^{0.05 \times 0.5}] = [190 \times 1.02532]$	T ₁	194.81
6. Net Gain made [(4) – (5)]	T ₁	5.19

Note: The amount of gain is the minimum amount and will Increase with every Increase in Spot Price as on the Exercise Date.

(Q1)

June'23 MTP Set 2, Postal Test Paper

Y, a British firm with a US subsidiary, seeks to refinance some of its existing British pound debt to include floating rate obligations. The best floating rate it can obtain in London is LIBOR + 2.0%. Its current debts are as follows:

US\$ 10 million owed to CT Bank at 9.5% (fixed annually); and

£ 5 million owed to MD Bank at 9.5% (fixed) annually.

HRS Company wishes to finance exports to Britain with £3 million of pound denominated fixed rate debt for six months. HRS is unable to obtain a fixed interest rate in London for less than 13.5% interest because of its lack of credit history in the UK. However, Lloyds Bank is willing to extend a floating rate British pound loan at LIBOR + 2%. HRS, however, cannot afford to pay more than 12%. Assume that Y is in a strong bargaining position and can negotiate the best deal possible, but HRS will not pay over 12%. Assume further that transaction costs are 0.5% and exchange rates are stable. Advise whether Y and HRS can help each other by an interest rate swap. In case the swap deal is workable, **determine** the amount of gains for Y, HRS and the Swap Dealer. **Create** a diagrammatic representation of the effective post-swap interest rates of each party. **Explain** the diagram with needful narratives. Also **show** the effective interest rates for each party over the six months period of the swap. [16]

Reference
Interest Rate Swap
What's New

Answer

Particulars	Cost of Funds Y and HRS		
	Objective	Fixed Rate	Floating Rate
Y	Floating	9.5% p.a.	LIBOR + 2%
HRS	Fixed	13.5% p.a.	LIBOR + 2%
Differential in absolute terms		4%	0

The differential between two markets = 4% – 0% = 4%.

A total of 4% needs to be shared between Y, HRS and Swap Dealer.

Since HRS cannot pay more than 12% as against the fixed rate funding of 13.5%, it requires 1.5% benefit out of 4%. Commission to swap dealer is 0.5%. so, benefit to Y = $4\% - 1.5\% - 0.5\% = 2\%$.

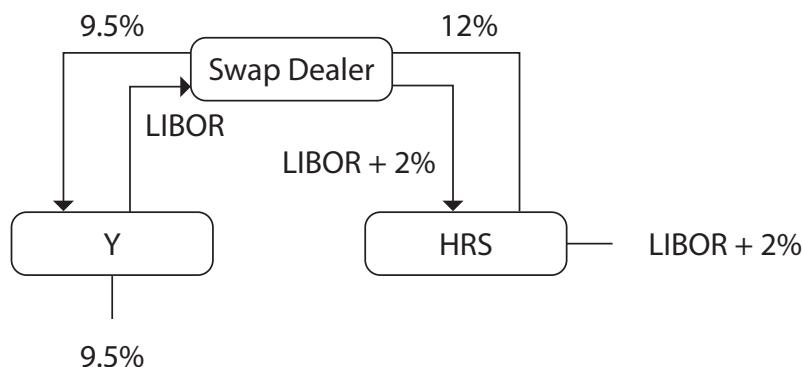
The swap can therefore be structured as follows:

Firm	Paid to Swap Dealer	Received from Swap Dealer	Paid to Market	Net Cost	Savings
Y	LIBOR	9.50%	9.50%	LIBOR	LIBOR + 2% – LIBOR = 2%
HRS	10%	LIBOR	12%	12%	13.5% – 12% = 1.5%

Y gets floating rate funds at LIBOR as against LIBOR + 2%, thereby getting advantage of 2% HRS gets fixed rate funds at 13.5%, there by getting advantage of 1.5%.

Finally Swap Dealer get commission of 0.5%.

Schematic Diagram



Effective interest rates: If HRS is able to negotiate such that its total outflow is 12%, Commission will be borne by Y.

Hence, effective interest rate for Y = LIBOR

HRS = 12%

Alternatively, Y = LIBOR + 2% – 2.25% = LIBOR – 0.25%

HRS = 12% (Fixed) + 0.25% (Commission) = 12.25% (Fixed).



13.5

Interest Rate Derivatives – Forward Rate Agreement, Interest Rate Futures and Options, Caps, Floors and Collars

(Q)1

Postal Test Paper

MNC rolls over a \$25 million loan priced at LIBOR on a three-month basis. The company feels that interest rates are rising and that rates will be higher at the next roll-over date in three months. Suppose the current LIBOR is 5.4375%. **Explain** how MNC can use FRA at 6% offered by a bank to reduce its interest rate risk on this loan. In three months, if interest rates have risen to 6.25%, **how much** will MNC receive/pay on its FRA? Assume the three months period as 90 days. [6]

Reference**FRA Settlement****What's New****Answer**

MNC can use 3×6 FRA, if it expects that the rates would be higher at the next roll-over of three months, starting three months from today. In other words MNC would buy 3×6 FRA @ 6%, clearly with a view that higher rate would prevail on the settlement date i.e. 3 months from now.

Now if on the settlement date, the rate is 6.25%, then MNC's decision to buy 3×6 FRA has been proved right and it would receive the present value of the interest differentials on the loan amount i.e. it would receive:

$$\text{Payoff} = \text{National Amount} \times \frac{\text{Reference Rate} - \text{Fixed Rate}}{1 + \text{Reference Rate} \times \alpha} \times \alpha \quad (\alpha \text{ is the day count function})$$

$$= \$2,50,00,000 \times \frac{(0.0625 - 0.0600) \times 92 / 360}{1 + (0.06125 \times 90 / 360)}$$

$$= \$15,385$$

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Q 2

Postal Test Paper

DY has purchased ₹400 million cap (i.e., call options on interest rates) of 9 percent at a premium of 0.65% of face value. ₹400 million floor (i.e., put options on interest rates) of 4 percent is also available at premium of 0.69 percent of face value.

- (i) If interest rates rise to 10 percent, what is the amount received by DY? **What** are the net savings after deducting the premium?
- (ii) If DY also purchases a floor, **what** are the net savings if interest rates rise to 11 percent? **What** are the net savings if interest rates fall to 3 percent?
- (iii) If, instead, DY sells (writes) the floor, **what** are the net savings if interest rates rise to 11 percent? **What** if they fall to 3 percent?
- (iv) **What** amount of floors should it sell in order to compensate for its purchases of caps, given the above premium? [8]

Reference
 **Net Savings, Floor & Cap**
What's New
Answer

- (a) Premium for purchasing the cap = $0.65\% \times ₹400 \text{ million} = ₹26,00,000$. If interest rates rise to 10 percent, cap purchasers receive $₹400 \text{ million} \times 0.01 = ₹40,00,000$. The net savings is $₹14,00,000$.
- (b) If DY also purchases the floor: Premium = $0.0069 \times ₹400 \text{ million} = ₹27,60,000$, and the total premium = $₹27,60,000 + ₹26,00,000 = ₹53,60,000$.
If interest rates rise to 11 percent, cap purchasers receive $0.02 \times ₹400 \text{ million} = ₹80,00,000$ and the net savings = $₹80,00,000 - ₹53,60,000 = ₹26,40,000$.
If interest rates fall to 3 percent, floor purchaser receive $0.01 \times ₹400 \text{ million} = ₹40,00,000$ and the net savings = $₹40,00,000 - ₹53,60,000 = - ₹13,60,000$.
- (c) If DY sells the floor, it receives net ₹27,60,000 minus the cost of the cap of ₹26,00,000 = + ₹1,60,000.
If interest rates rise to 11 percent, cap purchasers receive $0.02 \times ₹400 \text{ million} = ₹80,00,000$. The net the savings = ₹80,00,000 + ₹1,60,000 = ₹81,60,000.
If interest rates fall to 3 percent, floor purchasers receive $0.01 \times ₹400 \text{ million} = ₹40,00,000$. The net savings to DY = - ₹40,00,000 + 1,60,000 = - ₹38,40,000
- (d) DY. Needs to sell: $X \times 0.0069 = ₹26,00,000$, or $X = ₹37,68,11,594$ worth of 4 percent floors.



NOTES

Chapter 14

The International Financial Environment

14.1

International Financial Institutions and Markets

14.2

Sources of Foreign Currency



International Financial Institutions and Markets

(Q)1**Dec'23**

Identify the major initiatives taken by the World Bank (any five). [5]

Reference	What's New
 Major Initiatives - World Bank	

A n s w e r

The major initiatives taken by the World Bank are as follows:

(i) **Poverty Reduction :**

The Bank's assistance plans are based on poverty reduction strategies, by combining an analysis of local groups with an analysis of the country's financial and economic situation.

(ii) **Global Partnerships:**

Together with the World Health Organization, the World Bank administers the International Health Partnership (IHP+).

(iii) **Protect from the Adversities of Climate Change:**

The World Bank doubled its aid for climate change adaptation from \$2.3bn (£1.47bn) in 2011 to \$4.6 bn in 2012.

(iv) **Food Security:**

The World Bank also took slew of measures including Global Food Security Program in 2010and also launched Global Food Crisis Response Program.

(v) **Clean Air Initiative (CAI):**

It is a World Bank initiative to advance innovative ways to improve air quality in cities through partnerships in selected regions of the world by sharing knowledge and experiences.

(vi) **Open Data Initiatives (ODI) :**

The World Bank collects and process Large amounts of data and generate them on the basis of economic model.

(vii) Open Knowledge Repository (OKR) :

The World Bank hosts the open knowledge Repository (OKR) as an official open access repository for its research outputs and knowledge products.



Sources of Foreign Currency

(Q)1**Jun'23 MTP Set 1****What do you mean by ADR? Discuss its advantages and limitations.**

[8]

Reference**ADR: advantages and limitations****What's New****Answer**

An American Depository Receipt (ADR) is a certificate that represent shares of a foreign stock owned and issued by a U.S. bank. The foreign shares are usually held in custody overseas, but the certificates trade in the U.S. Through this system, a large number of foreign-based companies are actively traded on one of the three major U.S. equity markets (the NYSE, AMEX or Nasdaq).

Advantages of ADRs: ADRs provide the following advantages -

- (i) Access to Large Capital.
- (ii) Access to Foreign Exchange.
- (iii) No Change in the Shareholding / voting pattern.
- (iv) Increased recognition for the Company internationally by bankers, customers, etc.
- (v) No Exchange Rate risk since the Company pays interest and dividends in Indian Rupees.

Limitations of ADRs:

- (i) High cost of Issue.
- (ii) Requirement as to large size of issue.
- (iii) Stringent compliance requirements.

Q2

Dec'23 MTP Set 1

Discuss who can invest in participatory notes.

[5]

Reference	What's New
 Participatory Notes	

Answer

Following entities are eligible to invest in Participatory Notes:

- (i) Any entity incorporated in a jurisdiction that requires filing of constitutional and/or other documents with a registrar of companies or comparable regulatory agency or body under the applicable companies' legislation in that jurisdiction;
- (ii) Any entity that is regulated, authorized or supervised by a central bank, such as the Bank of England, the Federal Reserve, the Hong Kong Monetary Authority, the Monetary Authority of Singapore or any other similar body provided that the entity must not only be authorized but also be regulated by the aforesaid regulatory bodies;
- (iii) Any entity that is regulated, authorized or supervised by securities or futures commission, such as the Financial Services Authority (UK), the Securities and Exchange Commission, the Commodities Futures Trading Commission, the Securities and Futures Commission (Hong Kong or Taiwan), Australia Securities and Investments Commission(Australia) or other securities or futures authority or commission in any country, state or territory;
- (iv) Any entity that is a member of securities or futures exchanges such as the New York Stock Exchange (Sub-account), London Stock Exchange (UK), Tokyo Stock Exchange (Japan), NASD (Sub-account) or other similar self-regulatory securitiess authority or commission within any country, state or territory provided that the aforesaid organisations which are in the nature of self-regulatory organisations are ultimately accountable to the respective securities / financial market regulators.
- (v) Any individual or entity (such as fund, trust, collective investment scheme, Investment Company or limited partnership) whose investment advisory function is managed by an entity satisfying the criteria of (a), (b), (c) or (d) above.



Q3**Jun'23 MTP Set 2****Compare** and contrast ADR and GDR.**Reference****ADR and GDR****What's New****Answer**

An American Depository Receipt (ADR) is a certificate that represent shares of a foreign stock owned and issued by a U.S. bank. The foreign shares are usually held in custody overseas, but the certificates trade in the U.S. Through this system, a large number of foreign-based companies are actively traded on one of the three major U.S. equity markets (the NYSE, AMEX or Nasdaq).

These are a class of investment which allows international investors to own shares in foreign companies where the foreign market is hard to access for the retail investor, and without having to worry about foreign currencies and tax treatments. Global Depository Receipts are issued by international investments banks as certificates (the GDR) which represents the foreign shares but which can be traded on the local stock exchange. For example, a UK investor may be able to buy shares in a Vietnamese company via a GDR issued by a UK investment bank. The GDR will be denominated in GB Pounds and will be tradable on the London Stock Exchange. The investment bank takes care of currency exchange, foreign taxes etc. and pays dividends on the GDR in GB Pounds.

Q4**Jun'24****Align** the features of Global Depository Receipt (GDR).

[5]

Reference**Features of Global Depository Receipt****What's New****Answer**

The features of Global Depository Receipt (GDR) are aligned below:

(i) Underlying Shares:

Each GDR may represent one or more underlying share, which are physically held by the Custodian appointed by the Depository Bank.

(ii) **Entry in Company's Books:**

In the Company's books, the Depository Bank's name appears as the holder of the shares.

(iii) **Returns:**

Depository gets the dividends from the Company (in local currency) and distributes them to the holders of the Depository Receipts after converting into dollars at the going rate of exchange.

(iv) **Negotiable:**

GDRs are exchangeable with the underlying share either at any time, or after the lapse of a particular period of time, generally 45 Days.

(v) **Globally Marketed:**

GDRs are marketed globally without being confined to borders of any market or country as it can be traded in more than one country.

(vi) **Settlement:**

GDRs are settled through CEDEL, & Euro Clear International Book Entry Systems.

Q 5

MTP Dec'24 Set 1

What are the different types of foreign bonds? **Discuss.**

[4]

Reference	What's New
<ul style="list-style-type: none"> ● ● Types of Foreign Bonds ● ● ● 	

A n s w e r

Different types of foreign bonds are as follows:

- **Yankee Bonds:** These are US dollar denominated issues by foreign borrowers (usually foreign governments or entities, supranational and highly rated corporate borrowers) in the US bond markets. Reliance Industries Ltd. has been the most successful corporate to tap this instrument with a 50-year, \$50 million Yankee Bond issue in 2013.
- **Samurai Bonds:** These are bonds issued by non-Japanese borrowers in the domestic Japanese markets. Borrowers are supranational and have at least a minimum investment grade rating (A rated). The maturities range between 3-20 years.
- **Bulldog Bonds:** These are sterling denominated foreign bonds which are raised in the UK domestic securities market. The maturity of these bonds will be either for very short periods (5 years) or for very long maturities (25 years and above). Bonds with intermediate



maturity periods are rare. These bulldog bonds are generally subscribed by long-term institutional investors like pension funds and life insurance companies.

- **Shibosai Bonds:** These are the privately placed bonds issued in the Japanese markets. The qualifying criteria is less stringent as compared to Samurai or EuroYen bonds. Shibosai bonds are offered to a different market segment that consists of institutional investors, including banks.

Chapter 15

Foreign Exchange Market

15.1

Introduction – Structure of Foreign Exchange Market

15.2

Foreign Exchange Rate – Meaning, Determinants, Equilibrium Exchange Rate, Exchange Rate Quotations – Meaning, Direct vs. Indirect Quote, American vs. European Quote, Bid-Ask Rate and Spread, Cross Rates

15.3

Segments of Foreign Exchange Market – Spot Market (including two and three-point Arbitrage), Forward Market

15.4

Foreign Currency Derivatives

15.5

Parity Relationships



15.1

Introduction – Structure of Foreign Exchange Market

No questions have been asked yet from this chapter !

15.2

Foreign Exchange Rate – Meaning, Determinants, Equilibrium Exchange Rate, Exchange Rate Quotations – Meaning, Direct vs. Indirect Quote, American vs. European Quote, Bid-Ask Rate and Spread, Cross Rates

No questions have been asked yet from this chapter !



15.3

Segments of Foreign Exchange Market

– Spot Market (including two and three-point Arbitrage), Forward Market

No questions have been asked yet from this chapter !

15.4

Foreign Currency Derivatives

No questions have been asked yet from this chapter !



15.5 Parity Relationships

(Q)1

Dec'23 MTP Set 1

Exchange rate between Rupee and Swiss franc is ₹33/SFr at the reference period and the forward rate is found to be ₹33.40/SFr after 9 months. Nine-month interest rate on Rupee is 8% p.a. Recommend what should have been corresponding interest rate on Swiss franc.

Show that interest rate differential is equal to forward premium or discount.

[7]

Reference

Interest Rate Parity

What's New

Answer

Given, $e_0 = ₹33/\text{SFr}$

$f_1 = ₹33.40/\text{SFr}$

Interest rate in home country (India) = $r_h = 8\%$ p.a. (for 9 months)

Interest rate in foreign country (USA) = $r_f = x\%$ p.a. (for 9 months)

$$\text{Since, as per IPR, } f = e_0 \frac{1+r_h}{1+r_f}$$

$$\text{Conditionally, } 33.40 = 33 \times \frac{1+0.08 \times \frac{9}{12}}{1+x \times \frac{9}{12}}$$

or, $x = 0.063$ or 6.3%

So, the interest rate on Swiss franc is 6.3% p.a.

$$\text{Interest rate differential} = \frac{r_h + r_f}{1 + r_f} = \frac{\frac{0.08 \times \frac{9}{12}}{1 + 0.063 \times \frac{9}{12}} - 0.063 \times \frac{9}{12}}{1 + 0.063 \times \frac{9}{12}} = 1.21\%$$

$$\text{Forward Premium or discount} = \frac{f_1 - e_0}{e_0} = (33.40 - 33.00)/33.00 = 1.21\%$$

So, interest rate differential is equal to forward premium or discount.

(Q) 2

MTP Jun'24 Set 1

Following are the USD/INR spot and 3-month forward quotes available. Which currency is in forward premium or discount? **Calculate** the annualised forward premium or discount.

Spot rate, USD/INR: ₹75.42/50

3-month swap points: 20/30

[7]

Reference	What's New
<ul style="list-style-type: none"> ● ● Forward Premium / Discount ● ● ● 	

Answer

Calculation of 3-month forward quote

Particulars	Bid rate	Ask rate	Spread
Spot rate	75.42	75.50	0.11%
Swap points (to be added)	0.20	0.30	
3-month Forward rate	75.62	75.80	0.24%

Since, the rates are in bid-ask form, we need to calculate the mid-rate to determine the forward premium and discount.

$$\text{Spot (USD/INR) mid} = (75.42 + 75.50)/2 = ₹75.46/\$$$

$$\text{3-month Forward (USD/INR) mid} = (75.62 + 75.80)/2 = ₹75.71/\$$$

Here, USD has become dearer. Hence, USD is in forward premium and INR is in forward discount.

$$\text{Forward Premium (annualised)} = \frac{\text{Forward Rate} - \text{Spot Rate}}{\text{Spot Rate}} \times \frac{12}{m} \times 100$$

$$= \frac{75.71 - 75.46}{75.46} \times \frac{12}{3} \times 100 = 1.33\%$$

So, USD is in forward premium by 1.33%.

$$\begin{aligned}\text{Forward discount (annualised)} &= \frac{\frac{1}{75.71} - \frac{1}{75.46}}{\frac{1}{75.46}} \times \frac{12}{3} \times 100 \\ &= \frac{0.01321 - 0.013252}{0.013252} \times \frac{12}{3} \times 100 = 1.27\%\end{aligned}$$

So, INR is in forward discount by 1.27%.

(Q) 3

MTP Dec'24 Set 1

Exchange rate between Rupee and Swiss franc is ₹33/SFr at the reference period and the forward rate is found to be ₹33.40/SFr after 9 months. Nine-month interest rate on Rupee is 8% p.a. Recommend what should have been corresponding interest rate on Swiss franc.

Show that interest rate differential is equal to forward premium or discount. [7]

Reference	What's New
Interest Rate Differential	

Answer

Given, $e_0 = ₹33/\text{SFr}$

$f_1 = ₹33.40/\text{SFr}$

Interest rate in home country (India) = $r_h = 8\%$ p.a. (for 9 months)

Interest rate in foreign country (USA) = $r_f = x\%$ p.a. (for 9 months)

Since, as per IPR, $f_1 = e_0 \times (1 + r_h)/1 + r_f$

$$\text{Conditionally, } 33.40 = 33 \times \frac{1 + 0.08 \times 9 / 12}{1 + X \times 9 / 12}$$

or, $x = 0.063$ or 6.3%

So, the interest rate on Swiss franc is 6.3% p.a.

$$\begin{aligned}\text{Interest rate differential} &= r_h - r_f / 1 + r_f \\ &= \frac{0.08 \times 9 / 12 - 0.063 \times 9 / 12}{1 + 0.063 \times 9 / 12} \\ &= 1.21\%\end{aligned}$$

$$\begin{aligned}\text{Forward premium or discount} &= f_1 - e_0 / e_0 \\ &= (33.40 - 33.00) / 33.00 \\ &= 1.21\%\end{aligned}$$

So, interest rate differential is equal to forward premium or discount.



NOTES

Chapter

16

Foreign Exchange Risk Management

16.1

Transaction Exposure

16.2

Translation Exposure

16.3

Operating Exposure



16.1

Transaction Exposure

(Q) 1

June'23 MTP Set 1

X Ltd. has imported goods from USA worth US \$ 10 million and it requires 90 days to make the payment. The USA supplier has offered a 60 days interest free credit period and for additional credit for 30 days interest is to be charged at 8% per annum. (Consider 360 days p.a.)

The banker of X Ltd. Offers a 30 days loan at 10% per annum and its quotes for foreign exchange are as follows:

Spot 1 US \$	₹ 64.50
60 days forward rate for 1 US \$	₹ 65.10
90 days forward rate for 1 US \$	₹ 65.50

You are **required** to **evaluate** the following options:

- (i) **Pay** the USA supplier in 60 days or
- (ii) **Avail** the supplier's offer of 90 days' credit. **Advise** X Ltd. accordingly. [8]

Reference

Evaluation of Lagging

What's New

Answer

- (i) **Payment to supplier in 60 days**

If the payment is made to supplier in 60 Days, the applicable forward rate for 1 US\$	₹ 65.10
Payment due	US\$ 1,00,00,000
Outflow in rupees ($US\$ 1,00,00,000 \times ₹ 65.10$)	₹ 65,10,00,000
Add: Interest on Loan for 30 days @10% p.a.	₹ 54,25,000
Total Outflow	₹ 65,64,25,000

(ii) **Payment to supplier in 90 days**

Amount Payable	US\$ 1,00,00,000
Add: Interest on Credit Period for 30 days @ 8% p.a.	US\$ 66,667
Total Outflow in US\$	US\$ 1,00,66,667
Applicable forward for 1 US\$	₹ 65.50
Total Outflow (US\$ 1,00,66,667 × ₹ 65.50)	₹ 65,93,66,689

Comment: It is better to select alternative (i) as it entails lower cash flows.

Q 2

June'23 MTP Set 2

A company operating in USA has on 1st September 2022 invoiced sales in \$ to an Indian company, the payment being due on 1st December 2022. The invoice amount is \$ 13,750. At spot rate on 1/9/2022 it is equivalent to ₹ 10,18,875. The 3 months forward rate is presently quoted at \$ 0.01340 per rupee. The importer wants to hedge half his exposure by a forward contract. Advise the company on hedging transaction by forward contract. Substantiate your advice through calculation of the pay outs and the net gain or loss due to hedging if the spot rates are as follows on 1st December 2022.

- (i) \$ 0.01338
- (ii) \$ 0.01352

Present your calculation using ₹/\$ up to two decimal places. Ignore transaction cost.

Reference  Hedging - Importer's view point	What's New
---	-------------------

Answer

The importer will loss if the \$ appreciates, as is indicated by the forward rate/ Spot rate on 1/9/2022 = 74.10 ₹/\$ (Since, ₹10,18,875/\$13,750)

3m forward rate = 1/0.01340 = 74.63

Hence by a forward contract, he will ask his banker to sell him at ₹ 74.63, 3 months later, irrespective of what happens to the spot rate on 1st Dec.

- (i) On Dec 1st, if the sport rate increases to 74.74 (i.e., 1/0.01338),

Half of his exposure is hedged.

His pay-out will be on 1st Dec, $13,750/2 \times 74.74 + 13,750/2 \times 74.63$

$$\text{i.e., } 6,875 \times 74.40 + 6,875 \times 74.63 = 5,13,838 + 5,13,081 = 10,26,919.$$



If he had not gone for the Forward contract, he would have paid $13,750 \times 74.74 = 10,27,675$

By forward contract, the net gain is $10,27,675 - 10,26,919 = 757$

Or

He can still buy from his bank at 74.63. He saves ₹0.11 per \$ by hedging

i.e., $0.11 \times 6,875 = 757$

- (ii) If the exchange rate falls to 73.96 (i.e., 1/0.01352) on 1st December,

His pay out on 1/12 will be $6,875 \times 73.96 + 6,875 \times 74.63$

i.e., he will pay $5,08,475 + 5,13,081 = 10,21,556$

If not gone for forward contract, he would have paid $13,750 \times 73.96 = 10,16,950$

By forward contract the net loss = $10,21,556 - 10,16,950 = ₹4,606$

Or

He will lose due to the forward contract to the extent of $6,875 \times (74.63 - 73.96) = ₹4,606$

Since the forward rate was indicating a premium, the importer would only go for forward purchase agreement from the bank. If the actual spot rate goes in a different direction, then the forward contract will not result in hedging and will instead create loss.

Q3

Jun'23

NOTON Ltd. has imported goods to the extent of US\$ 1 crore. The payment terms are 60 days interest-free credit. For additional credit of 30 days, interest at the rate of 7.75% p.a. will be charged.

The banker of NOTON Ltd. has offered a 30 days loan at the rate of 9.5% p.a. Further their quote for the foreign exchange is as follows:

Spot rate INR/US\$ X	₹ 75.50
60 days forward rate INR/US\$	₹ 76.15
90 days forward rate INR/US\$	₹ 76.45

Required:

Advice which one of the following options would be better for NOTON Ltd.:

- (i) Pay the supplier on 60th day and avail bank loan for 30 days.
- (ii) Avail the supplier's offer of 90 days credit.

Note: Consider 360 days a year and calculation to be in crore rounding off upto 4 decimal points for INR and 5 decimal points for USD.
[3 + 4 + 1 = 8]



Reference**Evaluation of Lagging****What's New****Answer**

- (i) Total Outflow under Option-1 = ₹ 76.7529 Crore
- (ii) Total Outflow under Option-2 = ₹ 76.9439 Crore

Advice: Since cash outflow is least under option-1, it is better to avail loan from bank.

(Q)4**Dec'23 MTP Set 1**

On 25th March 2023, a customer requested his bank to remit DG 12,50,000 to Netherlands in payment of import of diamonds under an irrevocable LC. However due to bank strikes, the bank could affect the remittance only on 2nd April 2023. The inter-bank market rates were as follows:

Date	25.03.2023	02.04.2023
Bombay [\$ / ₹100]	2.2873 – 2.2962	2.3063 – 2.3159
London [US\$/Pound]	1.9120 – 1.9135	1.9050 – 1.9070
DG /Pound	4.1125 – 4.1140	4.0120 – 4.0130

The bank wishes to retain an exchange margin of 0.25%.

Calculate how much does the customer stand to gain or lose due to the delay?

[7]

Reference**Modification of Forward Contract****What's New****Answer****1. Determination of Rupee Value of DG 1 on 25.03.2021**

Process: Buy US \$ at Ask Rate at Bombay => Buy Pound (using US \$) at Ask Rate at London
=> Sell Pound at Bid Rate for DG

Therefore, ₹ / DG = Ask Rate at Bombay (for Purchase of Dollar) × Ask Rate for Pound at London (for Purchase of Pound) × Bid Rate for DG (for conversion of Pound into DG)

$$= 100/2.2873 \times 1.9135 \times (1/4.1125)$$



= ₹ 20.34 per DG

2. Determination of Rupee Value of DG 1 on 02.04.2021

Process: Buy US \$ at Ask Rate at Bombay => Buy Pound (using US \$) at Ask Rate at London
 => Sell Pound at Bid Rate for DG

Therefore, ₹/DG = Ask Rate at Bombay (for Purchase of Dollar) × Ask Rate for Pound at London (for Purchase of Pound) × Bid Rate for DG (for conversion of Pound into DG)

$$= 100/2.3063 \times 1.9070 \times (1/4.0120)$$

= ₹20.61 per DG

3. Loss because of Delay

(a) Loss without considering Banker's Margin (Extra Money payable by the Company)

= Amount Payable × (Exchange Rate on the date of actual payment – Exchange Rate on the date on which payable)

$$= \text{DG } 12,50,000 \times (\text{₹}20.61 - \text{₹}20.34)$$

= ₹3,37,500

(b) Banker's Margin on Loss

$$= ₹3,37,500 \times 0.25\%$$

= ₹ 844

(c) Total Loss to the Company

$$= ₹3,37,500 + ₹844$$

= ₹3,38,344

(Q)5

Dec'23

ZISTON Ltd., an Indian MNC is executing a plant in Nepal. It has raised ₹ 600 Bill. Half of the amount will be required after six months' time. ZISTON Ltd. is looking for an opportunity to invest this amount for a period of six months. It is considering following two options:

Market	UK	Europe
Nature of Investment	Index Fund (GBP)	Treasury Bills (Euro)
Dividend (GBP in Billions)	0.1365	-
Income from stock lending (GBP in Billions)	0.0065	-
Discount on the investment value at the end	3%	-
Interest	-	7.8 percent per annum
Exchange Rate (Spot)	GBP/INR 0.0099	EUR/INR 0.011
Exchange Rate (6 month Forward)	GBP/INR 0.0100	EUR/INR 0.011



Required:

You as an investment manager suggest a suitable option to be considered which is economical to the company.

 Reference Evaluation of	What's New
--	-------------------

Answer

- (i) If Investment is made in Index Fund (GBP):

Value of Investment after 6 months in D @ GBP / INR D 302.39 Billion

- (ii) If Investment is made in Treasury Bills (Europe):

Value of Investment after 6 months in D @ EURO / INR 0.011 D 311.7000 Billion

Suggestion:

Total amount of Second Option i.e. investment in Treasury Bills (EURO) is higher than that of the First Option i.e. investment in Index Fund (GBP) and Treasury Bills (EURO) is Risk Free also. So investment in Treasury Bills (EURO) is suggested.

Q6**MTP Dec'24 Set 1**

A firm is contemplating import of a consignment from USA for a value of USD 10,000. It requires 90 days to make payment. Supplier has offered 60 days' interest-free credit and is willing to offer additional 30 days' credit at an interest rate of 6% per annum. (Consider 360 days p.a.)

The Bankers of the firm offer a 30 days loan at 9 % per annum and its quotes for foreign exchange are as follows:

Spot 1 USD = ₹ 46.00,

60 days forward rate for 1 USD = ₹ 46.20,

90 days forward rate for 1 USD = ₹ 46.35.

You are **required** to advice the firm as to whether it should -

- (i) Pay the supplier in 60 days or
- (ii) Avail the suppliers offer of 90 days' credit

[7]



Reference
Hedging - Lagging
What's New
Answer

Cash Outflows under the two options are -

(i) **Payment to supplier in 60 days**

If the payment is made to supplier in 60 Days, the applicable forward rate for 1 US\$	₹46.20
Payment due	US\$ 10,000
Outflow in rupees (US\$ 10,000 × ₹ 46.20)	₹4,62,000
Add: Interest on Loan for 30 days @9% p.a.	₹3,465
Total Outflow	₹4,65,465

(ii) **Payment to supplier in 90 days**

Amount Payable	US\$ 10,000
Add: Interest on Credit Period for 30 days @ 6% p.a.	US\$ 50
Total Outflow in US\$	US\$ 10,050
Applicable forward for 1 US\$	₹46.35
Total Outflow (US\$ 10,050 × ₹ 46.35)	₹4,65,818

It is better to select alternative (i) as entails lower cash flows.

16.2

Translation Exposure

No questions have been asked yet from this chapter !



Operating Exposure

(Q)1

Dec'23

Swadeshi Ltd. an export-oriented unit invoices in the currency of the importer. It is expecting a receipt of USD 2,40,000 on 1st August 2023 for the goods exported on 1st May 2023.

The following information is available as on 1st May 2023:

Contract Size: ₹ 6,40,000

Exchange Rates		Currency Futures	
USD/INR		USD/INR	
Spot	0.0125	May	0.0126
1 Month Forward	0.0124	June	0.0125
3 Months Forward	0.0123		

	Initial Margin	Interest Rates in India
May	₹ 15,000	9% p.a.
August	₹ 26,000	8.5% p.a.

On 1st August 2023, the spot rate in USD/INR is 0.0126 and currency future rate is 0.0125.

Required:

Suggest a suitable approach to Swadeshi Ltd. that would be most advantageous out of the following methods:

- (i) Forward Contract
- (ii) Currency Futures
- (iii) No hedge

Assume that the variation in margin would be settled on the maturity of the futures contract.

[7]

Reference**Different methods of Hedging****What's New****Answer**

Receipts Using Currency Futures:

The number of contracts needed is = 30

	₹
Receipts under different methods of Hedging	
Forward contract	1,95,12,195
Futures	1,90,31,044
No hedge	1,90,47,619

The most advantageous option would have been to hedge with forward contract.

(Q)2**MTP Jun'24 Set 1**

Following are the details of cash inflows and outflows in foreign currency denominations of M 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

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

(b) **Are** any of the exposure positions off-setting to some extent?

[7]

Reference**Net Exposure in each currency, Off-Setting****What's New**

Answer
(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 [200 × 48.01]	894 [120 × 7.45]	7557 [100 × 75.57]	(32) [100 × 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 × 0.81]	80.4 [120 × 0.67]	41.0 [100 × 0.41]	(8.0) [(100) × (0.8)/10]

(2) Off Setting Position:

- (a) Net Exposure in all the currencies is 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.

(Q)3
Jun'24

SONTEX Ltd. an Indian firm needs to pay JAPANESE YEN (JY) 1 Crore on 31st August. In order to hedge the risk involved in foreign currency transaction, the firm is considering two alternative methods i.e. Forward Market Cover and Currency Option Contract.

On 1st June, the following quotations (JY / INR) are made available:

Spot: 1.5225/ 1.5345

3 months forward : 1.5726 / 1.5923

The price of forex currency option on purchase are as follows :

Strike Price : JY 1.5855

Call option (August): JY 0.047

Put option (August): JY 0.098

For excess or balance of JY covered, the firm would use forward rate as future spot rate.

Note : Except rates, round off other calculation to nearest rupees.

Required:

Analyse and infer on which of the following methods would be most advantageous to SONTEX Ltd.:

- (i) Forward Market Cover
- (ii) Currency Option Contract

[7]

Reference

Hedging using Forward and Currency Option

What's New

Answer

(i) Forward Cover :

3 Month Forward Rate = ₹ 0.6359 / JY

Accordingly INR required for JY 1,00,00,000 = ₹ 63.59 Lakh

(ii) Option Cover :

To purchase JY 1,00,00,000, SONTEX LTD. shall enter into a Put option @ JY 1.5855 / INR.

Accordingly Outflow in INR = ₹ 63,07,159

Add Premium = ₹ 4,05,978

Total Cash Outflow = ₹ 67,13,137

Decision:

Since the Outflow of Cash (₹ 63,59,000) is the lowest in case of FORWARD COVER, the same would be most advantageous to SONTEX Ltd.

Q4

Jun'24

AJANTHA Pharma Ltd. (APL) has acquired an export order for ₹ 10 million for formulation to TANP (P) Ltd. a European Company. The APL has also planned to import bulk drug worth ₹ 5 million from GODON Ltd., a company in U.K. The proceeds of export will be realized in 3 months from now and the payment for import will be due after six months from now. The invoicing of



these exports and imports can be done in any currency i.e. Dollar, Euro or Pounds sterling at Company's choice. The following market quotes are available :

	Spot Rate	Annualized Premium
₹/\$	82.10 / 82.20	\$ & 7%
₹ / Euro	77.15 / 77.20	Euro = 6%
₹ / Pounds	100.65 / 100.75	Pounds = 5%

Required :

As a financial consultant **what** recommendation would you make to the AJANTHA Pharma Ltd. about invoicing in **which** currency for proceeds of export and in which currency for payment of import ?

(Calculation should be up to 3 decimal points.)

[7]



Answer

- (i) Proceeds of Exports in INR = ₹ 10 Million.

Position of Inflows under three Currencies will be as follows:

Currency	Invoice at Spot Rate	Expected Rate after three Months	Conversion in INR after three Months
\$	\$ 121802.680	₹ 83.537	₹ 1,01,75,030.48
€	€ 129617.628	₹ 78.307	₹ 1,01,49,967.60
£	£ 99354.198	₹ 101.908	₹ 1,01,24,987.61

- (ii) Payment of Import in INR = ₹ 5 Million.

Position of Outflows under three Currencies will be as follows :

Currency	Invoice at Spot Rate	Expected Rate after three Months	Conversion in INR after three Months
\$	\$ 60827.251	₹ 85.077	₹ 51,75,000.03
€	€ 64766.839	₹ 79.516	₹ 51,49,999.97
£	£ 49627.792	₹ 103.269	₹ 51,25,012.45

Recommendation:

Since cash inflow is highest (₹ 1,01,75,030.48) in case of \$, the invoicing for proceeds of export should be in \$ (Dollars Currency). Further, Since cash outflow is least (₹ 51,25,012.45) in case of £, the invoicing for payment of import should in £ (Pound Sterling Currency).

Chapter

17

Digital Finance

17.1

Meaning, Traditional Finance vs. Digital Finance

17.2

Digital Finance Ecosystem

17.3

Regulation and Governance in a Digital Finance Environment



17.1

Meaning, Traditional Finance vs. Digital Finance

No questions have been asked yet from this chapter !

17.2

Digital Finance Ecosystem

 Q1

June'23 MTP Set 1

Briefly discuss the components of digital finance.

[6]

Reference

Components of Digital Finance

What's New



Answer

The components of digital finance ecosystem include the following.

1. **Digital Infrastructure:** Digital infrastructure refers to the digital technologies that bring together and interconnect physical and virtual technologies such as computer, storage, network, applications etc. to provide the foundation for an organisation's digital operations. The components of digital infrastructure are as follows-
 - (i) Internet
 - (ii) Mobile telecom and digital communication suites, including applications
 - (iii) Data centers and networks
 - (iv) Enterprise portals, platforms, systems, and software
 - (v) Cloud services:
 - (vi) Operational security, user identity and data encryption
 - (vii) APIs and integrations
2. **Digital Money:** digital money is largely interpreted as digital currency issued by the central bank of a country and is essentially a digital version of cash that can be stored and transferred using an internet or mobile application. It is also known as Central Bank Digital Currency (CBDC)
3. **Digital Assets:** A digital asset is anything that is stored digitally and is uniquely identifiable that the owner can use to realize value. In other words, a digital asset is anything that exists only in digital form and comes with a distinct usage right. Data that do not possess that right are not considered. Types of digital assets include, but are not exclusive to: photography,



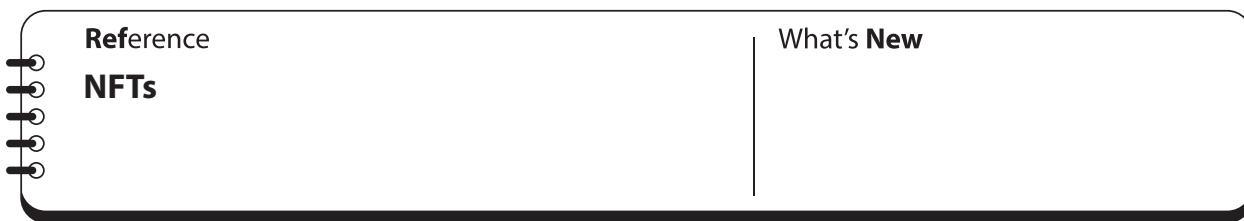
logos, illustrations, animations, audio-visual media, presentations, spreadsheets, digital paintings, word documents, electronic mails, websites, and a multitude of other digital formats and their respective metadata. In addition to above, digital assets may also include Non-Fungible Tokens, Private Cryptocurrency, Stablecoins which are immensely popular in today's digital age.

4. **Digital Financial Services:** Digital Financial Services (DFS) are financial services (e.g., payments, remittances, and credit) accessed and delivered through digital channels, including via mobile devices. These encompass established instruments (e.g., debit and credit cards) offered primarily by banks, as well as new solutions built on cloud computing, digital platforms, and distributed ledger technologies (DLT), spanning mobile payments, and peer-to-peer (P2P) applications.

Q2

June'23 MTP Set 2

Write a short note on: Non-Fungible Tokens (NFTs).



Answer

Non-fungible tokens (NFTs) are cryptographic assets on a blockchain with unique identification codes and metadata that distinguish them from each other. Unlike cryptocurrencies (which are fungible as each unit of cryptocurrency represent same value and characteristics), these are non-fungible as each NFT is unique. Non-fungible tokens can digitally represent any asset, including online-only assets like digital artwork and real assets such as real estate. Today, however, much of the current market for NFTs is centered around collectibles, such as digital artwork, sports cards, and rarities. Perhaps the most hyped space is NBA Top Shot, a place to collect non-fungible tokenized NBA moments in digital card form. Some of these cards have sold for millions of dollars. Recently, Twitter's (TWTR) Jack Dorsey tweeted a link to a tokenized version of the first tweet ever, in which he wrote: "just setting up my twtr." The NFT version of the first-ever tweet sold for more than \$2.9 million.

NFTs are created through a process called 'asset tokenization'. Asset tokenization is the process by which an issuer creates digital tokens on a distributed ledger or blockchain (Ethereum being most popular), which represent either digital or physical assets.

NFTs can be bought and sold in NFT marketplace such as Rarible, OpenSea, Foundation. However, to buy NFTs from this marketplace, one will require a wallet and need to fund it. In most of the platforms wallets are required to be funded by cryptocurrencies and the widely accepted cryptocurrency in this context is the Ethereum.

Q3

Dec'23 MTP Set 1

Prepare a short note on Digital Infra Structure. [5]

Reference	What's New
 Digital Infra Structure	

Answer

Digital infrastructure refers to the digital technologies that bring together and interconnect physical and virtual technologies such as computer, storage, network, applications etc. to provide the foundation for an organisation's digital operations. Businesses use this foundation to re-architect their services for global digital delivery and to access the ecosystems and capabilities they need to rapidly build products and services and deliver them at scale.

Components of digital infrastructure include:

- (1) **Internet:** The Internet is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It is a network of networks that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing. Internet acts as the prime enabler or connecting force that integrates the digital world including digital finance.
- (2) **Mobile telecom and digital communication suites, including applications:** These components connect various organisations to a common network and enables communication for digital transactions.
- (3) **Data centers and networks:** A data center is a physical facility that organisations use to house their critical applications and data. A data center's design is based on a network of computing and storage resources that enable the delivery of shared applications and data. The key components of a data center design include routers, switches, firewalls, storage systems, servers, and application-delivery controllers.
- (4) **Enterprise portals, platforms, systems, and software:** An enterprise portal, also known as an enterprise information portal (EIP), is a framework for integrating information, people and processes across organizational boundaries in a manner similar to the more general web portals. Enterprise portals provide a secure unified access point, often in the form of a web-based user interface, and are designed to aggregate and personalize information through application-specific portlets. The portal integrated with required systems and applications delivers the required service.



- (5) **Cloud services:** The term “cloud services” refers to a wide range of services delivered on demand to companies and customers over the internet. These services are designed to provide easy, affordable access to applications and resources, without the need for internal infrastructure or hardware. These are infrastructure, platforms, or software that are hosted by third-party providers and made available to users through the internet. Cloud services can be of three types – (i) Infrastructure-as-a-service (IaaS) where the cloud service provider manages the infrastructure for the firm through an internet connection; (ii) Platforms-as-a-Service (PaaS) where the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform and the data the app relies on and (iii) Software- as-a-Solution (SaaS) where the service provider delivers a software application – which the cloud service provider manages – to its users.
- (6) **Operational security, user identity and data encryption:** Operational security is a security and risk management process that prevents sensitive information from getting into the wrong hands. It applies specific authentication process to verify user identity and also systems and software to ensure data encryption apart from advanced data security through antivirus and antimalware.
- (7) **APIs and integrations:** An application programming interface (API) is a messenger that processes request and ensures seamless functioning of enterprise systems. An API integration is the connection between two or more applications, via their APIs, that lets those systems exchange data. API integrations power processes throughout many high-performing businesses that keep data in sync, enhance productivity, and drive revenue.

The above elements are the generic components of a digital infrastructure. In addition, digital finance infrastructure will include the digital payment system infrastructure of the country, blockchain enabled distributed ledger system under a broader Decentralized Finance (DeFi) system.

Q4

Jun'23

Briefly discuss the components of Digital Infrastructure.

Reference	What's New
<ul style="list-style-type: none">●● Components●●	

Answer

Components of digital infrastructure include the following: (Any six)

(1) **Internet**

The internet connects vast range of information resources and services, acts a prime enabler or connecting force that integrates the digital world including digital finance.

(2) **Mobile telecom and digital communication suites, including applications**

These connect various organizations to a common network and enables communication for digital transaction.

(3) **Data centres and networks**

It is a physical facility that organizations use to house their critical applications and data.

(4) **Enterprise portals, platforms, systems and software**

It is a framework for integration information, people and processes across organization boundaries, provides secure and unified access point.

(5) **Cloud Services**

These are designed to easy and affordable access to application and resources and without the need for internal infrastructure or hardware.

(6) **Operational security, user identity and data encryption**

It is a security and risk management process that prevents sensitive information from getting into wrong hands

(7) **APIs and integrations**

An application programming interface (API) is a messenger that processes request and ensures seamless functioning of enterprise systems.

Q5

Dec'23

Briefly **append** the different variants of Stablecoin.

[5]

 <p>Reference</p> <p>Variants of Stablecoin</p>	<p>What's New</p>
--	--------------------------



Answer

The variants of Stable coins are appended as follows:

(i) **Flat-collateralized stable coins**

This type of stable coin is linked to the sovereign legal tenders of countries. Some of the most well-known flat-collateralized stable coins, for instance, include Tether and TUSD (True USD). However, these stable coins are not created by the central authority. The issuer issues these tokens by depositing an equal amount of fiat in its reserves.

Simply put, the stable coin's value is based on the premise that the issuer behind it has the equivalent amount in hand.

(ii) **Commodity-backed stable coins**

These are backed by reserved assets other than fiat currencies — by commodities. Real estate, gold, silver, and various other precious metals are examples of commodities. Kitco Gold, for example, is backed by the company's gold reserves, and the token itself is based on the Ethereum - backed ERC-20 block chain ecosystem.

(iii) **Crypto-backed Stable coins**

This type of stable coins is backed by any other crypto currency. Due to the volatile nature of crypto currencies, these stable coins must be overcompensated in order to be collateralized. For example, to buy \$500 worth of the crypto-backed stable coin, Maker DAO's Dai, one needs to deposit \$ 1,000 in ETH.

(iv) **Algorithmic stable coins**

These are primarily non-backed stable coins in which prices, token numbers, and other variables are manipulated with the help of special algorithms, software, and code in order to better manage supply and demand. This strategy allows the company to maintain the reserve peg in the event of price fluctuations.

Q6

MTP Dec'24 Set 1

What do you mean by Stable-coins? Discuss their uses.

[5]

Reference

Stable-coins - Meaning and Issues

What's New

Answer**Concept of Stablecoin:**

A Stablecoin is a cryptocurrency which is pegged to any reserve asset like a fiat currency, commodity, or other cryptocurrencies. It is a tokenized version of the asset and can be introduced subtly into a blockchain ecosystem to facilitate seamless pass transactions, improved arbitrage, and exchange of value. Many times it is referred to as a utility token because it allows you to quickly buy and sell on decentralized exchanges that do not accept fiat currencies. However, these can also be used in centralized exchanges and reduce the processing time.

Uses of Stablecoin:

- (i) Stablecoin can be used as an everyday currency. Unlike traditional crypto coins, which are subject to high degree of price fluctuations and volatility, stablecoins do not fluctuate rapidly because they are backed by national currencies, commodities etc.
- (ii) Stablecoins also have a great potential for smart contracts. Smart contracts are frequently based on other cryptocurrencies, such as Ethereum. Frequent price changes of cryptocurrencies can have an unpredictable impact on the contract's terms. Therefore, the use of stablecoins like Tether can provide contract stability to both parties, by reducing market volatility and ensuring more secure contracts enforced by the blockchain.



17.3

Regulation and Governance in a Digital Finance Environment

No questions have been asked yet from this chapter !

Chapter 18

Objectives

MTP Jun'23 Set 1
1. Multiple Choice Questions

- (i) An investor buys a call option contract for a premium of ₹ 150. The exercise price is ₹ 15 and the current market price of the share is ₹ 12. If the share price after three months reaches ₹ 20, what is the profit made by the option holder on exercising the option? Contract is for 100 shares. Ignore the transaction charges.
- ₹ 300
 - ₹ 350
 - ₹ 400
 - ₹ 450
- (ii) The declining market is called bear market because of the _____. Provide a justification.
- Long hibernation period of bears
 - Traditional usage
 - Fur coat of the bears
 - Attacking manner of bears
- (iii) An investor has three alternatives of varying investment values. The data available for each of these alternatives are given below:

Alternative	Expected Return (%)	Standard Deviation of Return
I	23	8.00
II	20	9.50
III	18	5.00

Which alternative would be the best if coefficient of variation is used?

- Alternative I
- Alternative II
- Alternative III



- (d) None of the above
- (iv) The strike price and the current stock price of a European put option are ₹ 1,000 and ₹ 925 respectively. What is its theoretical minimum price after 6 months, if the risk-free rate of interest is 5% p.a.?
- (a) ₹ 50.3053
 - (b) ₹ 50.2056
 - (c) ₹ 51.2125
 - (d) ₹ 52.4125
- (v) If ROA is 0.20 and leverage factor is 1.5, the ROE of the company is
- (a) 0.25
 - (b) 0.30
 - (c) 0.45
 - (d) 0.50
- (vi) According to the stock market psychology
- (a) Investors forget the past
 - (b) History repeats itself
 - (c) More faith is placed in predictions of the future
 - (d) Both (A) and (B)
- (vii) The concept of securitisation is associated with _____. Provide justification for your selection.
- (a) Capital market
 - (b) Money market
 - (c) Debt market
 - (d) Foreign exchange market
- (viii) ____ is/are a private arrangement between lending banks and a borrower. Provide justification for your selection.
- (a) Club loan
 - (b) Multiple component facility
 - (c) Syndicated Euro credit
 - (d) All of the above
- (ix) Which of the following is not an assumption of perfect capital market? Why?
- (a) No transaction cost
 - (b) No taxes
 - (c) Information is available to all

- (d) None of the above
- (x) Hedging through 'currency of invoicing' results in _____. Why?
- The exporter covering forex exposure
 - The importer covering forex exposure
 - Both exporter and importer covering forex exposure
 - Either exporter or importer covering forex exposure

Answer :

Sl. No.	Answer	Justification																
(i)	(b)	<p>When share price reaches to ₹ 20 per share, the profit will be $= (20 - 15) \times 100 - 150$ $= ₹ 350$</p> <p>So, the correct option is (b)</p>																
(ii)	(d)	<p>The bear market phenomenon is thought to get its name from the way in which a bear attacks its prey—swiping its paws downward. This is why markets with declining stock prices are called bear markets.</p> <p>So, the correct option is (d)</p>																
(iii)	(c)	<p>The Co-efficient of Variation is the ratio of standard deviation to mean.</p> <table border="1"> <thead> <tr> <th>Alternative</th><th>Expected Return (%)</th><th>Standard Deviation of Return (%)</th><th>Co-efficient of Variation</th></tr> </thead> <tbody> <tr> <td>I</td><td>23</td><td>8</td><td>0.35</td></tr> <tr> <td>II</td><td>20</td><td>9.5</td><td>0.48</td></tr> <tr> <td>III</td><td>18</td><td>5</td><td>0.28</td></tr> </tbody> </table> <p>Alternative III is the best as its co-efficient of variation is the lowest. So, the correct option is (c)</p>	Alternative	Expected Return (%)	Standard Deviation of Return (%)	Co-efficient of Variation	I	23	8	0.35	II	20	9.5	0.48	III	18	5	0.28
Alternative	Expected Return (%)	Standard Deviation of Return (%)	Co-efficient of Variation															
I	23	8	0.35															
II	20	9.5	0.48															
III	18	5	0.28															
(iv)	(a)	<p>Theoretical minimum price $= [\text{Present Value of Strike Price} - \text{Current Stock Price}]$ $= [1,000 \times e^{-rt}] - 925$ $= [1,000 / e^{0.05 \times 0.5}] - 925$ $= [1,000 / e^{0.025}] - 925$ $= [1000/1.02532] - 925$ $= 975.3053 - 925$ $= 50.3053$</p> <p>So, the correct option is (a)</p>																
(v)	(b)	<p>$\text{ROE} = \text{ROA} \times \text{Leverage factor} = 0.20 \times 1.5 = 0.30$ So, the correct option is (b)</p>																

(vi)	(b)	Financial history is replete with boom-bust cycles and repetition of these cycles makes one believe that history repeats itself. So, the correct option is (b)
(vii)	(c)	Securitization is an act of conversion of loans into debt instruments The process of taking an illiquid group of assets or an individual asset through financial engineering and changing it into a security is called securitization. So, the correct option is (c)
(viii)	(a)	The club loan is a private arrangement between lending banks and a borrower. Conventionally, the entry into Euromarkets for a funding deal is well-publicized. When the loan amounts are small and parties familiar with each other, lending banks form a club and advance a loan. So, the correct option is (a)
(ix)	(d)	A perfect capital market assumes information availability to all market participants, absence of transaction cost and taxes. So, the correct option is (d)
(x)	(d)	A very simple way of eliminating the transaction exposure is to invoice all receivables and payables in the domestic currency. However, only one of the parties involved can hedge itself in this manner. It will still leave the other party exposed as it will be dealing in a foreign currency. So, the correct option is (d)

1. Multiple Choice Questions

- (i) In Porter's structural analysis, which of the following is not considered as an entry barrier? Why?
 - (a) Product differentiation
 - (b) Switching costs
 - (c) Capital requirements
 - (d) Low value addition
- (ii) Which of the following is not a part of financial risk? Why?
 - (a) Operational risk
 - (b) Market risk
 - (c) Credit risk
 - (d) Liquidity risk
- (iii) Which of the following is not a type of Euro Notes? Why?
 - (a) Commercial Papers
 - (b) Note Issuance Facility
 - (c) Medium Term Notes
 - (d) Short Term Notes
- (iv) The type of lease that includes a third party, a lender, is called _____. Why?
 - (a) Sale and leaseback
 - (b) Leverage lease
 - (c) Direct lease arrangement
 - (d) Operating lease
- (v) DCL measures the relationship between
 - (a) EPS and EAT
 - (b) EPS and P/E
 - (c) EPS and EBIT
 - (d) EPS and Sales
- (vi) A six-month forward contract on a stock that does not pay dividend is available at ₹340. The risk-free interest rate is 12% p.a. continuously compounded. Calculate the forward price.
 - (a) ₹ 359.051
 - (b) ₹ 361.012

- (c) ₹ 363.217
 - (d) ₹ 364.119
- (vii) A project with an initial investment of ₹50 lakh and life of 10 years generates Cash Flow After Tax (CFAT) of ₹10 lakh per annum. Calculate Payback Reciprocal.
- (a) 15%
 - (b) 18%
 - (c) 20%
 - (d) 22%
- (viii) The return on market portfolio is 14%. The last dividend of share A was ₹2 and the dividend and earnings have a constant growth rate of 5% p.a. The beta of the share is 2 and the intrinsic value of the share is ₹12.35. Find the risk-free return.
- (a) 5%
 - (b) 6%
 - (c) 7%
 - (d) 8%
- (ix) It was observed that in a certain month, 6 out of 10 leading indicators have moved up as compared to 4 indicators in the previous month. The diffusion index for the month was
- (a) 20%
 - (b) 40%
 - (c) 60%
 - (d) 80%
- (x) An Indian Company is planning to invest in the US. The annual rates of inflation are 8% in India and 3% in USA If the spot rate is currently ₹ 78.50/\$, what spot rate can you expect after 5 years, assuming the inflation rates will remain the same over 5 years?
- (a) ₹ 88.89
 - (b) ₹ 94.95
 - (c) ₹ 99.50
 - (d) ₹ 86.10

Answer :

Sl. No.	Answer	Justification
(i)	(d)	Low value addition does not create any barrier for the new entrants rather it provides the space for them in the market. So, the correct option is (d).
(ii)	(a)	Operational risk is a part of business risk and hence not a part of financial risk. So, the correct option is (a).



(iii)	(d)	Euro notes are of three types – Commercial Papers, Note Issuance Facilities and Medium Term Notes. So, the correct option is (d)
(iv)	(b)	Leveraged lease refers to a lease agreement wherein the lessor acquires an asset partially financed by the financial institutions and lease out the same to the lessee for the agreed lease payments. So, the correct option is (b)
(v)	(d)	DCL = % change in EPS/% change in sales. So, So, the correct option is (d)
(vi)	(b)	The Forward Price (F) = $340 \times e^{6/12 \times 0.12} = 340 \times 1.0618 = ₹ 361.012$. So, the correct option is (b).
(vii)	(c)	Payback Reciprocal = ₹ 10 lakh ÷ ₹ 50 lakh = 1/5 or 20%. So, the correct option is (c).
(viii)	(b)	Intrinsic value of a share = $D_1 / (K_e - g) = 2.1 / (K_e - 0.05) = 12.35$ or, $K_e = 0.05 + 2.1/12.35 = 22\%$ $E(R) = R_f + \beta (R_m - R_f) = R_f (1 - \beta) + \beta R_m$ $22\% = R_f (-1) + 2 \times 14\%$, or, $R_f = 6\%$ So, the correct option is (b).
(ix)	(c)	The diffusion index = $6/10 = 60\%$ So, the correct option is (c).
(x)	(c)	$F = S \times [(1 + r_A)^n / (1 + r_B)^n]$; or, $F(\$/₹) = 78.50 \times [1 + 0.08]^5 / (1 + 0.03)^5$ $= 78.50 \times 1.267455 = ₹ 99.50$ So, the correct option is (c).

1. Multiple Choice Questions

- (i) ZOTSON Plc. has been evaluating investment in a project which will require ₹ 39 lakh capital expenditure on a new machinery. The company expects the capital investment to provide annual cash flows of ₹ 6 lakh per year after taxes indefinitely. The discount rate, which it applies to invest decisions of this nature, is 14 percent net. What will be the Base Case NPV for ZOTSON Plc.'s project? (Calculation upto two decimal points.)
- (a) ₹ 4.00 lakh
 - (b) ₹ 3.86 lakh
 - (c) ₹ 3.56 lakh
 - (d) ₹ 3.25 lakh
- (ii) SBT company is considering four projects P, Q, R and T with the following information:

	Project A	Project B	Project C	Project D
Expected NPV (₹)	1,20,000	1,60,000	1,40,000	1,80,000
Standard Deviation (₹)	8,000	20,000	24,000	28,000

Identify the Least Risky Project if coefficient of variation is used:

- (a) Project P
 - (b) Project Q
 - (c) Project R
 - (d) Project T
- (iii) Which of the following is/are not the component of digital infrastructure and why?
- (a) APIs and Integrations
 - (b) Cloud Services
 - (c) Stablecoins
 - (d) Internet
- (iv) MR. PATOB, a Portfolio Manager managing a Portfolio (Beta 1:50) whose current market value of ₹ 12 crore. It is expected that the markets are likely to correct downwards and hedging needs to be adopted using NIFTY Index futures. Currently Index futures are quoted at 8000 with each contract underlies 100 units. Mr. PATOB hedges 100% of his Portfolios. What is the number of NIFTY Index contracts to be sold?
- (a) 180 contracts
 - (b) 200 contracts
 - (c) 225 contracts
 - (d) None of the above

- (v) MR. GORG is a forex dealer in India. Rates of Rupee and Euro in the International Market are US \$ 0:012572 and US \$ 1-117294 respectively. What will be his direct quote of € (Euro) to his customers? (Calculation upto 3 decimal points.)
- (a) ₹ 85.925
 - (b) ₹ 88.872
 - (c) ₹ 89.125
 - (d) ₹ 90.312
- (vi) Plain Vanilla interest rate swaps involved
- (a) Fixed to Fixed rate Swap
 - (b) Fixed to Floating rate Swap
 - (c) Floating to Floating rate Swap
 - (d) Currency Swap
- (vii) An option's theoretical value increases by 1.75 if the interest rate is decreased by 1%. Then 1.75 is
- (a) the Rho of a call option.
 - (b) the Rho of a put option.
 - (c) the Theta of a call option.
 - (d) the Theta of put option.
- (viii) The intercept of the security market line (SML) on the Y-axis is
- (a) the risk free return.
 - (b) the positive risk premium.
 - (c) the Beta of the security.
 - (d) the expected return when $B = 1$
- (ix) MS BRISTI is considering an investment in a Mutual Fund with a 2% load. As another alternative, she can also invest in a Bank Deposit paying 8% interest. Her investment planning period is 4 years. Examine, what should be the annual rate of return on Mutual Fund so that she prefers the investment in the Fund to the investment in Bank Deposit.
- (a) 8:15%
 - (b) 8:55%
 - (c) 8.82%
 - (d) None of the above
- (x) Which one of the following is not a part of Market Risk and why?
- (a) Equity Risk
 - (b) Inflation Risk

- (c) Downgrade Risk
- (d) None of the above

MTP Dec'23 Set 1

1. Multiple Choice Questions

- (i) Which of the following techniques is the most suitable, when NPV and IRR lead to inconsistent ranking due to life disparity between two or more projects?
- Modified Net Present Value.
 - Modified Internal Rate of Return.
 - Uniform Annual Equivalent Cost/Benefit.
 - Discounted Payback Period
- (ii) The Profitability Index of a project is 1.28 and its cost of investment is ₹ 2,50,000. The NPV of the project is _____.
- ₹ 75,000
 - ₹ 80,000
 - ₹ 70,000
 - ₹ 65,000
- (iii) The following information is available with respect to Project X:

NPV Estimate (₹)	30,000	60,000	1,20,000	1,50,000
Probability	0.1	0.4	0.4	0.1

The expected NPV will be _____

- ₹ 1,00,000
 - ₹ 75,000
 - ₹ 90,000
 - ₹ 1,20,000
- (iv) The major advantage of leasing is that it _____.
- provides flexible financing
 - provides lower payments
 - avoids risks of obsolescence.
 - All of the above
- (v) It was observed that in a certain month, 6 out of 10 leading indicators moved up as compared to 4 indicators in the previous month. The diffusion index for the months was:
- 20%
 - 40%
 - 60%



- (d) 80%
- (vi) Bond volatility is inversely related to:
- (a) Term to maturity
 - (b) Yield to maturity
 - (c) Coupon rate
 - (d) Both (b) and (c)
- (vii) Mr. X expects 20% return from his investment. The dividend from the stock is ₹2.0 and the present price is ₹50. What should be the future price of the stock?
- (a) ₹ 56.39
 - (b) ₹ 58.00
 - (c) ₹ 60.00
 - (d) ₹ 62.30
- (viii) According to the constant growth model, the next year's dividend is ₹2.00, required rate of return is 15% and the growth rate is 10%, the market price would be:
- (a) ₹ 50
 - (b) ₹45
 - (c) ₹ 40
 - (d) ₹ 48
- (ix) Which among the following increases the NAV of a mutual fund scheme?
- (a) Value of investments
 - (b) Receivables
 - (c) Accrued income
 - (d) All of (a), (b) and (c)
- (x) A portfolio comprises two securities and the expected return on them is 12% and 16% respectively. Determine return of portfolio if first security constitutes 40% of total portfolio.
- (a) 12.4%
 - (b) 13.4%
 - (c) 14.4%
 - (d) 15.4%
- (xi) Plain vanilla interest rate swaps involved:
- (a) Fixed to fixed rate swap
 - (b) Fixed to floating rate swap
 - (c) Floating to floating rate swap

- (d) Currency swap
- (xii) An investor writes a three-month put on the stock of an oil company at an exercise price of ₹275 per share at a premium of ₹34. If the expiration date price is ₹280, calculate the gain/loss of put writer.
- (a) ₹5
 - (b) (-) ₹5
 - (c) ₹34
 - (d) None of the above
- (xiii) The 6-month forward rate for US dollar against Rupee is quoted as ₹49.50 as opposed to a spot price of ₹48.85. The forward premium on US dollar is:
- (a) 1.50 %
 - (b) 3.08 %
 - (c) 3.05 %
 - (d) None of the above.
- (xiv) The sterling is trading at \$1.6400 today. Inflation U.K. is 3.8% and that in U.S.A. is 2.9%. What would be the spot rate (\$/£) after 2 years?
- (a) \$1.6117
 - (b) \$1.615
 - (c) \$1.625
 - (d) None of the above
- (xv) Sharpe's measure of the portfolio performance is based on:
- (a) Systematic risk of the portfolio
 - (b) Unsystematic risk of the portfolio
 - (c) Total risk of the portfolio
 - (d) Market risk of the portfolio

Answer :

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
c	c	c	d	c	d	b	c	d	c	b	c	b	a	c



Dec'23

1. Multiple Choice Questions

- (i) A project of ROBN Ltd. has a Net Present Value (base case NPV) of ₹ 1,50,000. This project has one financial side effect; it expands the firm's borrowing power by ₹ 5,00,000. The project lasts indefinitely so it is treated as supporting perpetual debt. If the borrowing rate is 10 per cent and the net tax-shield is 35 per cent, the Adjusted Net Present Value (ANPV) of the project will be
- (a) ₹ 3,25,000
 - (b) ₹ 3,10,000
 - (c) ₹ 2,88,000
 - (d) None of the above
- (ii) ABON Ltd.'s earning per share is ₹ 15 and growth rate of earning is 5%. The earnings growth rate is expected to stay at this level in the near future. If its payout ratio is 50% and costs of capital is 15%, what will be the market price of the share after three years? (Calculation upto two decimal places)
- (a) ₹ 95.50
 - (b) ₹ 91.16
 - (c) ₹ 90.20
 - (d) None of the above
- (iii) The expected return from a portfolio is 16 % and its variance of return (Risk Squared) is 285%. If the investor's tolerance is 60 ; the Risk penalty will be
- (a) 5.80 %
 - (b) 4.95 %
 - (c) 4.90 %
 - (d) 4.75 %
- (iv) The following particulars relate to a mutual fund scheme:

Sector	Investment in shares (at cost) ₹ lakh	Index on Purchase date	Index on Valuation date
IT and ITES	28	1,750	2,950
Infrastructure	15	1,375	2,475

The outstanding number of units is 1.25 lakhs . What will be the Net Asset Value (NAV) per unit?

- (a) ₹ 59.36
- (b) ₹ 55.30
- (c) ₹ 54.31

- (d) ₹ 53.29
- (v) If the director of COMTECH Ltd . who has access to inside information is unable to use this information to make Supernormal Profits, it is a sign of
- weak form of Efficient Market hypothesis .
 - semi-strong form of Efficient Market hypothesis.
 - strong form of Efficient Market hypothesis .
 - incompetence of the Director.
- (vi) EYAN Ltd. (EL) has a Beta of 0.80 with BSE 300. Each BSE 300 Futures contract is worth 100 units. BINUA Anticipates a bearish market for the next three months and has gone short on Shares of 25000 Shares of EL in the Spot Market. EL shares are traded at ₹ 100. 3 months' Future BSE 300 is quoted at 15500 . What are the numbers of BSE 300 Futures contract to be taken by BINUA if she wants to hedge price risk to the extent of 125%?
- 300
 - 250
 - 240
 - 200
- (vii) Buying and Selling a call and a put option with same strike prices and same expiry date is called
- Straddle
 - Box spread
 - Strip
 - Butterfly spread
- (viii) When the trade opens on 01.03.2023 the stock price of Rolex Ltd. , is ₹ 250 . It rises to ₹ 260. The March 2023 , call option on Rolex Ltd. started at ₹ 25. It moved to ₹ 29 . The Delta of call option of Rolex Ltd. would be ---
- 0.50
 - 0.40
 - 0.35
 - Insufficient information
- (ix) The Slope of the Security Market Line (SML) denotes
- The Risk Premium required
 - Beta of the Security
 - Market Volatility
 - The influence of the unsystematic
- (x) Which of the following is/are the benefit(s) of Unified Payment Interface (UPI) to the

merchants?

- (a) Round the clock availability
- (b) Single click authentication
- (c) Safer, secured and innovative
- (d) In-App Payments (IAP)

(xi) In Porter's structural analysis, which of the following is not considered as an entry barrier?

- (a) Product differentiation
- (b) Switching costs
- (c) Capital requirements
- (d) Low value addition

(xii) Which one of the following is not a Digital Asset?

- (a) Digital Printing
- (b) Website
- (c) Stable Coin
- (d) Fintech

(xiii) The 90-day interest rate is 1.85 % in USA and 1.35 % in the UK and the current spot exchange rate is \$ 1.6/1£. The 90-day forward rate is

- (a) \$ 0.62808
- (b) \$ 1.592145
- (c) \$ 1.607893
- (d) \$ 1.342132

(xiv) ZONS Ltd . Shares are traded in the Stock Market. The Standard Deviations of ZON S'S Shares and the Market are 6% and 4% respectively. If the Correlation Co-efficient for the shares with the market is 0.8, what will be Beta Co-efficient of the Company's Shares based on the CAPM?

- (a) 0.90
- (b) 1.00
- (c) 1.20
- (d) 1.50

(xv) RTZ Ltd . wishes to earn real rate of 10% from its project. When the inflation recorded is 7%, what is the normal rate the company would earn ?

- (a) 16.60 %
- (b) 17.70 %
- (c) 18.20%

(d) None of the above

Answer :

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
A	B	D	A	C	B	A	B	A	D	D	D	C	C	B



1. Choose the correct option:

[15 x 2 =30]

- (i) The IRR of a project is 10%. If the annual cash flow after tax is ₹1,30,000 and project duration is 4 years, what is the initial investment in the project?
- (a) ₹4,10,000
 - (b) ₹4,12,100
 - (c) ₹3,90,000
 - (d) ₹4,05,000
- (ii) Which of the following is/are not true regarding the risk adjusted investment appraisal techniques?
- i. In the certainty equivalent method, if there is high degree of correlation between the cashflows for the entire project life the certainty equivalent coefficient is taken as one for all the years.
 - ii. In sensitivity analysis, the impact of the changes in one or more variables on the criterion of merit is studied.
 - iii. Simulation does not produce an optimal solution but the user of the technique has to generate all possible combinations of conditions and constraints to choose the optimal solution.
- (a) Only (ii) above.
 - (b) Only (iii) above.
 - (c) Both (i) and (ii) above
 - (d) Both (i) and (iii) above
- (iii) Given, expected value of profit without perfect information = ₹1,600 and expected value of perfect information = ₹300, then expected value of profit with perfect information will be _____.
- (a) ₹1,300
 - (b) ₹1,900
 - (c) ₹950
 - (d) None of the above
- (iv) The type of lease that includes a third party, a lender, is called as which of the following?
- (a) Sale and lease back
 - (b) Leveraged Lease
 - (c) Direct leasing arrangement
 - (d) Operating lease

- (v) The current price is ₹100, the required rate of return is 20% and the dividend paid ₹3.00 on a share of ₹10 face value. What is the expected growth rate?
- (a) 15%
 - (b) 16%
 - (c) 18%
 - (d) 17%
- (vi) In the bull market:
- (a) The stock prices are increasing
 - (b) Each peak is higher than the previous peak
 - (c) Each bottom is higher than the previous bottom
 - (d) Both (b) and (c)
- (vii) Mr. X expects 20% return from his investment. The dividend from the stock is ₹2.0 and the present price is ₹50. What should be the future price of the stock?
- (a) ₹56.39
 - (b) ₹58.00
 - (c) ₹60.00
 - (d) ₹62.30
- (viii) Yield to maturity is same as:
- (a) NPV
 - (b) IRR
 - (c) Geometric mean
 - (d) Both (b) and (c)
- (ix) If opening units 1,25,000 Units subscribe 2,00,000, Units redeem 50,000 then Closing units?
- (a) 3,25,000 units
 - (b) 2,75,000 units
 - (c) 3,75,000 units
 - (d) 2,50,000 units
- (x) A portfolio comprises two securities and the expected return on them is 12% and 16% respectively. Determine return of portfolio if first security constitutes 40% of total portfolio.
- (a) 12.4%
 - (b) 13.4%
 - (c) 14.4%
 - (d) 15.4%

- (xi) An investor buys 100 shares of a sugar mill at ₹210 per share and at the same time writes a September 250 call at a premium of ₹20 per share. If the expiration date price is ₹280, calculate the net gain/loss.
- (a) ₹20
 - (b) ₹40
 - (c) ₹60
 - (d) None of the above
- (xii) With respect to capital market theory, the average beta of all assets in the market is:
- (a) Less than 1.0.
 - (b) Equal to 1.0.
 - (c) Greater than 1.0.
 - (d) None
- (xiii) The United States Dollar is selling in India at ₹45.20. If the interest rate for a 6-months borrowing in India is 10% and the corresponding rate in USA is 4%, what would be the rate of forward premium/(discount)?
- (a) 5.93 %
 - (b) 5.88 %
 - (c) (5.17%)
 - (d) (5.52%)
- (xiv) Plain vanilla interest rate swaps involved:
- (a) Fixed to fixed rate swap
 - (b) Fixed to floating rate swap
 - (c) Floating to floating rate swap
 - (d) Currency swap
- (xv) The portfolio's risk premium is 12% and the standard deviation of market and the portfolio are 4 and 3, respectively. The fund's beta value is 1.5. The Treynor index is:
- (a) 3.0
 - (b) 8.0
 - (c) 4.0
 - (d) 12

Answer :

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
b	c	b	b	d	d	b	d	b	c	c	b	b	b	b

1. Choose the correct option from the four alternatives given: $2 \times 15 = 30$

- (i) A Project of ZOBM Ltd. requires an initial investment of ₹ 100 Lakh and generates annual Cash inflows of ₹ 29.85 Lakh for five years. If the risk-free rate of discount is 10% and the premium for the normal risk of the Company is 3%, what is the maximum premium for abnormal risk that can be earned on this project (using IRR method) ?

[Given : PVIFA (13% 5 yrs.) = 3.52, PVIFA (14%, 5 yrs.) = 3.43 and PVIFA (15%, 5 yrs.) = 3.35]

- (a) 0%
 - (b) 2%
 - (c) 4%
 - (d) None of (A), (B) and (C)
- (ii) Please Turn OverEZAN Ltd. has an ROE of 18% and a ploughback ratio of 50%. The Market Capitalization rate is 13%. If the Coming year's earnings are expected to be ₹ 4 per share, at what price EZAN's share should sell in 3 years ?
- (a) ₹ 75.10
 - (b) ₹ 64.75
 - (c) ₹ 60.50
 - (d) None of the above
- (iii) The expected return of a Portfolio ZON is 15%, and Variance of return is 280(%). If the investor's tolerance is 70, what will be the investor's utility ?
- (a) 15%
 - (b) 11%
 - (c) 4%
 - (d) Insufficient information
- (iv) SANTIKA Project has a mean value of ₹ 11,700. The Management wants to determine the Probability of the NPV of the Project under different ranges. If the Standard Deviation (SD) of the Project is ₹ 6,000, what will be the Probability of NPV between ₹ 7,200 and ₹ 13,200 ?

[Given : Area under Standard Normal Curve]

$z = 0 \text{ To } Z$	0.10	0.25	0.50	0.60	0.75	1.00	1.25	1.50
Table Value	0.0398	0.0987	0.1915	0.2257	0.2734	0.413	0.3944	0.4332

(Calculation up to two Decimal Points)

- (a) 17.47%
- (b) 22.55 %
- (c) 37.21 %



- (d) None of the above
- (v) Ms. RUDRA on 1st August, 2023 during initial offer of AB Mutual Fund, invested in 10,000 units having face value of ₹ 10 for each unit. On 31st March, 2024, dividend declared and given by AB Mutual Fund was 10%, and Ms. RUDRA found that her annualized yield was 150%. What is the NAV as on 31.03.2024 ?
- (a) ₹21
 - (b) ₹ 19
 - (c) ₹ 15
 - (d) None of the above
- (vi) Which one of the following Digital Financial Technologies and Technological concepts, is a type of distributed ledger which provide an order, time stamped and highly Secured record of transactions ?
- (a) Peer to peer Technology
 - (b) Enablers
 - (c) Block chain
 - (d) Big Data Analytics
- (vii) MR. KAYON a Portfolio Manager managing a Portfolio XB whose current Market value of ₹ 1,800 Lakh. It is expected that the market are likely to correct downwards and hedging needs to be adopted using NIFTY Index futures. Currently Index futures are quoted at 8,000 with each contract underlines 200 units. MR. KAYON hedges 100% of his Portfolios. If the number of NIFTY Index contracts to be sold is 180, what will be the Portfolio Beta ?
- (a) 1.60
 - (b) 1.50
 - (c) 1.20
 - (d) None of the above
- (viii) The current price of BCC's Stock is ₹ 1,515 and it is expected that price of the stock may either go up to the ₹ 1,818 or go down to ₹ 1,212. If strike price of call option of BCC's Stock is ₹ 1,515 and risk-free rate is 7%, the probability of decrease in stock price is
- (a) 0.4523
 - (b) 0.3971
 - (c) 0.325
 - (d) None of the above
- (ix) If conclusion and opinions of equity analysts and other experts, based on publicly available information are reflected in stock prices, then stock market exhibits
- (a) Weak form of efficiency
 - (b) Semi- strong form of efficiency

- (c) Inefficiency
 - (d) Both (A) and (B) above
- (x) Which one of the following Greek alphabets with respect to option measures the sensitivity of options price with respect to its time to expiry i.e. Time value of an option?
- (a) Delta
 - (b) Theta
 - (c) Rho
 - (d) Vega
- (xi) DAZON Ltd. an export customer who relied on the Inter-bank rate of ₹ / US \$ 82.45 / 10 requested his banker to purchase a bill US \$ 90,000. What is the rate to be quoted to DAZON Ltd., if the banker wants a margin of 0.20%? (Calculation up to 2 decimal points)
- (a) ₹ 81.90
 - (b) ₹ 82.15
 - (c) ₹ 82.29
 - (d) ₹ 82.80
- (xii) Which of the following statement(s) is / are True ?
- (i) For a Characteristics line, the Y-axis represents the returns for a particular security and the X-axis represents the returns for the Market Index.
 - (ii) The SML Line is the same as the Characteristics line for an individual Security.
 - (iii) The Slope of the SML is the Beta for the particular Security.
- (a) Only (i) above
 - (b) Only (ii) above
 - (c) Only (iii) above
 - (d) Only (i) and (ii) above
- (xiii) The concept of securitization is associated with .
- (a) Capital Market
 - (b) Money Market
 - (c) Debt Market
 - (d) Foreign Exchange Market
- (xiv) Which of the following is/are the Component(s) of Digital Finance Ecosystem?
- (a) Digital Money
 - (b) Digital Assets
 - (c) Digital Liabilities
 - (d) (A) and (B) of the above.

- (xv) MR. KKM, an investor buys a call option contract for a premium of ₹ 150. The exercise price is ₹ 45 and the current market price of the share is ₹ 42. If the share price after three months reaches ₹ 50, what is the profit made by the option holder on exercising the option? Contract is for 100 shares. Ignore the transaction charges.
- (a) ₹ 450
(b) ₹ 350
(c) ₹ 375
(d) ₹ 400

Answer :

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
(b)	(b)	(b)	(c)	(b)	(c)	(a)	(c)	(b)	(b)	(c)	(a)	(c)	(d)	(b)

MTP Dec'24 Set 1

1. Choose the correct option:

[$15 \times 2 = 30$]

- (i) The following information is available in case of an investment proposal:
NPV at discounting rate of 10% = ₹1,250 and NPV at discounting rate of 11% = (-) ₹200. The IRR of the proposal is:
 - (a) 11.86%
 - (b) 9.87%
 - (c) 11.96%
 - (d) 10.86%
- (ii) Coefficient of variation ____ .
 - (a) Is an absolute measure of risk
 - (b) Is given by the product of mean expected return and standard deviation
 - (c) Is given by mean expected return by standard deviation
 - (d) Is a relative measure of risk
- (iii) A certain mutual fund has a return of 17% with standard deviation of 3.5% and the sharpe ratio is 4. The risk free rate is ____ .
 - (a) 3%
 - (b) 12.5%
 - (c) 4%
 - (d) 7.5%
- (iv) The growth in book value per share shows the ____ .
 - (a) Rise in the share price
 - (b) Increase in the physical assets of the firm
 - (c) Growth in reserve
 - (d) Increase in the net worth
- (v) A stock with a dividend pay-out ratio of 45%, required rate of return is 15% and a constant growth rate of 10% will have a P/E ratio of ____ .
 - (a) 3 times
 - (b) 9 times
 - (c) 8 times
 - (d) 7.5 times
- (vi) A mutual Fund had a Net Asset Value (NAV) of ₹72 at the beginning of the year. During the year, a sum of ₹6 was distributed as Dividend besides ₹ 4 as Capital Gain distributions. At



- the end of the year, NAV was ₹ 84. Total return for the year is:
- (a) 30.56%
 - (b) 31.56%
 - (c) 40.56%
 - (d) 41.56%
- (vii) Bond volatility is inversely related to _____.
 - (a) Term to maturity
 - (b) Yield to maturity
 - (c) Coupon rate
 - (d) Both (b) and (c)
- (viii) Covariance between a stock and a market index and variance of market index are 33.56 and ____ 19.15 respectively. The Beta of stock is:
 - (a) 1.55
 - (b) 1.85
 - (c) 1.75
 - (d) 1.95
- (ix) The following details relate to an investment proposal of XYZ Ltd. Investment outlay - ₹ 100 lakhs, Lease Rentals are payable at ₹180 per ₹1,000, Term of lease - 8 years , Cost of capital - 12%. What is the present value of lease rentals, if lease rentals are payable at the end of the year? [Given PV factors at 12% for years (1- 8) is 4.9676.
 - (a) ₹ 98,14,680
 - (b) ₹ 89,41,680
 - (c) ₹ 94,18,860
 - (d) ₹ 96,84,190
- (x) A project had an equity beta of 1.4 and is to be financed by a combination of 25% Debt and 75% Equity. Assume Debt Beta as zero, $R_f = 12\%$ and $R_m = 18\%$. Hence, the required rate of return of the project is _____.
 - (a) 18.3%
 - (b) 17.45%
 - (c) 16.72%
 - (d) 12.00%
- (xi) This type of risk is avoidable through proper diversification _____.
 - (a) Portfolio risk
 - (b) Systematic risk

- (c) Unsystematic risk
 (d) Total risk
- (xii) What should be the price of call, if value of a put ₹5, strike price ₹100, rate of interest 6% p.a. time period-2 months?
 (a) ₹4
 (b) ₹6
 (c) ₹7
 (d) ₹5
- (xiii) Arbitrageur in a foreign exchange market _____.
 (a) buys when the currency is low and sells when it is high
 (b) buys and sells simultaneously the currency with a view to making riskless profit
 (c) sells the currency when he has a receivable in future
 (d) buys or sells to take advantage of market imperfections.
- (xiv) Digital Finance Cube has ____ dimensions.
 (a) Six
 (b) Four
 (c) Three
 (d) Two
- (xv) The 90 day interest rate is 1.85% in USA and 1.35% in the UK and the current spot exchange rate is \$ 1.6/£. The 90-day forward rate is _____.
 (a) \$ 1.607893
 (b) \$ 1.901221
 (c) \$ 1.342132
 (d) \$ 1.652312

Answer :

(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)	(xv)
(d)	(b)	(a)	(c)	(b)	(a)	(c)	(c)	(b)	(a)	(c)	(b)	(b)	(c)	(a)



Postal Test Paper**1. Multiple Choice Questions**

- (i) The declining market is called bear market because of the _____. Provide a justification.
- Long hibernation period of bears
 - Traditional usage
 - Fur coat of the bears
 - Attacking manner of bears
- (ii) The strike price and the current stock price of a European put option are ₹1,000 and ₹925 respectively. What is its theoretical minimum price after 6 months, if the risk-free rate of interest is 5% p.a.?
- ₹ 50.3053
 - ₹ 50.2056
 - ₹ 51.2125
 - ₹ 52.4125
- (iii) Which of the following is not an assumption of perfect capital market? Why?
- No transaction cost
 - No taxes
 - Information is available to all
 - None of the above
- (iv) Which of the following is not an apart of financial risk? Why?
- Operational risk
 - Market risk
 - Credit risk
 - Liquidity risk
- (v) DCL measures the relationship between
- EPS and EAT
 - EPS and P/E
 - EPS and EBIT
 - EPS and Sales
- (vi) A project with an initial investment of ₹ 50 lakh and life of 10 years generates Cash Flow After Tax (CFAT) of ₹ 10 lakh per annum. Calculate Payback Reciprocal.
- 15%

- (b) 18%
- (c) 20%
- (d) 22%
- (vii) The concept of securitisation is associated with _____. Provide justification for your selection.
- (a) Capital market
- (b) Money market
- (c) Debt market
- (d) Foreign exchange market
- (viii) Hedging through 'currency of invoicing' results in _____. Why?
- (a) The exporter covering forex exposure
- (b) The importer covering forex exposure
- (c) Both exporter and importer covering forex exposure
- (d) Either exporter or importer covering forex exposure
- (ix) Which of the following is not a type of Euro Notes? Why?
- (a) Commercial Papers
- (b) Note Issuance Facility
- (c) Medium Term Notes
- (d) Short Term Notes
- (x) It was observed that in a certain month, 6 out of 10 leading indicators have moved up as compared to 4 indicators in the previous month. The diffusion index for the month was
- (a) 20%
- (b) 40%
- (c) 60%
- (d) 80%



NOTES