PORTFOLIO MANAGEMENT

IMPORTANT QUESTIONS

CLASS WORK QUESTIONS

Question 5:

Mayuri is interested to construct a Portfolio of Securities X and Y. She has collected the following information:

	X	Y
Expected Return (ER)	19%	23%
Risk (σ)	14%	18%

Mayuri has 5 Portfolio options of X and Y as follows:

i. 50% of funds in each X and Y
ii. 75% of funds in X and 25% in Y
iii. 25% of funds in X and 75% in Y
iv. 60% of funds in X and 40% in Y
v. 35% of funds in X and 65% in Y

Suppose if Co-efficient of correlation (r) between X and Y is 0.16, you are required to calculate:

i. Expected Return under different Portfolio Options.
ii. Risk Factor associated with these Portfolio Options.
iii. Which Portfolio is best from the point of view of Risk?
iv. Which Portfolio is best from the point of view of Return?

(Source: ICAI)

Question 13:

An investor has decided to invest to invest ₹ 1,00,000 in the shares of two companies, namely, ABC and XYZ. The projections of returns from the shares of the two companies along with their probabilities are as follows:

Probability	ABC(%)	XYZ(%)
20	12	16
25	14	10
25	-7	28
30	28	-2

You are required to:

i. Comment on return and risk of investment in individual shares.
ii. Compare the risk and return of these two shares with a Portfolio of these shares in equal proportions.
iii. Find out the proportion of each of the above shares to formulate a minimum risk portfolio.

(Source: ICAI)

Question 14:

Suppose that in the universe of available risky securities contains a large number of shares and stocks, identically distributed with E(r) = 15%, or σ = 60%, and with a common correlation coefficient of ρ= 0.5.

a. What is the expected return and standard deviation of an equally weighted risky portfolio of 25 stocks?
b. What is the smallest number of stocks necessary to generate an efficient portfolio with a standard deviation equal to or smaller than 43%?
c. What is the systematic risk in this security universe?
d. If T-bills are available and yield 10%, what is the slope of the CAL?

(Source: ICAI)

Question 15:

If the rate of return and Standard Deviation of Market Portfolio (Index) is 8% and 6% respectively and the risk free rate of return is 5%, you are required to:

i. Construct an efficient portfolio which produces expected return of 7.5%.
ii. Calculate the risk of above portfolio.
iii. Suppose if Mr. X has Rs.1,00,000 of his personal funds, then how he would construct his portfolio giving expected return of 10% and what will be risk of this portfolio.

(Source: ICAI)

Question 16:

The rates of return on the security of Company X and market portfolio for 10 periods are given below:

Period	Return of Security X (%)	Return on Market Portfolio (%)
1	20	22
2	22	20
3	25	18
4	21	16
5	18	20
6	–5	8
7	17	–6
8	19	5
9	–7	6
10	20	11

i. What is the beta of Security X?
ii. What is the characteristic line for Security X?

(Source: ICAI)

Question 17:

Mr. Gupta is considering investment in the shares of R. Ltd. He has the following expectations of return on the stock and the market:

	Return (%)	
Probability	**R. Ltd.**	**Market**
0.35	30	25
0.30	25	20
0.15	40	30
0.20	20	10

You are required to:

i. Calculate the expected return, variance and standard deviation for R. Ltd.
ii. Calculate the expected return variance and standard deviation for the market.
iii. Find out the beta co-efficient for R. Ltd. shares.

(Source: ICAI)

Question 18:

Expected returns on two stocks for particular market returns are given in the following table:

Market Return	Aggressive	Defensive
7%	4%	9%
25%	40%	18%

You are required to calculate:

a. The Betas of the two stocks.
b. Expected return of each stock, if the market return is equally likely to be 7% or 25%.
c. The Security Market Line (SML), if the risk free rate is 7.5% and market return is equally likely to be 7% or 25%.
d. The Alphas of the two stocks.

(Source: ICAI)

Question 29:

A Foreign Institutional Investor (FII) is planning to invest $10 million in an Indian security with a beta of 1.40 and standard division of return 10% p.a. The holding period of investment will be one year. The current rupee dollar exchange rate is ₹48/$. The FII expects the rupee to depreciates against dollar by 4% over next one year period, with a volatility of 8% p.a. The expected return from the market portfolio is 9% p.a. Correlation between the return of the security and the exchanges rate is 0.15. The risk free rate of return in India is 6% p.a. You are required to calculate the expected return and risk for the FII.

(Source: FOD)

Question 32:

Equity of ABC Ltd. (ABCL) is ₹ 500 Crores, its debt, is worth ₹ 290 Crores. Printer Division segments value is attributable to 64%, which has an Asset Beta (β_p) of 1.55, balance value is applied on Spares and Consumables Division, which has an Asset Beta (β_{sc}) of 1.40 ABCL Debt beta (β_D) is 0.28.

You are required to calculate:

i. Equity Beta (β_E),

ii. Ascertain Equity Beta (β_E), if ABC Ltd. decides to change its Debt Equity position by raising further debt and buying back of equity to have its Debt to Equity Ratio at 1.50.

Assume that the present Debt Beta (β_{D1}) is 0.45 and any further funds raised by way of Debt will have a Beta (β_{D2}) of 0.50.

iii. Whether the new Equity Beta (β_E) justifies increase in the value of equity on account of leverage?

(Source: ICAI)

Question 35:

ABC Ltd. manufactures Car Air Conditioners (ACs), Window ACs and Split ACs constituting 60%, 25% and 15% of total market value. The stand-alone Standard Deviation and Coefficient of Correlation with market return of Car AC and Window AC is as follows:

	S.D.	Coefficient of Correlation
Car AC	0.30	0.6
Window AC	0.35	0.7

No data for stand-alone SD and Coefficient of Correlation of Split AC is not available. However, a company who derives its half value from Split AC and half from Window AC has a SD of 0.50 and Coefficient of correlation with market return is 0.85. Index has a return of 10% and has SD of 0.20. Further, the risk-free rate of return is 4%.

You are required to determine:

i. Beta of ABC Ltd.

ii. Cost of Equity of ABC Ltd.

iii. Assuming that ABC Ltd. wants to raise debt of an amount equal to half of its Market Value then determine equity beta, if yield of debt is 5%.

(Source: ICAI)

Question 36:

Suppose that economy A is growing rapidly and you are managing a global equity fund and so far you have invested only in developed-country stocks only. Now you have decided to add stocks of economy A to your portfolio. The table below shows the expected rates of return, standard deviations, and correlation coefficients (all estimates are for aggregate stock market of developed countries and stock market of Economy A).

	Developed Country Stocks	Stocks of Economy A
Expected rate of return (annualized percentage)	10	15
Risk [Annualized Standard Deviation (%)]	16	30
Correlation Coefficient(ρ)	0.30	

Assuming the risk-free interest rate to be 3%, you are required to determine:

a. What percentage of your portfolio should you allocate to stocks of Economy A if you want to increase the expected rate of return on your portfolio by 0.5%?
b. What will be the standard deviation of your portfolio assuming that stocks of Economy A are included in the portfolio as calculated above?
c. Also show how well the Fund will be compensated for the risk undertaken due to inclusion of stocks of Economy A in the portfolio? ***(Source: ICAI)***

Question 39:

A study by a Mutual fund has revealed the following data in respect of three securities:

Security	σ (%)	Correlation with Index, Pm
A	20	0.60
B	18	0.95
C	12	0.75

The standard deviation of market portfolio (BSE Sensex) is observed to be 15%.

i. What is the sensitivity of returns of each stock with respect to the market?
ii. What are the covariances among the various stocks?
iii. What would be the risk of portfolio consisting of all the three stocks equally?
iv. What is the beta of the portfolio consisting of equal investment in each stock?
v. What is the total, systematic and unsystematic risk of the portfolio in (iv) ?

(Source: ICAI)

Question 40:

The following data are available to you as a portfolio manager.

Security	Expected Return	Beta	Standard Deviation
O	0.32	1.70	0.50
P	0.30	1.40	0.35
Q	0.25	1.10	0.40
R	0.22	0.95	0.24
S	0.20	1.05	0.28
T	0.14	0.70	0.18
Composite Index	0.12	1.000	0.20
T-bills	0.08	0.00	0.00

i. In terms of a security market line (SML) , which of the securities listed above are undervalued? Why?

ii. Assume that a portfolio is constructed using equal portions of the six stocks listed above.
   a. Why is the expected return of such a portfolio?
   b. What would the expected return if this portfolio was increased by 40% through borrowed funds with the cost of borrowing at 12%?

iii. Assume a portfolio is construed using equal portion of six stocks listed Above.
   a. What is the total risk of such a portfolio
   b. What would be the risk if this portfolio was increased by 40% through borrowed funds with cost of borrowing 12%

(Source: ICAI)

Question 47:

Mr. X owns a portfolio with the following characteristics:

	Security A	Security B	Risk Free security
Factor 1 sensitivity	0.80	1.50	0
Factor 2 sensitivity	0.60	1.20	0
Expected Return	15%	20%	10%

It is assumed that security returns are generated by a two factor model.

i. If Mr. X has ₹ 1,00,000 to invest and sells short ₹ 50,000 of security B and purchases ₹ 1,50,000 of security A what is the sensitivity of Mr. X's portfolio to the two factors?

ii. If Mr. X borrows ₹ 1,00,000 at the risk free rate and invests the amount he borrows along with the original amount of ₹ 1,00,000 in security A and B in the same proportion as described in part (i), what is the sensitivity of the portfolio to the two factors?

iii. What is the expected return premium of factor 2?

(Source: ICAI)

Question 49:

Mr. Tamarind intends to invest in equity shares of a company the value of which depends upon various parameters as mentioned below:

Factor	Beta	Expected value in %	Actual value in %
GNP	1.20	7.70	7.70
Inflation	1.75	5.50	7.00
Interest rate	1.30	7.75	9.00
Stock market index	1.70	10.00	12.00
Industrial production	1.00	7.00	7.50

The risk-free rate of interest be 9.25%,

Calculate the return of the share as per Arbitrage Pricing Theory.

(Source: ICAI)

Question 50:

Data for finding out the optimal portfolio are given below:

Security Number	Mean Return	Excess Return	Beta	Unsystematic Risk	Excess Return to Beta
	R_i	$R_i - R_f$	β	$\sigma^2_{\in i}$	$\frac{R_i - R_f}{\beta_i}$
1	19	14	1.0	20	14
2	23	18	1.5	30	12
3	11	6	0.5	10	12
4	25	20	2.0	40	10
5	13	8	1.0	20	8
6	9	4	0.5	50	8
7	14	9	1.5	30	6

The riskless rate of interest is 5 per cent and the market variance is 10. Determine the cut -off point.

(Source: ICAI)

Question 52:

The closing value of Sensex for the month of October, 2007 is given below :

Date Closing	Sensex Value
1.10.07	2800
3.10.07	2780
4.10.07	2795
5.10.07	2830
8.10.07	2760
9.10.07	2790
10.10.07	2880
11.10.07	2960
12.10.07	2990
15.10.07	3200
16.10.07	3300
17.10.07	3450
19.10.07	3360
22.10.07	3290
23.10.07	3360
24.10.07	3340
25.10.07	3290
29.10.07	3240
30.10.07	3140
31.10.07	3260

With the help of above data evaluate the weak form of efficient market hypothesis by applying the run test at 5% and 10% level of significance.

Following value can be used:

Value of t at 5% is 2.101 at 18 degrees of freedom

Value of t at 10% is 1.734 at 18 degrees of freedom

(Source: ICAI)

Question 53:

Mr. Sumeet Gulati is a young analyst who is encouraged by the performance of Dr. Reddy Labs in the year ended March, 2002. On close examination he finds that the announcement regarding sale of molecule DRF 4158 by Dr. Reddy's Lab (DRL) to Novartis took place on May 31, 2001 and there was a renewed interest in the scrip as the company received USD 55 mn as milestone payment. The company would further receive royalties from sale if and when the product comes to market.

To check the market efficiency in semi strong form in the above case, Mr. Gulati collected following relevant information:

Month	Closing Price of DRL stock (Rs.)	Closing Price of Sensex (Rs.)
January, 2001	1299.90	4326.72
February, 2001	1332.80	4247.04
March, 2001	1247.25	3604.38
April, 2001	1121.50	3519.16
May, 2001	1406.30	3631.91
June, 2001	1610.25	3456.78
July, 2001	1688.35	3329.28
August, 2001	1771.35	3244.95
September, 2001	1785.30	2811.60
October, 2001	1045.20	2989.35

Further using the data for 3 previous years the characteristic line arrived by Mr. Gulati is

$$r_{s,t} = 3.92 + 0.51 r_{m,t}$$

Where $r_{m,t}$ is % monthly return on market in any month t

$r_{s,t}$ is % monthly return on DRL stock in the same month t

You are required to conduct the residual analysis to test semi-strong form of market efficiency

(Source: FOD)

Question 54:

During the year 2002-03, three companies Star Software Ltd., Kanishka Airways and Indian Auto Ltd. have announced higher dividends on December 31, 2002. A financial analyst working in a brokerage firm wanted to test the consistency of the semi-strong form of market efficiency. He estimated the characteristic lines for a period of 4 years on a monthly basis upto September 30, 2002. The relationship between the returns on these three companies and the market index are represented by following equations.

$r_{S,t} = 1.25\% + 0.92r_{mt}$

$r_{K,t} = 1.39\% + 1.03\ r_{mt}$

$r_{I,t} = 1.78\% + 1.07\ r_{mt}$

Where $r_{S,t}$ $r_{K,t}$ and $r_{I,t}$ are the returns of Star Software, Kanishka Airways and Indian Auto during period t and $r_{m,t}$ is return of the market index during the same period. The following data pertains to the returns of the companies and market for the period 3 months before and 3 months after the dividend was declared.

Period (Months)	Actual return (%)			Market return (%)
	$r_{S,t}$	$r_{K,t}$	$r_{I,t}$	r_{mt}
Sep 30, 2002	11.21	11.78	12.25	10.25
Oct 31, 2002	11.42	12.49	13.25	10.75
Nov 30, 2002	12.02	13.02	13.39	10.90
Dec 31, 2002	11.98	12.29	13.10	10.80
Jan 31, 2003	12.92	13.45	14.25	11.25
Feb 28, 2003	12.23	13.02	14.01	10.92
Mar 31, 2003	12.75	13.21	14.19	11.15

Using event studies approach you are required to verify the validity of semi-strong form of market efficiency in the Indian stock market.

(Source: FOD)

Question 55:

Indira has a fund of ₹ 3 lacs which she wants to invest in share market with rebalancing target after every 10 days to start with for a period of one month from now. The present NIFTY is 5326. The minimum NIFTY within a month can at most be 4793.4. She wants to know as to how she should rebalance her portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:

1. Immediately to start with.
2. 10 days later-being the 1st day of rebalancing if NIFTY falls to 5122.96.
3. 10 days further from the above date if the NIFTY touches 5539.04.

For the sake of simplicity, assume that the value of her equity component will change in tandem with that of the NIFTY and the risk free securities in which she is going to invest will have no Beta.

(Source: ICAI)

Question 56:

Ms. Sunidhi is working with an MNC at Mumbai. She is well versant with the portfolio management techniques and wants to test one of the techniques on an equity fund she has constructed and compare the gains and losses from the technique with those from a passive buy and hold strategy. The fund consists of equities only and the ending NAVs of the fund he constructed for the last 8 months are given below:

Month Ending	NAV (₹/unit)	Month Ending	NAV (₹/unit)
December 2018	40.00	April 2019	38.00
January 2019	25.00	May 2019	37.00
February 2019	36.00	June 2019	42.00
March 2019	32.00	July 2019	43.00

Assume Sunidhi has an amount of ₹ 20 lakhs for investment and she has invested equally in the equity fund and a conservative portfolio (of bonds) in the beginning of December 2018 and the total portfolio was being rebalanced each time the NAV of the fund increased or decreased by 15%.

You are required to determine the value of the portfolio for each level of NAV following the Constant Ratio Plan.

Note: Rounded off number of units upto 2 decimal points only.

(Source: ICAI)

Question 57:

An investor has two portfolios known to be on minimum variance set for a population of three securities A, B and C having below mentioned weights:

	WA	WB	WC
Portfolio X	0.30	0.40	0.30
Portfolio Y	0.20	0.50	0.30

It is supposed that there are no restrictions on short sales.

i. What would be the weight for each stock for a portfolio constructed by investing ₹5,000 in portfolio X and ₹ 3,000 in portfolio Y?.

ii. Suppose the investor invests ₹ 4,000 out of ₹ 8,000 in security A. How he will allocate the balance between security B and C to ensure that his portfolio is on minimum variance set?

(Source: ICAI)

Question 59:

Mr. Abhishek is interested in investing ₹ 2,00,000 for which he is considering following three alternatives:

i. Invest ₹ 2,00,000 in Mutual Fund X (MFX)
ii. Invest ₹ 2,00,000 in Mutual Fund Y (MFY)
iii. Invest ₹ 1,20,000 in Mutual Fund X (MFX) and ₹ 80,000 in Mutual Fund Y (MFY)

Average annual return earned by MFX and MFY is 15% and 14% respectively. Risk free rate of return is 10% and market rate of return is 12%.

Covariance of returns of MFX, MFY and market portfolio Mix are as follow:

	MFX	MFY	Mix
MFX	4.800	4.300	3.370
MFY	4.300	4.250	2.800
Mix	3.370	2.800	3.100

You are required to calculate:

i. variance of return from MFX, MFY and market return,
ii. portfolio return, beta, portfolio variance and portfolio standard deviation,
iii. expected return, systematic risk and unsystematic risk; and
iv. Sharpe ratio, Treynor ratio and Alpha of MFX, MFY and Portfolio Mix

(Source: ICAI)

Question 67:

Following data is related to Company X, Market Index and Treasury Bonds for the current year and last 4 years:

Year	Company X		Market Index		
	Average Share Price(P)	Dividend Per Share (D)	Average Market Index	Market Dividend Yield	Return on Treasury Bonds
2010	₹ 139	₹ 7.00	1300	3%	7%
2011	₹ 147	₹ 8.50	1495	5%	9%
2012	₹ 163	₹ 9.00	1520	5.5%	8%
2013	₹ 179	₹ 9.50	1640	4.75%	8%
2014 (Current Year)	₹ 203.51	₹ 10.00	1768	5.5%	8%

With the above data estimate the beta of Company X's share.

(Source: ICAI)

Question 71:

The return of security 'L' and security 'K' for the past five years are given below:

Year	Security-L Return %	Security-K Return %
2012	10	11
2013	04	- 06
2014	05	13
2015	11	08
2016	15	14

Calculate the risk and return of portfolio consisting above information.

(Source: ICAI)