

$$\text{Additional units} = \frac{10,000}{20.50} = 487.80 \text{ units}$$

$$\text{Total Units} = 10,000 + 48,780 = 10,487.80$$

**31/3/2009**

$$\begin{aligned} \text{Dividend amount} &= (10,487.80 \text{ units} \times 10 \times 20\%) \\ &= 20,975 \end{aligned}$$

$$\begin{aligned} \text{Additional units} &= (11,296.11 - 10,487.80) \\ &= 808.31 \text{ units} \end{aligned}$$

$$\text{NAV} = \frac{20,974}{808.31} = 25.95$$

**31/3/2010**

$$\text{Annualized Yield} = \text{HPR} \times \frac{12}{n}$$

$$73.52 = \text{HPR} \times \frac{12}{33}$$

$$\text{HPR} = 73.52 \times \frac{33}{12} = 202.18\%$$

$$202.18\% = \frac{x - 1,00,000}{1,00,000} = 3,02,180$$

$$\text{NAV} = \frac{3,02,180}{11,296.11} = ₹ 26.75$$

**Question – 20**

Mr. Alex, a practicing Chartered Accountant, can earn a return of 15 percent by investing in equity shares on his own. He is considering a recently announced equity based mutual fund scheme in which initial expenses are 6 percent and annual recurring expenses are 2 percent.

- (i) How much should the mutual fund earn to provide Mr. Alex a return of 15 percent per annum?



incentive fee of 2%. The incentive will be linked to gross return each year in excess of the portfolio maximum value since the inception of fund. The maximum value the fund achieved so far since inception of fund about one and half year ago was ₹ 21 crores.

You are required to compute the fee payable to CA. X, if return on the fund this year turns out to be

- (a) 29%, (b) 4.5%, (c) -1.8%

**(SM TYK – 23)**

**Solution:**

**(a) Return = 29%**

Portfolio Value (20 × 1.29) = 25.80 Crore	
Basic Fees (20 Crore × 0.10%)	= ₹ 2,00,000
Incentives (25.80 Crore – 21 Crore) × 2%	= ₹ 9,60,000
Total	<u>= ₹ 11,60,000</u>

**(b) Return = 4.5%**

Portfolio Value (20 × 1.045) = 20.90 Crore	
Basic Fees	= 2,00,000
Incentives	= 0
	<u>= 2,00,000</u>

**(c) Return = -1.8%**

Portfolio Value (20 Crore × 0.982) = 19.64 Crore	
Basic Fees	= 2,00,000
Incentives	= 0
	<u>= 2,00,000</u>

**(4) PERFORMANCE EVALUATION OF MUTUAL FUND**

**Question – 22**

Five portfolios experienced the following results during a 7- year period:

Portfolio	Average Annual Return ( $R_p$ ) (%)	Standard Deviation ( $S_p$ )	Correlation with the market returns ( $r$ )
A	19.0	2.5	0.840
B	15.0	2.0	0.540
C	15.0	0.8	0.975
D	17.5	2.0	0.750
E	17.1	1.8	0.600
Market Risk ( $\sigma_m$ )		1.2	
Market Risk of Return ( $R_m$ )	14.0		
Risk-free rate ( $R_f$ )	9.0		

Rank the portfolios using (a) Sharpe’s method, (b) Treynor’s method and (c) Jensen’s Alpha

**(RTP November – 2021)**

**Solution:**

Let portfolio standard deviation be  $\sigma_p$

Market Standard Deviation =  $\sigma_m$

Coefficient of correlation =  $r$

$$\text{Portfolio beta } (\beta_p) = \frac{\sigma_p r}{\sigma_m}$$

$$\text{Required portfolio return } (R_p) = R_f + \beta_p (R_m - R_f)$$

Portfolio	Beta	Return from the portfolio ( $R_p$ ) (%)
A	1.75	17.75
B	0.90	13.50
C	0.65	12.25
D	1.25	15.25
E	0.90	13.50

Portfolio	Sharpe Method		Treynor Method		Jensen's Alpha	
	Ratio	Rank	Ratio	Rank	Ratio	Rank
A	4.00	IV	5.71	V	1.25	V
B	3.00	V	6.67	IV	1.50	IV

C	7.50	I	9.23	I	2.75	II
D	4.25	III	6.80	III	2.25	III
E	4.50	II	9.00	II	3.60	I

**Question – 23**

There are two Mutual Funds viz. D Mutual Fund Ltd. and K Mutual Fund Ltd. Each having close ended equity schemes.

NAV as on 31-12-2014 of equity schemes of D Mutual Fund Ltd. is ₹ 70.71 (consisting 99% equity and remaining cash balance) and that of K Mutual Fund Ltd. is 62.50 (consisting 96% equity and balance in cash).

Following is the other information:

Particular	Equity Schemes	
	D Mutual Fund Ltd.	K Mutual Fund Ltd.
Sharpe Ratio	2	3.3
Treynor Ratio	15	15
Standard deviation	11.25	5

There is no change in portfolios during the next month and annual average cost is ₹ 3 per unit for the schemes of both the Mutual Funds.

If Share Market goes down by 5% within a month, calculate expected NAV after a month for the schemes of both the Mutual Funds.

For calculation, consider 12 months in a year and ignore number of days for particular month.

**(SM TYK – 22, RTP Nov – 2020 & May – 2019)**

**Solution:**

**(1) Calculation of Equity & Cash Component**

	D Mutual Fund Ltd.	K Mutual Fund Ltd.
NAV	₹ 70.71	₹ 62.50
Equity (%)	99%	96%
Equity per unit	70.00	60.00



**(4) Calculation of Cash**

	<b>D Mutual Fund</b>	<b>K Mutual Fund</b>
Cash Opening	0.71	2.50
(-) Expenses $\left(\frac{3}{12}\right)$	0.25	0.25
	0.46	2.25

**(5) Calculation of NAV after 1 month**

Equity	64.75	56.70
(+) Cash	0.46	2.25
	65.21	58.95

**Question – 24**

Following is the information related to three mutual funds:

Year	MF-A	MF-B	MF-C
2020	10%	5%	14%
2021	8%	10%	10%
2022	12%	8%	18%

Correlation between market and mutual fund:

	MF-A	MF-B	MF-C
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 Rank the Mutual fund using Sharpe's ratio and Treynor's ratio.

**(Exam Nov – 2022)**

**Solution:**

**Working Note 1:**

**Mutual Fund A**

$$R_p = \frac{10 + 8 + 12}{3} = 10\%$$

$$\begin{aligned} \sigma_p &= \frac{\sqrt{(10-10)^2 + (8-10)^2 + (12-10)^2}}{3} \\ &= 1.63\% \end{aligned}$$

**Mutual Fund B**

$$R_p = \frac{5 + 10 + 18}{3} = 7.67\%$$

$$\begin{aligned} \sigma_p &= \frac{\sqrt{(5-7.67)^2 + (10-7.67)^2 + (18-7.67)^2}}{3} \\ &= 2.05\% \end{aligned}$$

**Mutual Fund C**

$$R_p = \frac{14 + 10 + 18}{3} = 14\%$$

$$\begin{aligned} \sigma_p &= \frac{\sqrt{(14-14)^2 + (10-14)^2 + (18-14)^2}}{3} \\ &= 3.27\% \end{aligned}$$

**Working Note 2:**

$$B_p = \frac{\sigma_p}{\sigma_m} \times r_m$$

$$B_A = \frac{1.63}{3} \times 0.45 = 0.244$$

$$B_B = \frac{2.05}{3} \times 0.25 = 0.171$$

$$B_C = \frac{3.27}{3} \times 0.65 = 0.709$$

Fund	Sharpe Ratio	Rank	Treynor Ratio	Rank
A	$\frac{10-7}{1.63} = 1.84$	II	$\frac{10-7}{0.244} = 12.30$	I
B	$\frac{7.67-7}{2.05} = 0.33$	III	$\frac{7.67-7}{0.171} = 3.92$	III
C	$\frac{14-7}{3.27} = 2.14$	I	$\frac{14-7}{0.709} = 9.87$	II

**Question – 25**

The following are the details of three mutual funds of MFL:

	Growth Fund	Balanced Fund	Regular Fund	Market
Average Return (%)	7	6	5	9
Variance	92.16	54.76	40.96	57.76
Coefficient of Determination	0.3025	0.6561	0.9604	

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

You are required to:

- (i) Rank the funds as per Sharpe's measure.
- (ii) Rank the funds as per Treynor's measure.
- (iii) Compare the performance with the market.

(MTP April – 2023)

**Solution:**

**(i) Sharpe Ratio**

$$SR = \frac{R_p - R_f}{\sigma_p}$$

$$\text{Growth Fund} = \frac{7 - 9}{\sqrt{92.16}} = -0.208 \quad \dots\dots I$$

$$\text{Balance Fund} = \frac{6 - 9}{\sqrt{54.76}} = -0.405 \quad \dots\dots II$$

$$\text{Regular Fund} = \frac{5 - 9}{\sqrt{40.96}} = -0.625 \quad \dots\dots \text{III}$$

**(ii) Treynor's Ratio**

$$\text{Coefficient of determination} = r^2$$

$$r_{AM} = \sqrt{0.3025} = 0.55$$

$$r_{BM} = \sqrt{0.6561} = 0.81$$

$$r_{CM} = \sqrt{0.9604} = 0.98$$

$$B_A = \frac{\sigma_A}{\sigma_M} \times r_{AM}$$

$$B_A = \frac{\sqrt{92.16}}{\sqrt{57.76}} \times 0.55 = 0.696$$

$$B_B = \frac{\sqrt{54.76}}{\sqrt{57.76}} \times 0.81 = 0.789$$

$$B_C = \frac{\sqrt{40.96}}{\sqrt{57.76}} \times 0.98 = 0.825$$

$$\text{TR} = \frac{R_p - R_f}{\beta}$$

$$\text{Growth Fund} = \frac{7 - 9}{0.696} = -2.87 \quad \dots\dots \text{I}$$

$$\text{Balance Fund} = \frac{6 - 9}{0.789} = -3.802 \quad \dots\dots \text{II}$$

$$\text{Regular Fund} = \frac{5 - 9}{0.825} = -4.849 \quad \dots\dots \text{III}$$

**(iii) Sharpe Ratio & Treynor's Ratio of Market**

$$\text{Sharpe Ratio} = \frac{9 - 9}{\sqrt{57.76}} = 0$$

$$\text{Treynor's Ratio} = \frac{9 - 9}{1} = 0$$

Market performance is better than Mutual Fund.