Module 10 · Portfolio performance evaluation P14 · 10.1 · 10.2

SM pp. 419–436 (exercise 437–444). **A long question in every paper** (expected 6.4) — in Q4(b) or Q5: ranking by **Sharpe, Treynor, Jensen** (J23, J24, D25 = SM Illus. 7 template, J26), reverse questions (D23: beta and R_f from Jensen and Treynor) — plus MCQs (D24, J25: Sharpe ratio; correlation or market SD from the two ratios). 10.2 market timing / style analysis: headings only.

Paper	Long question
Jun'23	Q5(b) rank three MFs by Sharpe and by Treynor
Dec'23	Q5(a) from Jensen alpha and Treynor: beta, R_f, SML
Jun'24	Q4(b) four funds: Sharpe, Treynor (beta from systematic risk)
Dec'25	**Q5(b) three funds: Sharpe, Treynor, Jensen ($\beta = \rho\sigma \div \sigma_M$)**
Jun'26	Q4(b) fund returns from NAVs; Sharpe and Treynor

Formula	When to use	SM
Sharpe = $(R_i - R_f) \div \sigma_i$	Reward per unit of **total** risk; poorly diversified portfolio.	[SM 428]
Treynor = $(R_i - R_f) \div \beta_i$	Reward per unit of **systematic** risk; well-diversified portfolio.	[SM 424, SM 428]
Jensen α = $R_p - [R_f + \beta_p(R_m - R_f)]$	Absolute out- / under-performance against CAPM.	[SM 425]
MWROR: IRR equating the fund's opening value and net cash flows with its end value	Money-weighted return (affected by timing of contributions); TWROR removes it.	[SM 419–420]

ANSWER LAYOUT (ICMAI TABLE)

- Columns: Fund · R · σ · β · R − R_f · Sharpe · rank · Treynor · rank · CAPM return · Jensen α · rank. Include the market as a row when it is given.
- Beta not given: $\beta = \rho \times \sigma_{fund} \div \sigma_{market}$, or from systematic risk: $\beta = \sqrt{(\text{systematic variance})} \div \sigma_M$.
- Reverse questions: Treynor = $(R - R_f) \div \beta$ and $\alpha = R - R_f - \beta(R_m - R_f)$ are two equations — solve for β and R_f.
- MCQ: Sharpe ÷ Treynor = $\beta \div \sigma = \rho \div \sigma_M$ → correlation or market SD.
- Ranks can differ: Sharpe penalises unsystematic risk, Treynor does not.

PROBLEMS BOX · RANKING FUNDS (RECOMPUTED BY SCRIPT m10_patterns.py)

WORKED PATTERN · SM ILLUSTRATION 7 (SIX FUNDS, R_f 6%, R_m 15%)

Fund	R	σ	β	Sharpe	Rk	Treynor	Rk	Jensen	Rk
P	18.5	24.05	1.2	0.5198	4	10.4167	2	1.7	2
Q	16.3	22.37	1.1	0.4604	5	9.3636	4	0.4	4
R	9.0	14.59	0.9	0.2056	7	3.3333	7	-5.1	7
S	21.25	28.10	1.3	0.5427	3	11.7308	1	3.55	1
T	16.80	19.58	1.05	0.5516	2	10.2857	3	1.35	3
U	12.25	16.00	0.8	0.3906	6	7.8125	6	-0.95	6
Market	15.00	13.40	1	0.6716	1	9	5	0	5

[SM 426–428]

SM ILLUSTRATIONS 5 AND 6

Treynor: return 40%, β 1.2, R_f 8% → 32 ÷ 1.2 = 26.67% v market 25%; CAPM 8 + (25 − 8) × 1.2 = 28.4% → outperformed by 11.6%. [SM 424]

Jensen: R_m 12%, R_f 6%: portfolio 1 14.5 − 13.2 = +1.30%; 2: 9.5 − 10.8 = −1.30%; 3: 18.0 − 14.4 = +3.60% (best). [SM 427]

DEC'25 Q5(b) TAMIA (OUR WORKING; R_f 9%, R_m 14%, σ_M 1.20)

Fund	Sharpe	Rk	β = ρσ ÷ 1.20	Treynor	Rk	Jensen	Rk
ROX	10 ÷ 2.50 = 4.00	1	1.75	5.7143	1	+1.25	1
SEZ	4.5 ÷ 2.00 = 2.25	3	0.90	5.0000	2	0.00	2
TOM	2 ÷ 0.80 = 2.50	2	0.65	3.0769	3	−1.25	3

Jensen: ROX 19 − (9 + 1.75 × 5) = +1.25; SEZ 13.5 − (9 + 0.90 × 5) = 0; TOM 11 − (9 + 0.65 × 5) = −1.25.

PRACTISE THESE (MOST LIKELY FIRST)

D25 Q5(b), J26 Q4(b), J24 Q4(b) · D23 Q5(a) (reverse) · J23 Q5(b) · MQP Q5(b), Q1(vii) · PTP Q4(b), Q5(b) · postal Q6(a) · MCQs D24 Q1(iv), (xiii), J25 Q1(iii), (xi) · SM Illus. 1–8 (SM 420–428), exercise MCQs 4–5 (SM 441) · MCQ bank Q104–Q109 · also M7 (fund NAV) for Q4(b).

⚠ **Traps**: use excess return ($R - R_f$) in both ratios; rank the **highest** ratio first; negative Jensen = under-performed; compute β before Treynor when only ρ is given.