

ISE 307: Engineering Economic Analysis (Term 253)

Quiz 2

Multiple choice. Choose the single best answer for each item. Coverage: present-worth analysis and annual-equivalence analysis (Lectures 12-16).

1. Two cost streams are equal in present worth at $i = 10\%$. Comparing them by annual equivalent (AE) at the same rate and life gives:
 - (A) a reversed preference between the two streams
 - (B) no valid ranking of the two streams
 - (C) a reversal only when salvage values differ
 - (D) the same preference between the two streams
2. For a cash-tight startup, the legitimate reason to prefer a short payback period is that payback:
 - (A) equals the project's internal rate of return
 - (B) maximizes the project's net present worth
 - (C) reflects the time value of money precisely
 - (D) screens liquidity and early-recovery risk
3. Two projects have identical undiscounted inflows and the same 4-year conventional payback, but Project A's inflows arrive earlier within the window. At a positive MARR:
 - (A) the two projects have equal net present worth
 - (B) Project B has higher NPW and shorter discounted payback
 - (C) neither project can be ranked by net present worth
 - (D) Project A has higher NPW and shorter discounted payback
4. On a plot of NPW versus interest rate for a simple investment, the internal rate of return is the:
 - (A) NPW value at a zero interest rate
 - (B) slope of the NPW curve
 - (C) highest point on the NPW curve
 - (D) rate where the NPW curve crosses zero
5. Comparing two alternatives by net future worth is valid only when the future worths are evaluated at:
 - (A) each alternative's end-of-life date
 - (B) each alternative's payback date
 - (C) the same point in time
 - (D) any two convenient dates
6. A project costs 250,000 SAR, returns 55,000 SAR/yr for 6 years, and has a 30,000 SAR salvage; $i = 12\%$ [$(P/A, 12\%, 6) = 4.1114$, $(P/F, 12\%, 6) = 0.5066$]. The NPW and decision are: (*calculation*)
 - (A) +65,000 SAR; accept
 - (B) -8,675 SAR; reject

- (C) +8,675 SAR; accept
(D) -65,000 SAR; reject
7. A perpetuity of A/yr begins at end of year 1 forever; an identical one begins only at end of year 11. Evaluated today, the second is worth:
- (A) more than the first perpetuity
(B) less than the first perpetuity
(C) one-tenth of the first perpetuity
(D) the same as the first perpetuity
8. A fund must cover 30,000 SAR/yr of upkeep forever plus a one-time 100,000 SAR now, at $i = 10\%$. Its required size today is [use A/i for the perpetual part]:
- (A) 3,000,000 SAR
(B) 300,000 SAR
(C) 400,000 SAR
(D) 130,000 SAR
9. A project is legally required and 'do nothing' is not an option. The alternatives are compared by:
- (A) choosing the highest-revenue alternative
(B) accepting only positive-NPW alternatives
(C) choosing the least-cost alternative
(D) rejecting all negative-NPW alternatives
10. For mutually exclusive revenue projects of equal life, picking the lowest first cost instead of the highest NPW:
- (A) is the rule required by payback analysis
(B) can forgo added value from a larger project
(C) always maximizes total net present worth
(D) always leads to the same choice
11. If identical repetition of a short-lived alternative is unrealistic, the better way to handle unequal lives is to:
- (A) ignore the difference in service lives
(B) use a common study period with terminal values
(C) apply the LCM with identical replacement
(D) select the longer-lived alternative outright
12. Alternatives with 4-year and 6-year lives, compared by PW under repeatability, require a study horizon of:
- (A) 4 years
(B) 10 years
(C) 24 years
(D) 12 years

13. For a single project, the annual-equivalent accept/reject decision at the MARR:
- (A) matches only when salvage is zero
 - (B) always matches the NPW decision
 - (C) can differ from the NPW decision
 - (D) matches only for service projects
14. The forms $(I - S)(A/P, i, N) + iS$ and $I(A/P, i, N) - S(A/F, i, N)$ for capital recovery are equal because:
- (A) the interest rate is taken as zero
 - (B) the salvage term cancels in both
 - (C) $(A/P, i, N)$ equals $(A/F, i, N)$
 - (D) $(A/P, i, N)$ equals $(A/F, i, N)$ plus i
15. Machine 95,000 SAR, salvage 25,000 SAR, life 5 yr, $i = 10\%$ [$(A/P, 10\%, 5) = 0.26380$, $(P/F, 10\%, 3) = 0.7513$], operating 20,000 SAR/yr, plus a 30,000 SAR refit at end of year 3. Full AEC is closest to: (*calculation*)
- (A) 35,020 SAR/yr
 - (B) 46,912 SAR/yr
 - (C) 50,966 SAR/yr
 - (D) 40,966 SAR/yr
16. A plant's full annual-equivalent cost of making a product is AEC and it makes Q units/yr. Its break-even unit price is:
- (A) Q divided by AEC
 - (B) AEC divided by Q
 - (C) AEC minus Q
 - (D) AEC multiplied by Q
17. In-house annual-equivalent cost is 90,000 SAR/yr and a supplier charges 25 SAR/unit. The break-even volume is: (*calculation*)
- (A) 360 units/yr
 - (B) 4,000 units/yr
 - (C) 2,250 units/yr
 - (D) 3,600 units/yr
18. Service options, $i = 10\%$. A: 40,000, op 9,000/yr, 4 yr, salvage 8,000 [$(A/P, 10\%, 4) = 0.31547$]. B: 60,000, op 6,000/yr, 6 yr, salvage 10,000 [$(A/P, 10\%, 6) = 0.22961$]. Lower-AEC choice: (*calculation*)
- (A) B, about 18,481 SAR/yr
 - (B) B, about 22,000 SAR/yr
 - (C) A, about 19,895 SAR/yr
 - (D) A, about 15,000 SAR/yr
19. A firm already spent 25,000 SAR last quarter on a make-versus-buy study. In today's decision that 25,000 SAR should be:

- (A) recovered by making the part
 - (B) added to the make option
 - (C) ignored as a sunk cost
 - (D) split evenly across options
- 20.** Machine G has a high first cost but low operating cost; H is the reverse. A fair comparison requires:
- (A) comparing full annual-equivalent costs
 - (B) choosing the lower first cost
 - (C) comparing operating costs only
 - (D) comparing first costs only
- 21.** A simple project has $IRR = 13\%$. At $MARR = 13\%$, its NPW and the decision are:
- (A) undefined; reject
 - (B) positive; accept
 - (C) zero; indifferent
 - (D) negative; reject
- 22.** A project costs 100,000 SAR and returns 30,000 SAR/yr for 5 years. With $PW(12\%) = +8,144$ and $PW(18\%) = -6,184$, the interpolated IRR is closest to: (*calculation*)
- (A) 30.0%
 - (B) 12.0%
 - (C) 15.4%
 - (D) 18.0%
- 23.** The most general way to find the present worth of a stream of unequal yearly cash flows is to:
- (A) discount each flow by its own $(P/F, i, n)$
 - (B) average them and apply $(P/A, i, N)$
 - (C) add the nominal cash-flow amounts
 - (D) apply $(P/A, i, N)$ to the largest flow
- 24.** The capitalized cost of a perpetual service is best interpreted as the:
- (A) first cost plus one year of operating
 - (B) salvage value of the perpetual asset
 - (C) sum today whose interest funds it forever
 - (D) total undiscounted spending over time
- 25.** If a project's discounted payback period is finite and shorter than its life, its NPW at that MARR is:
- (A) negative
 - (B) exactly zero
 - (C) indeterminate
 - (D) positive

- 26.** Converting a one-time present cost P into an equivalent annual cost over an infinite horizon gives [note $(A/P, i, \text{infinity}) = i$]:
- (A) P multiplied by i and N
 - (B) P multiplied by i
 - (C) zero over an infinite horizon
 - (D) P divided by N
- 27.** When service alternatives are compared by present worth, the preferred one has the:
- (A) largest initial first cost
 - (B) shortest useful service life
 - (C) most positive PW of net cash flow
 - (D) least present worth of costs
- 28.** Two revenue alternatives differ in both revenue and cost. The correct rule is to choose the one with the:
- (A) higher net present worth
 - (B) higher total revenue
 - (C) shorter payback period
 - (D) lower total cost
- 29.** A durable asset has a modest first cost but steady inflows for 30 years. A strict 2-year payback cutoff would:
- (A) likely reject a high-NPW asset
 - (B) compute the asset's internal return
 - (C) maximize the asset's net worth
 - (D) correctly accept the durable asset
- 30.** For mutually exclusive alternatives over a common horizon, NPW and AE rankings agree but individual-IRR ranking may not, because IRR:
- (A) uses a different MARR per option
 - (B) is insensitive to project scale
 - (C) ignores the time value of money
 - (D) cannot be computed for these options