# ISE 307: Engineering Economic Analysis (Term 253)

Quiz 3

Multiple choice. Choose the single best answer for each item. Coverage: depreciation, income taxes, project uncertainty, and spreadsheet tools (Lectures 21-24).

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**1.** A firm pays 46,000 SAR for a machine, 1,200 SAR freight, 1,300 SAR site preparation, 1,500 SAR installation, and signs a 4,000 SAR/yr maintenance contract. The cost basis for depreciation is:

(A) 46,000 SAR - the purchase price only
(B) 54,000 SAR - everything spent in year 1
(C) 50,000 SAR - all costs required to place the asset in service; the recurring contract is an annual operating expense
(D) 47,200 SAR - price plus freight only

**2.** Computing the year-3 double-declining-balance charge requires the year-1 and year-2 charges first because:

(A) each DDB charge applies the rate alpha to the remaining book value, so charges chain through the balances one year at a time
(B) the rate alpha itself changes every year
(C) the salvage floor must be tested starting from year 1
(D) the MACRS percentage table must be consulted for prior years

**3.** Which statement about book versus tax depreciation is correct?

(A) firms may freely choose their tax depreciation method to match asset wear
(B) tax schedules are designed to track each asset's actual loss of market value
(C) accelerated tax schedules increase the firm's total tax paid over the asset's life
(D) book depreciation is chosen for financial reporting (SL, DB, UoP), while tax depreciation is mandated by the authority and accelerated - larger charges earlier defer taxes

**4.** Each MACRS percentage column sums to exactly 100% of the cost basis because MACRS:

(A) assumes salvage is zero, recovering the entire basis; actual sale proceeds are settled later through gain-or-loss on disposal
(B) applies the half-year convention, which doubles the year-1 rate
(C) requires book value to land exactly on the salvage estimate
(D) rounds each year's percentage up to guarantee full recovery

**5.** For the same cost basis, zero salvage, and life N (with roughly even usage), the method with the LARGEST year-1 deduction is:

(A) straight line, at 1/N of the basis
(B) double declining balance, at 2/N of the full basis - which is exactly why accelerated methods are preferred for tax
(C) units of production, at the year-1 usage share
(D) all three tie in year 1 and differ only later

**6.** A project year shows R = 200,000 SAR, cash expenses E = 110,000 SAR, depreciation D = 30,000 SAR, and t = 25%. The after-tax cash flow is: *(calculation)*

(A) 45,000 SAR
(B) 67,500 SAR
(C) 90,000 SAR
(D) 75,000 SAR

**7.** In ATCF = net income + depreciation, the depreciation is added back because it:

(A) was subtracted in computing net income although no cash actually left the firm - its only cash effect is the smaller tax bill
(B) is refunded to the firm by the tax authority each year
(C) approximates the salvage value received at disposal
(D) was double-counted inside the cash operating expenses

**8.** If the marginal tax rate rises from 20% to 30%, the annual cash value of a fixed depreciation charge D:

(A) falls, since higher taxes leave less cash overall
(B) is unchanged - D is set by the depreciation schedule, not the tax rate
(C) rises: the shield is t x D, so each SAR of deduction now shields more tax
(D) becomes negative once the rate passes 25%

**9.** An asset with book value 20,000 SAR is sold for 26,000 SAR; gains are taxed at 25%. The net cash proceeds are: *(calculation)*

(A) 26,000 SAR
(B) 24,500 SAR
(C) 19,500 SAR
(D) 21,500 SAR

**10.** In an after-tax project analysis, the purchase price of new equipment:

(A) is deducted as a lump-sum expense in the purchase year's income statement
(B) appears only at disposal, through the gain-or-loss settlement
(C) is ignored, since depreciation replaces it entirely
(D) enters the tax computation only through the annual depreciation allowances, while the cash outflow itself sits at year 0 of the diagram

**11.** A sensitivity study gives PW swings of: revenue 63,700; operating cost 39,400; investment 22,000; salvage 1,200 (SAR). The team can fund one more week of estimation work before deciding. It should be spent on:

(A) the salvage estimate, since it is the cheapest to refine
(B) the revenue forecast - the widest tornado bar, where refinement changes the decision most
(C) the investment quote, since it is paid first
(D) all four inputs equally, to stay unbiased

**12.** A project: investment 70,000 SAR, salvage 5,000 SAR at year 5 [(P/F,10%,5) = 0.6209], most-likely annual net 20,000 SAR, MARR 10% [(P/A,10%,5) = 3.7908]. The break-even annual net A* and the cushion are closest to: *(calculation)*

(A) A* = 17,647 SAR/yr; cushion about 11.8%
(B) A* = 18,466 SAR/yr; cushion about 7.7%
(C) A* = 14,000 SAR/yr; cushion about 30%
(D) A* = 20,000 SAR/yr; cushion 0% - the project is at break-even

**13.** A project has E[PW] = +6,862 SAR but a 25% chance of a roughly 22,800 SAR loss. The complete recommendation is to:

(A) accept without qualification - the expected value is positive
(B) reject - any nonzero loss probability is disqualifying
(C) report both the positive expectation and the 25% chance of losing about 22,800 - a risk-averse owner may still decline
(D) average the two figures and decide on the result

**14.** A project shows E[PW] = 6,862 SAR and sigma = 19,733 SAR. Read together, the pair says the project is:

(A) safe - a positive mean guarantees a profit
(B) profitable on average, but the outcomes scatter about three times wider than the mean: a risky project
(C) unacceptable - sigma may never exceed the mean
(D) mispriced, since sigma should be measured in percent

**15.** Crushing for outside clients: price 12 SAR/tonne, variable cost 8 SAR/tonne, fixed cost 96,000 SAR/yr, so Q* = 24,000 tonnes/yr. For this break-even to respect the time value of money, the fixed cost should:

(A) be replaced by the machine's purchase price
(B) exclude all capital items, keeping only cash O&M
(C) be discounted to present worth before dividing
(D) include the machine's capital recovery cost CR(i) - Q* then marks the volume where AE = 0

**16.** With the year-0 investment in cell A1, the formula =NPV(0.10, A1:A6) returns:

(A) the correct present worth of the project
(B) the correct present worth divided by 1.10 - every flow, including the investment, slid one year into the future
(C) the project's internal rate of return
(D) a #VALUE! error, since ranges may not include year 0

**17.** =RATE(12, 28000, -200000) returns 9.05%, but =RATE(12, 28000, 200000) returns an error, because RATE:

(A) requires its arguments to carry disagreeing signs - money must be given up in one direction to receive it in the other, or no rate balances the equation
(B) accepts only negative present values by convention

(C) cannot handle more than 10 periods without anchoring

(D) needs the guess argument whenever pv is positive

**18.** To reproduce one full row of a sensitivity table - PW at five candidate revenue levels - in a single operation, use:

(A) Goal Seek, run once per candidate revenue

(B) an IRR call over the candidate revenue column

(C) a one-way Data Table: candidates in a column, a link to the PW cell placed one up-and-right, and column input cell = the revenue input

(D) a VDB call with the revenues as its range

**19.** In =DDB(cost, salvage, life, year), typing the salvage as 0 when the true salvage is 5,000 SAR will:

(A) have no effect - the DDB function ignores its salvage argument

(B) overstate the late-year charges: DDB applies the salvage floor itself, so it needs the true salvage to cap the schedule

(C) understate the year-1 charge by exactly 5,000 SAR

(D) make Excel switch to straight line automatically

**20.** In an AEC(N) table, the capital-recovery column holds =PMT($B$2, A5, -$B$1, B5), where $B$1 is the price, A5 is N, and B5 is the year-N market value S_N. The arguments encode:

(A) borrowing S_N today and repaying the price at year N

(B) depositing the price for N years at the market rate

(C) amortizing I - S_N with no interest charged on the salvage portion

(D) paying the price now and recovering S_N at the end - PMT returns exactly (I - S_N)(A/P, i, N) + i x S_N per year