Q.1-3

* Company SZ is considering replacing an old machine with a new machine today. The new machine costs $9000 plus $1000 for shipping and installation and falls under the 3-year MACRS asset class; the machine will be depreciated over the next four years. (See the schedule below) If the company takes this project of asset replacement, revenues will increase by $22000 and operating costs will increase by $2000 for each of the next 4 years compared to the case of just using the old machine. When the project ends in the fourth year, the new machine will be sold for $2000. If the project is taken, net working capital will rise by $1000 at the time of purchase of the new machine and will be reversed at the time of its sale. The corporate income tax rate is 40% and the tax rate on capital gain is 20%. The old machine was purchased 2 years ago at $6000, intended to be used for 6 years and it has been using straight line depreciation method. It can be sold for $3000 today and for $0, 4 years later.



* MACRS Schedule

Year 1 Year 2 Year 3 Year 4

33.33% 44.45% 14.81% 7.41%

Q.1. Find the incremental cashflow associated with the project in Year 0. Round the answer to the whole number. -$7800

Q.2. Find the incremental cashflow associated with the project in Year 1. Round the answer to the whole number. $12933

Q3. Find the incremental cashflow associated with the project in Year 4. Round the answer to the whole number. $14496



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 |
| Incremental Revenue |  | 22000 | 22000 | 22000 | 22000 |
| Incremental Operating Costs |  | 2000 | 2000 | 2000 | 2000 |
| Incremental Depreciation |  | 3333-1000 | 4445-1000 | 1481-1000 | 741-1000 |
| Incremental EBIT |  | 17667 | 16555 | 19519 | 20259 |
| Incremental EBIT(1-0.4) |  | 10600 | 9933 | 11711 | 12155 |
| Incremental EBIT(1-0.4)+Incremental Depreciation |  | 12933 | 13378 | 12192 | 11896 |
|  |  |  |  |  |  |
| Change in NWC | -1000 |  |  |  | 1000 |
|  |  |  |  |  |  |
| Cost of Machine | -10000 |  |  |  |  |
|  |  |  |  |  |  |
| Sale of Machine | 3000 |  |  |  | 2000 |
| Tax on Sale: (Sale of Machine - NBV)\*0.20 | 200 |  |  |  | -400 |
|  |  |  |  |  |  |
| Total CF | -7800 | 12933 | 13378 | 12192 | 14496 |

CF in Year 0: -7800

CF in Year 1: 12933

CF in Year 4: 14496

Q4.

Incremental cashflows associated with Project X (in dollars) are as follows



Year 0 Year 1 Year 2 Year 3  
-3000 1100 1210 1331

Incremental cashflows associated with Project Y (in dollars) are as follows



Year 0 Year 1 Year 2 Year 3  
-3000 1100 2000 541

Which of the following statements is TURE?



I. The internal rate of return (IRR) of Project X is 10%



II. If the firm’s policy states that the firm should accept any project as long as the payback period is 2 years at maximum, then the firm will accept Project Y. However, this decision making does not take into consideration information about the incremental cashflow from the project in Year 3.



III. If the firm only has a budget of $3000 and cannot raise additional capital, it should take Project Y and abandon Project X when the required rate of return on both the projects is 9% per year.



A) I

B) I and III

C) I and II

D) I, II, and III

I: -3000 + 1100/1.1+ 1210/1.1^2 + 1331/1.1^3=0



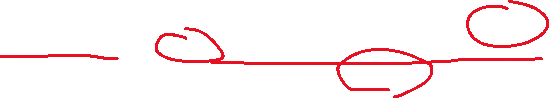
II: PBP is smaller than 2 as we will collect more than 3000 by Year 2. Also, we ignore information about Year 3’s cashflow in the computation of PBP.

III: NPV of Project X = -3000 + 1100/1.09 + 1210/1.09^2 + 1331/1.09^3=55.38 > 0

NPV of Project Y = -3000 + 1100/1.09 + 2000/1.0^2 + 541/1.09^3=426.93 > 0

Even though both Project X and Project Y have the same initial cash outlay, NPV of Project X is smaller than Project Y. Thus, we should accept Project Y and abandon Project X, despite the fact that Project X is a value-creating project.

Q5. The table below indicates a menu of projects that your firm can take: ICO indicates the initial cash outlay and NPV indicates the net present value of each project in dollars. If your firm cannot raise additional capital, and the budget is $16,000, which combination of projects do you have to take in order to maximize the total amount of NPV? Project C, E, H



|  |  |  |
| --- | --- | --- |
| Project | ICO | NPV |
| A | 1000 | 350 |
| B | 2000 | 300 |
| C | 3000 | 1200 |
| D | 4000 | 300 |
| E | 5000 | 1000 |
| F | 6000 | 600 |
| G | 7000 | 1100 |
| H | 8000 | 2000 |

NPV = -ICO + Sum of PV of future cashflows



PI = Sum of PV of future cashflows/ICO = (NPV+ICO)/ICO



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Project | ICO | NPV | PI | Decision | Decision\*NPV | Decision\*ICO |
| C | 3000 | 1200 | 1.400 | 1 | 1200 | 3000 |
| A | 1000 | 350 | 1.350 | 0 | 0 | 0 |
| H | 8000 | 2000 | 1.250 | 1 | 2000 | 8000 |
| E | 5000 | 1000 | 1.200 | 1 | 1000 | 5000 |
| G | 7000 | 1100 | 1.157 | 0 | 0 | 0 |
| B | 2000 | 300 | 1.150 | 0 | 0 | 0 |
| F | 6000 | 600 | 1.100 | 0 | 0 | 0 |
| D | 4000 | 300 | 1.075 | 0 | 0 | 0 |

You should choose Project C, E, H – you exhaust the budget of $16000 and your total NPV will be $4200



Method 1) Brute force method

1-1) One project only

C,A,H,E,G,B,F,D

* Not exhausting budget

1-2) Two projects only

CA, CH, CE, CG, CB, CF, CD

AH, AE, AG, AB, AF, AD

HE, HG, HB, HF, HD

EG, EB, EF, ED

GB, GF, GD

BF, BD

FD

* Not exhausting budget

1-3) Three projects only

1-3-1) Three projects that include C:

C + combinations from Part 1-2, which do not include C

For instance, C + AH, C+ AE, etc

1-3-2) Three projects that exclude C:

1-3-2-1) A + combinations from Part 1-2, which do not include C

For instance, A + HE, A+HG, etc

A + combinations from Part 1-2, which do not include A, C

For instance, A + CH, AE, etc

You repeat the process for H,E,G,B,F,D

1-3) Four projects and above

* Follow the same logic, but you will face over-budget most of the time.

Rule of thumb: Try the combinations from the top of the list

Method 2) Excel Solver