Economics of Entrepreneurship (EP60008) 13.04.2023
Max. Marks: 20 Time: 55 minutes

CLASS TEST 2

Q1. Answer the following questions: **[6 + 2 = 8]**

a. An asset is purchased for $10,000. It is classified as five year property and will be depreciated using the straight line method. The asset has no salvage value and is expected to increase revenues by $15,000 a year and expenses by $8,000 a year. If the tax rate is 30%, determine the cash flows from asset acquisition, asset disposition, and operating cash flows.

ANS. Refer to the Book chapter notes on 'Cash Flow Analysis' pdf file

b. Define Cannibalization. Cannibalization is a familiar business dynamic, what are the conflicting ideas that a company faces with successful product having strong market share?

ANS. Refer to slides on Cannibalization under topic 'Product Management & Customer Profitability'

Q2. You are decision maker and are considering the following two projects for investment: **[1 x 4 = 4]**

	Year 0	Year 1	Year 2	Year 3
Project A	($10,000)	$3,000	$7,000	$9,000
Project B	($5,000)	$3,000	$4,000	$5,000

a. Calculate the discounted payback period assuming a required rate of return of 10% and end-of-the-year cash flows.

ANS.

Discounted Cash flows	
Project A:	
Year 1	$3000[1/ (1 + 1/10)] = $2727
Year 2	$7000[1/ (1 + 1/10)^2] = $5785
Year 3	$9000[1/ (1 + 1/10)^3] = $6762
Project B:	
Year 1	$3000[1/ (1 + 1/10)] = $2727
Year 2	$4000[1/ (1 + 1/10)^2] = $3306
Year 3	$5000[1/ (1 + 1/10)^3] = $3757

Project A takes three years in-order to regain the initial investment of $10,000
Project B takes two years in-order to regain the initial investment of $5,000

As a decision maker you like the fact that the initial outlay for Project B is paid faster however this does not necessarily indicate that Project B is the best project. If the required return or cost of capital was higher than 10% then the discounted cash flow would have been a lesser amount and it would take longer to recoup the initial outlays for both investments.

b. Calculate the NPV, IRR of each project.

ANS.

NPV for Project A = $2727 + $5785 + $6762 = **$15,274**
NPV for Project B = $2727 + $3306 + $3757 = **$9,790**

Both projects produce positive NPV, which is desirable for all projects. So, both can be undertaken however, if only one project is to be selected for investment then Project A is accepted over project B as **$NPV_A > NPV_B$**.

IRR for Project A = $3000/(1+IRR) + $7000/(1+IRR)^2 + $9000/(1+IRR)^3 - $10,000 = 0
IRR for Project A = **33.24%**

IRR for Project B = $3000/(1+IRR) + $4000/(1+IRR)^2 + $5000/(1+IRR)^3 - $5,000 = 0
IRR for project B = **54.05%**
For trial and error method start by putting the value of IRR = 10% i.e. the current discount rate and then accordingly increase or decrease the value by 10/ 5 percentage points to get approximate IRR value.
Since the IRR are greater than the 10% discount rate hence both the projects are acceptable. The IRR indicates the discount rate that would generate an NPV of $0. It also reflects the assumption that cash flows are reinvested at the IRR rate. These rates are not necessarily realistic as investments that produce those types of returns would have to be very risky.

c. Calculate the MIRR of each project assuming a reinvestment rate of 10%.
ANS. For project A:
FV = 3000 $(1.10)^2$ + 7000 $(1.10)^1$ + 9000 $(1.10)^0$ = $ 20,330
PV = $10,000
FV = PV $(1 + MIRR)^t$
$20,330 = $10,000 $(1 + MIRR)^t$
$(1 + MIRR)^3$ = 2.033
MIRR = $\sqrt[3]{2.033} - 1$ = **26.68%**

For project B:
FV = 3000 $(1.10)^2$ + 4000 $(1.10)^1$ + 5000 $(1.10)^0$ = $ 13,330
PV = $5,000
FV = PV $(1 + MIRR)^t$
$13,330 = $5,000 $(1 + MIRR)^3$
$(1 + MIRR)^3$ = 2.666
MIRR = $\sqrt[3]{2.666}$ -1 = **38.66%**

The MIRRs reflect a more realistic rate of reinvestment of cash flows. While these rates are high, they are not as high as IRR. Still, in today's market, while these types of investments with these returns are possible, they would indicate risky investments.

Q3. Metropolitan Hospital has estimated its average monthly bed needs as: N = 1000 + 9X where
X = time period (months); January 2002 = 0
N = monthly bed needs
Assume that no new hospital additions are expected in the area in the foreseeable future. The following monthly seasonal adjustment factors have been estimated, using data from the past five years: **[2 x 2 = 4]**

MONTH	ADJUSTMENT FACTOR (%)
January	+5
April	−15
July	+4
November	−5
December	−25

a. Forecast Metropolitan's bed demand for January, April, July, November, and December 2007.
ANS. For time period, X: January 2002 = 0 so, for Feb. 2002 = 1, March 2002 = 2 …as follows:

Month (X)	2002	2003	2004	2005	2006	2007
Jan.	0	12	24	36	48	**60**
Feb.	1	13	25	37	49	61
March	2	14	26	38	50	62

April	3	15	27	39	51	**63**
May	4	16	28	40	52	64
June	5	17	29	41	53	65
July	6	18	30	42	54	**66**
August	7	19	31	43	55	67
September	8	20	32	44	56	68
October	9	21	33	45	57	69
November	10	22	34	46	58	**70**
December	11	23	35	47	59	**71**

Therefore, unadjusted forecast for Jan. 2007 is: N = 1000 + 9(60) = *1540*
Unadjusted forecast for April 2007 is: N = 1000 + 9(63) = *1567*
Unadjusted forecast for July 2007 is: N = 1000 + 9(66) = *1594*
Unadjusted forecast for Nov. 2007 is: N = 1000 + 9(70) = *1630*
Unadjusted forecast for Dec. 2007 is: N = 1000 + 9(71) = *1639*

These forecasts can be adjusted for seasonal effects as follows:
For Jan. 2007 the adjustment factor is +5 which means that the bed requirement is 5% higher than the trend value, hence the Jan. 2007 bed requirement forecast should be seasonally adjusted upward by 5% to N = 1540 (1 + 0.05) = **1617** (5% higher from 1540).
For April 2007, the trend forecast value is to be lower by 15% from 1567: so, N_{adj} = **1078**
For July 2007, the trend forecast value is to be higher by 4% from 1594: so, N_{adj} = **1658**
For Nov. 2007, the trend forecast value is to be lower by 5% from 1630: so, N_{adj} = **1549**
For Dec. 2007, the trend forecast value is to be lower by 25% from 1639: so, N_{adj} = **1230**

b. If the following actual and forecast values for June bed demands have been recorded, what seasonal adjustment factor would you recommend be used in making future June forecasts?
ANS. Refer to the Book Chapter Notes on 'Demand Forecasting' pdf file

Q4. A firm is making its production plans for next quarter, but the firm owner does not know what the price of the product will be next month. He believes that there is a 60 percent probability the price will be $15 and a 40 percent probability the price will be $20. The manager must decide whether to produce 7,000 units or 8,000 units of output. The following table shows the four possible profit outcomes, depending on which output management chooses and which price actually occurs: **[1 x 4 = 4]**

	Profit (loss) when price is	
	$15	$20
Option A: produce 7,000	-$3,750	+$31,770
Option B: produce 8,000	-$8,000	+$34,000

a. If the owner chooses the option with the higher expected profits, which output is chosen?
b. Which option is more risky?
c. What is the decision if owner uses mean–variance rules to decide between the two options?
d. What is the decision using the coefficient of variation rule?

ANS. Refer to the slides on topic 'Decision under Risk & Uncertainty' for estimation method and rules