Financial Management (HS60009)
MID-TERM EXAM
Feb 2017

(2 hrs)
(30% weightage)
Max marks: 75

Closed book exam. Attempt all questions. Calculators are allowed. Financial functions/calculators are not permitted.

1) A wealthy investor spends 1 million to drill and develop an oil well that has estimated reserves of 200,000 barrels. The well is to be operated over 5 years, producing the estimated quantities shown in the table. It is estimated that the oil will be sold for 20 per barrel. The net income is also shown in the table.

Year	Barrels produced	Net income
1	80,000	1,200,000
2	70,000	1,000,000
3	50,000	500,000
4	30,000	200,000
5	10,000	50,000

A depletion allowance, for tax purposes, can be computed in either of two ways each year: 22% of gross revenue up to 50% of net income before such deduction (option 1), or the investment cost of the product, equal in this case to the unit cost of the reserves, 5 per barrel (option 2). The allowance id deducted from net income to find the taxable income. The investor is in the 45% tax bracket.

a) Does the total depletion allowance exceed the original investment?
b) Calculate the NPV for this investment assuming a discount rate of 20%. (11 marks)

2) a) A project produces the following cash flows:

C0	C1	C2
5000	4000	-11000

The internal rate of return is 13%. If the opportunity cost of capital is 10%, would you accept the offer? Explain. (2.5 marks)

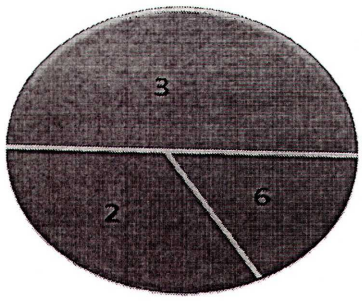
b) Can there be a conflict between discounted payback period and NPV for project selection. Why? (3.5 marks)

3) a) A portfolio comprises of equal proportion of investment in 10 stocks. If the standard deviation of returns of each stock is 10% and the coefficient of correlation between the returns of each stock is 0.03, what is the variance of the portfolio? (3marks)

b) If instead of 10 socks, the no. of stocks is large, what is the variance of the fully diversified portfolio? (3 marks)

4) a) Consider the betting wheel. Here one bets on the individual segments of the wheel. If one invests Re. 1 in the segment marked 3, then 3 will be the payoff if that segment is the landing segment. Otherwise the payoff is 0 and Re. 1 is lost. One is allowed to bet different amounts on different segments. One can bet on the segment with number 3, 2 or 6 with payoffs 3, 2 or 6 respectively. What is the variance of the payoff if you bet on the segment with number 2? What are the covariances of the payoffs associated with this bet? (3 marks)

Betting wheel



b) You are planning to invest 1 million in a concert to be held 1 yr from now. You figure you will obtain 3 million revenue from the 1 million investment, unless it rains. If it rains, you will lose your entire investment. There is a 50% chance that it will rain on the day of the concert. Someone suggests that you buy rain insurance. You can buy 1 unit of the insurance for 0.5 and this unit will pay 1 if it rains and nothing if it does not. You may purchase as many units as you wish up to 3 million. What is the expected rate of return on your investment if you buy u units of insurance? The cost of the insurance is in addition to your 1 million investment. What number of units will minimize the variance of the return? What is the expected return corresponding to this variance? (6 marks)

5) There are 3 goals and 10 projects (numbered 1 to 10). At most 1 project can be selected from a goal. The total available budget is B.

If projects 2 or 4 are carried out, either projects 6 or 7must also be carried out. Formulate the problem given the objective of NPV maximization. (5 marks)

Goal 1	Cost	NPV
1.	c1	n1
2.	c2	n2
3.	c3	n3
4.	c4	n4
Goal 2		
5.	c5	n5
6.	c6	n6
7.	c7	n7
Goal 3		
8.	c8	n8
9.	c9	n9
10.	c10	n10

6) A company is considering the following storage alternatives:

Storage alternatives:	Initial outlay (in million)	Annual cost (in million)	Project life
Rent storage system	2	1.5	12 years
Construct own storage system	10	0.5	Infinite
Use third-party system	-	2	1 year

The cost of capital is 12.5%. Which alternative would you recommend? Why? (7 marks)

7) A Company has a non-cancelable contract for construction. Construction involves a cash outlay of $250,000 at the end of each of the next two years. At the end of the third year the company will receive payment of $650,000. The company can speed up construction by working an extra shift. In this case there will be a cash outlay of $550,000 at the end of the first year followed by a cash payment of $650,000 at the end of the second year. What is the range of opportunity costs of capital at which the company should work the extra shift and why should this range be considered? (7 marks)

8) Consider projects A and B. Both projects have the same initial investment. The cash flows for the projects are as follows:

Project	Year 1	Year 2

A	C_{1A}	C_{2A}
B	C_{1B}	C_{2B}

Suppose $C_{1A} >> C_{1B}$, $C_{2A} < C_{2B}$, $C_{3B} >> C_{3A}$ .Which project selection criteria can be misleading? Why? (5 marks)

9) For an R&D project, a spectrometer costs 140,000 and another 30,000 to modify the equipment for use by the firm. The equipment falls in the three year depreciation class and will be sold after three years for 60,000. The firm spent and expensed1500 last year on research related to the project. The project will save the firm 50,000 a year in before-tax costs. The tax rate is 40%.
(4 marks)

Calculate the operating cash flow and terminal cash flow.

	Year(s)	3-year	5-year	7-year
1	1	33.33	20.00	14.29
2	2	44.45	32.00	24.49
3	3	14.81	19.20	17.49
4	4	7.41	11.52	12.49
5	5		11.52	8.93
6	6		5.76	8.92
7	7			8.93
8	8			4.46

10) a) Suppose you need to receive an amount A each year for n years. Assume an interest rate of r% and inflation rate of f%. Show that at the end of the period the amount you receive is the same whether you use nominal rate or real rate. (5 marks)

b) Suppose someone borrows 100,000 and the loan is to be repaid in 5 equal payments at the end of each year for the next 5 years. The lender charges 6% on the balance at the beginning of each year. Obtain the loan amortization schedule. (6 marks)

c) Which is preferred? (4 marks)
An investment paying interest of 11.7% compounded semiannually.
An investment paying 11.5% compounded continuously.
What is the value of each of these investments after 20 years?