



# The Co-operative University of Kenya

**END OF SEMESTER EXAMINATION AUGUST-2017**

**EXAMINATION FOR THE BACHELOR OF SCIENCE FINANCE**

**UNIT CODE: CMFI 2306:**

**UNIT TITLE: FINANCIAL MATHEMATICS I**

**DATE: 4<sup>TH</sup> AUGUST, 2017**

**TIME: 2:00 PM – 4:00 PM**

**QUESTION ONE IS COMPULSORY AND ANY OTHER TWO QUESTIONS (All**

**Questions Carry Equal marks)**

## **QUESTION ONE**

- a) Three projects Alpha, Beta and Theta are all equally risky. The firm plans to use a 8% cost of capital to evaluate each of them. The initial investment and annual cash inflows over the life of each machine are shown in the following table.

	<b>Alpha</b>	<b>Beta</b>	<b>Theta</b>
<b>Initial investment (CF<sub>0</sub>)</b>	102,000	265,000	137,225
<b>Year (t)</b>	<b>Cashflows (CF<sub>t</sub>)</b>		
1	45,000	50,000	35,000
2	35,000	60,000	35,000
3	25,000	70,000	35,000
4	15,000	80,000	35,000
5	5,000	90,000	35,000
6	16,000	---	---

### **Required:**

- a. Calculate the payback period for the 3 projects  
b. Calculate the NPV for the 3 projects  
c. Calculate the PI for the 3 projects  
d. Calculate the IRR for the 3 projects  
e. Advise based on each of the above appraisal methods (20 marks)
- b) In June 2009, after years of losses and weakening financial condition, General motors' Corporation, makers of Chevrolet, Saturn, Pontiac and Saab cars and trucks was forced into bankruptcy and as a result they have decided to restructure their operations in order to concentrate in the manufacture of a new franchise cars "Lamborghini-a luxury car out of this universe consuming Hydrogen rather than gasoline". As part of their restructuring plans they acquired loans worth Sh 100 million on January 1 2010. The loan mature in 10 years and bonds with similar risk and maturity yields 13%. Interest is paid annually on December 31.

**Required:** Prepare an amortization schedule that determines interest at the effective interest rate  
(10 marks)

## QUESTION TWO

a) In making a purchase you are given two payment alternatives:

- Pay Sh 400 immediately.
  - Pay five installments of Sh 100 each at the end of each of the next five years.
- Which is the most feasible option and why in regards to time value of money

Create an amortization schedule for the following loan:

Amount Borrowed:	Sh. 25,000	
Interest Rate:	8%	
Payment Frequency:	Yearly	
Loan Term:	5 years	<b>(10 Marks)</b>

b) Calculate the price of a bond with a par value of Sh. 1,000 to be paid in ten years, a coupon rate of 10% p.a. and a required yield of 12% p.a. Assume that coupon payments are made semi-annually to bond holders and that the next coupon payment is expected in six months.

**Required:**

- a) Calculate the price of the bond. **(5 marks)**
- b) Determine if the price is at a discount, premium or at par and suggest an explanation as to why. **(5 marks)**

## QUESTION THREE

a) There are two projects X and Y. each involves an investment of Sh 40,000. The expected cash flows and the certainty co-efficient are as under:

Year	Project X Cash inflows	Project Y Cash inflows
1	25,000	20,000
2	20,000	30,000
3	20,000	20,000
4	33,000	35,000
5	19,000	21,000

**Additional Information:**

1. Both projects are perfectly divisible.
2. Both projects are mutually inclusive.
3. The cost of capital is 13%.

**Required:** Evaluate the projects using NPV and payback period methods **(15 marks)**

- b) Ms. Kimani has secured a 10-year contract with Mumias Sugar Company. The annual salary is Shs. 300,000 which is expected to increase by 15% p.a during the 10-year contract. The appropriate discounting rate is 20%. Compute the present value of the growing annuities. **(5 marks)**

#### **QUESTION FOUR**

- a) If you deposit Sh. 1,000 at the end of each year for 3 years in a savings account that pays 5% interest per year, how much will have at the end of 3 years **(10marks)**
- b) Mr. Owino has just secured a job whose annual salary is Shs. 200,000. The job is a four- year contract. The salary is expected to increase by 12% p.a during the contract period. The discounting rate is 16%. The salary is received at the end of each year. Compute the present value of the growing annuities. **(10marks)**