



OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER REGULAR EXAMINATION

**FOR THE DEGREE OF BACHELOR OF SCIENCE
(APPLIED STATISTICS WITH COMPUTING)**

COURSE CODE: STA 428

**COURSE TITLE: MATHEMATICAL APPLICATION IN
FINANCE**

DATE: 10TH JUNE, 2022

TIME: 0900 – 1200 HRS

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF FOUR PRINTED PAGES

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REGULAR – MAIN EXAM**STA 428: MATHEMATICAL APPLICATION IN FINANCE****STREAM: ASC****DURATION: 3 Hours****INSTRUCTION TO CANDIDATES**Answer **ALL** questions from section A and **ANY THREE** Questions in section B.

All questions in section B carry Equal Marks

SECTION A (31 Marks)**QUESTION ONE (16MKS)**

a) Define the following terms;

- | | |
|------------------------|----------|
| i. Cash flow | [1Mark] |
| ii. Cash flow analysis | [2Marks] |
| iii. Balance sheet | [1Mark] |
| iv. Interest | [1Mark] |
| v. Principal | [1Mark] |

b) Explain four objectives of cash flow statement. [4Marks]

c) Find out the future value of Rs.1000 compounded annually for 10 years at an interest rate of 10%. [4Marks]

d) Explain the difference between compounding and discounting as used in mathematics for finance. [2Marks]

QUESTION TWO (15 Marks)

a) Define the following terms

- | | |
|------------------------|----------|
| i. Discount factor | [2Marks] |
| ii. Discount rate | [2Marks] |
| iii. Equation of value | [2Marks] |
| iv. Annuity | [2Marks] |

b) Brian intend to borrow money for buying motor vehicle. Cooperative bank charges 8% per annum interest compounded semi-annually. Kcb bank charges 7.9% per annum interest compounded monthly. In which case will he pay the highest amount of interest?

[7Marks]

SECTION B (39 MARKS)**QUESTION THREE (13 MARKS)**

- a) Suppose Mr. Ram deposits Rs. 10,000 annually in a bank for 5 years, at 10 per cent compound interest rate. Calculate the value of this series of deposits at the end of five years assuming that;
- (i) Each deposit occurs at the end of the year. [3Marks]
 - (ii) Each deposit occurs at the beginning of the year. [3Marks]
- b) Calculate the present value of Rs. 1000 receivable 6 years hence if the discount rate is 10 per cent. [3Marks]
- c) Find the effective rate which is equivalent to a nominal rate of 12% compounded quarterly. [4Marks]

QUESTION FOUR (13 Marks)

- a) An effective yearly rate is quoted at 12% per year where the compounding period is monthly. What is the effective monthly rate? [5Marks]
- b) Find the nominal interest rate per year and effective interest rate per compounding period for an effective annual interest rate of 12.36% where compounding is semiannual. [4Marks]
- c) A local post office charges interest at the rate of 5 rupees per 100 rupees per quarter payable in advance. Find the effective rate of interest per annum. [4Marks]

QUESTION FIVE (13 Marks)

- a) Raul has won a prize. He was given two options either to receive 8000/= or 10000 after two years. The market interest rate is 0.12 and the interest is compounded on monthly basis. Which option should Raul choose? [5Marks]
- b) Brian has a debt of 2000/= which is due after 12 years instead of lump sum payment, she is willing to pay 500/= now and 500/= at the end of six years and a final payment at the end of 12 years. If the rate of interest charged is 2% per annum effectively, what should be her final payment to pay off the debt? [6Marks]
- c) What is the relationship between nominal rate of discount and effective rate of discount? [2Marks]

QUESTION SIX (13 Marks)

- a) Discuss the following types of discounts
- i) Simple discount [2Marks]

- ii) Compound discount [2Marks]
- iii) Continuous discount [2Marks]
- b) A person borrows \$2,000 for 3 years at simple interest. The rate of interest is 8% per annum.
 - i) What are the interest charges for years 1 and 2? [2Marks]
 - ii) What is the accumulated amount at the end of year 3? [2Marks]
- c) How long will it take for \$100 to accumulate to \$300 if interest is compounded quarterly at the nominal rate of 6% per year? [3Marks]

QUESTION SEVEN (13 Marks)

- a) A person wants to accumulate \$100,000 eight years from today to sponsor his son's education. If an investment plan offers him 8% compounded monthly, what amount must he invest today? [4Marks]
- b) Find the sum of the present values of two payments of \$100 each to be paid at the end of year 4 and 9, if
 - i) Interest is compounded semiannually at the nominal rate of 8% per year. [3Marks]
 - ii) The simple-interest method at 8% per year is used. [3Marks]
- c) Explain the following terms as used in financial mathematics.
 - i) accumulated amount [1Mark]
 - ii) focal point of time [2Marks]
