**(FOR THE CANDIDATES ADMITTED**

**DURING THE ACADEMIC YEAR 2022 ONLY)**

REG.NO. :

## N.G.M. COLLEGE (AUTONOMOUS) : POLLACHI

### END-OF-SEMESTER EXAMINATIONS : NOVEMBER-2024

**COURSE NAME: B. Sc. MATHEMATICS**          **MAXIMUM MARKS: 50**

**SEMESTER: V**                    **TIME : 2 HOURS**

### PART - IV

### 22UMS5S1 –  FINANCIAL MATHEMATICS-I

**SECTION – A**          **(10 X 1 = 10 MARKS)**

**ANSWER THE FOLLOWING QUESTIONS.**                    **(K1)**

1.  The nominal rate of interest per unit period, convertible 'm' times in that unit period is

    a)  $i^{(m)} = m\{(1 + i)^m − 1\}$        b) $i^{(m)} = \{(1 + i)^m − 1\}$

    c) $i^{(m)} = m\{(1 + i)^{1/m} − 1\}$        d) $i^{(m)} = \{(1 + i)^{1/m} − 1\}$

2. The relationship between the present value and the force of interest is

    a) $e^{n\delta} = (1 + i)^n$        b) $e^{-n\delta} = (1 + i)^n$

    c) $e^{\delta} = (1 + i)^n$        d) $e^{-\delta} = (1 + i)^n$

3. Accumulated value of immediate annuity is

    a) $(1 − v^n)/i$        b) $\{(1 + i)^n − 1\}/i$

    c) $(1 − v^n)/(1 − v)$        d) $\{(1 + i)^n − 1\}/(1 − v)$

4. The present value of a perpetuity due is

    a) $a_{\infty\rceil}(1 + i)$        b) $1/i$

    c) $(1/i)\{n − a_{n\rceil}\}$        d) $(1 + i)^n(Ia)_{n\rceil}$

5.  The loan amount L at the beginning of the period 1 is

    a) $Xa_{n-1\rceil}$      b) $Xa_{n\rceil}$      c) $Xa_{n-t+1\rceil}$    d) $Xa_{1\rceil}$

**ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES**          **(K2)**

6. Write the formula for compound interest.

7. Define effective rate of interest.

8. Define annuity-due?

9. Define perpetuity.

10. What is the instalment amount paid at the end of each period 'n'?

## SECTION – B          (5 X 8 = 40 MARKS)

**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.**

**(K4 & K5)**

11.    a) A woman has a prize in some competition is offered either of two options below:
        Option A: A lump sum of 1,00,000 (or)
        Option B: 55,000 in one year's time and another 55,000 in two years time.
    If all investments are assumed to earn interest at a rate of 7% pa effective.
    Determine which option she should choose.

**(OR)**

    b) A person is entitled to Rs. 200 after 3 years, another Rs. 250 after a further period
      of 3 years and Rs. 500 after a further period of 4 years. Find the present value of the
      payments if the rates of interest assumed are 5% pa for the first four years, 6% pa
      for the next 4 years and 7% pa for the next 2 years.

12.    a) Calculate the accumulated value after 6 months of an investment of 100 at time 0
      using the following rates of interest:
        a) a force of interest of 5% pa
        b) a rate of interest of 5% pa convertible monthly
        c) an effective rate of interest of 5% pa.

**(OR)**

    b) The constant nominal rate of interest pa convertible quarterly is 15%. Calculate the
      accumulated value after 7 years of a payment of Rs. 300.

13.    a) A sum of Rs. 150 is deposited in a bank at the beginning of each year. What is the
      amount to the credit of the depositor at the end of 20 years, if interest is credited to
      the account at the rate of 6% pa for the first 10 years, 7% for the next 5 years and
      8% thereafter?

**(OR)**

    b) Calculate on 8% basis, the pure annual premium under a capital redemption
      assurance policy to assure Rs. 20,000 at the end of 10 years.

14.    a) An annuity is payable annuity in advance for a term of 20 years. The payment is
      500 in year 1, 550 in year 2, and so on, increasing by Rs. 50 each year. Calculate the
      present value of this annuity, assuming that the effective rate of interest is 5% pa for
      the first twelve years and 7% pa thereafter.

**(OR)**

b) Under a settlement of property, Mr. X is entitled to receive Rs. 1800 pa at infinitum, the first payment being due at the end of 6 years. Find the present value of Mr. X's right @ 6%.

15.     a) A loan od Rs. 3000 is repayable over 5 years by level quarterly instalments calculated suing a rate of interest of 5% pa effective.
       a) Calculate the amount of each quarterly instalment.
       b) What is the capital content of the sixth repayment?
       c) How much interest is paid in the second year?

**(OR)**

b) A loan of Rs. 30,000 is repaid by a level annuity certain payable annually in arrears for 20 years. Determine, on the basis of an interest rate of 15% pa,
       a) The annual repayment.
       b) The first repayment for which the capital content exceeds the interest content.

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