



Register Number:

Date :

St. Joseph's College (Autonomous), Bengaluru
B.Sc Mathematics - IV Semester
End Semester Examination: April 2023
(Examination conducted in May 2023)
MTOE-12 - Mathematics for Wealth Management

Duration: 2 Hours

Max. Marks: 60

The paper contains two pages and 3 parts.
Annuity table will be provided.
Calculators may be used.

Part A

Answer any SIX questions

[6 × 2 = 12]

1. If a bank offers 100% interest compounded annually for the principal you invest, what will be the maturity amount at the end of 1 year?
2. What is the difference between fixed deposit and recurring deposit?
3. Define annuity and give the formula for present value of an annuity.
4. Give the assessment formula for perpetuity.
5. Refer to the table and find the annuity factor for
 - (a) $n = 2, r = 5\%$
 - (b) $n = 4, r = 4\%$
6. Differentiate $x^{\frac{1}{x}}$
7. Determine the value of x for which the function is increasing $f(x) = 2x^2 - 24x + 7$
8. Find the elasticity of x^2e^x

Part B

Answer any FIVE questions

[5 × 6 = 30]

9. Ramesh and Suresh were given Rs. 5000 by their parents and given a choice to deposit it in Bank C or Bank D for 2 years. Ramesh deposited in Bank C, which gives 6% interest, compounded twice annually. Suresh deposited it in Bank D with simple interest of 6.5% per annum. Who will earn more return, and why?

10. A farmer just bought a tractor which has life of 10 years. At the end of 10 years, a replacement tractor will cost Rs. 10,00,000 and the farmer would like to set up a sinking fund for the same, starting now. What should be the annual investment if bank offers 10% interest per annum?
11. If Rs. 60,000 is invested now for 7 years in a bank which gives 5.25% interest for 3 years and 6% thereafter, what would be the size of the total investment at the end of seven years?
12. A bank grants a housing loan of Rs. 1,00,000 at 7% pa. The borrower is to repay the loan in 3 annual installments. How much must she pay each year?
13. (a) Mosby's Constructions is considering a project which would cost Rs. 50,00,000 now and yield Rs. 10,00,000 per annum every year in perpetuity, starting a year from now. The cost of capital is 15
(b) What if cost of capital was 25%? Would the project be still viable?
14. Vivek wants to buy a Celestron Telescope. This will cost him Rs. 65,000 in two years' time. He has decided to set aside an equal amount each quarter until he has the amount he needs. Assuming he can earn interest in his Cooperative bank at 5% per annum, how much does he need to set aside each year? Assume the first amount is set side one period from now.
15. Dominic has taken out a Rs. 30,000 mortgage over 25 years. Interest is to be charged at 12%. Calculate the monthly repayment.

Part C

Answer any THREE questions

[3 × 6 = 18]

16. Find $\frac{dy}{dx}$ when $y = \frac{x^4 + 3x^2 + 13}{10x^3 + 19x^2 + 21}$
17. Find the interval for which the following function is increasing or decreasing $f(x) = x^4 - 62x^2 + 120x + 9$.
18. Find the maxima and minima of the function $f(x) = 2x^3 - 24x + 7$
19. The manufacturer's total cost function is given as $C(x) = 2x^2 + 3x + 1000$. Find
 - (a) Average cost function
 - (b) Marginal cost function
 - (c) Marginal cost when 5 units are produced
20. The demand function for a product is given by $p = 6 - 3x^2$. Find the value of x at which demand will have unit price elasticity of demand.

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