



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF COMMERCE
END TERM EXAMINATION - JAN 2023**

Semester : Semester I - 2022

Course Code : MAT1011

Course Name : Sem I - MAT1011 - Basic Mathematics for Economics

Program : B.Sc. Economics

Date : 11-JAN-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.

PART A

ANSWER ALL THE FOLLOWING QUESTIONS

10 X 2 = 20M

1. Find the derivative of the function $y = e^{-2x} + x^4 + 8$
(CO3) [Knowledge]
2. Owing to continuous improvements in technology and efficiency in production, an empirical study found a factory's output of product Q at any moment in time to be determined by the function $Q = 40e^{0.03t}$ where t is the number of years from the base year in the empirical study and Q is the output per year in tonnes. What is the annual growth rate of production?
(CO4) [Knowledge]
3. If $V = \begin{bmatrix} 3 & 8 \end{bmatrix}$ and matrix $A = \begin{bmatrix} 5 & 2 \\ 3 & 6 \end{bmatrix}$ find the product matrix VA.
(CO5) [Knowledge]
4. Differentiate the function $y = x^{-1} + x^{0.5}$
(CO3) [Knowledge]
5. Solve for x if $16x - 4 = 68 + 7x$
(CO2) [Knowledge]
6. Evaluate $\sum_{k=3}^p (10 + 2k)$ for p=5
(CO2) [Knowledge]
7. Simplify $\frac{25}{3} * \frac{27}{5} * \frac{4}{7} =$
(CO1) [Knowledge]

8. 2.4% can also be written as (CO1) [Knowledge]
9. If $F=12,000$, $i=10\%$, $n=4$, then find the initial amount (CO3) [Knowledge]
10. Calculate the interest which will be earned on the investment of £500 for a year at 0.5%? (CO3) [Knowledge]

PART B

ANSWER ALL THE FOLLOWING QUESTIONS

5 X 10 = 50M

11. A firm faces the demand schedule $p = 184 - 4q$ and the TC function $TC = q^3 - 21q^2 + 160q + 40$. What output will maximize profit? (CO3) [Comprehension]
12. Solve the following equations using Cramer's Rule
 $2X+Y-Z=3$
 $X+Y+Z=1$
 $X-2Y-3Z=4$ (CO5) [Comprehension]
13. For the matrix $A = \begin{bmatrix} 5 & 0 & 2 \\ 3 & 4 & 5 \\ 2 & 1 & 2 \end{bmatrix}$ derive the cofactor matrix C, the adjoint matrix AdjA and the inverse of a matrix by manual calculation. (CO5) [Comprehension]
14. There are limited world reserves of mineral M. The current rate of extraction is 45 million tonnes a year, with all mined material being used up by manufacturing industry. This extraction rate is expected to increase at 3% per annum. Total estimated reserves are 1,200 million tonnes. When will they be expected to run out if this 3% growth rate continues? (CO3) [Comprehension]
15. A. You go into a foreign exchange bureau to buy US dollars for your holiday. You exchange £200 and receive \$343. When you get home you discover that you have lost your receipt. How can you find out the exchange rate used for your money if you know that the bureau charges a fixed £4 fee on all transactions?
 B. Two leisure park owners A and B have the same weekly running costs of £8,000. The numbers of customers visiting the two parks are x and y respectively. If $X > Y$, what can be said about comparative average costs per customer? (CO2) [Comprehension]

PART C

ANSWER ALL THE FOLLOWING QUESTIONS

2 X 15 = 30M

16. Use the inverse matrix method to find the unknown variables X, Y, and Z given that
 $3X+Y-2Z=5$
 $-X+6Y+Z=-1$
 $X-2Z=1$ (CO5) [Application]
17. A. Given the differential equation $dy/dt = -1.5y + 12$ derive a function for y in terms of t given the initial value $y_0 = 10$.
 B. When price is 10 for the demand function $p = 30 - 3q$, What is the point elasticity (CO4) [Application]
