MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :……..…**

Third Semester B.A. Degree Examination, November 2016
First Degree Programme under CBCSS
Complementary Course: Mathematics – III (for Economics)
AUMM331.1a: Mathematics for Economics – III

Time: **3** Hours Max. Marks: **80**

SECTION – A

*Answer **ALL** questions / problems in one or two sentences.*

1. If $f'(x) = 2x$, what is $\int f(x)dx$?
2. Evaluate $\int \sqrt{7x-3}\ dx$
3. Evaluate $\int_1^3 (1+2x)\, dx$
4. Write $\int \frac{1}{x^2-a^2}\, dx$
5. Write the Taylor Series expansion of $\sin x$ about $x = 0$.
6. Define exponential series.
7. If the nth term of a series is $3\left(\frac{1}{2}\right)^{n-1}$, write its first four terms.
8. Define a singular matrix.
9. Find the value of x if the matrix $A = \begin{bmatrix} 4 & 2 & 1 \\ 2 & 3 & 0 \\ x & 0 & 1 \end{bmatrix}$ is symmetric.
10. What is the order of AB if A is a 2×2 matrix and B is a 2×3 matrix?

(10 × 1 = 10 Marks)

SECTION – B

*Answer any **EIGHT** questions / problems, not exceeding a paragraph.*

11. Find $\int (2x+3)(x-3)(1-2x)dx$

12. Evaluate $\int \frac{5x^4}{1+x^{10}}\,dx$
13. Integrate $x \log x$ with respect to x.
14. Evaluate $\int \frac{x^3-1}{x-1}\,dx$
15. Find the area bounded by $y = 3x$, the x-axis and the ordinates at $x = 1$ and $x = 3$.
16. Marginal cost function of a firm is given by $2 + 4x + 30x^2$. If the fixed cost is Rs.100, determine the total cost function of the firm.
17. Find the revenue, if the marginal revenue function is $2 - 8x + 9x^2$.
18. Find the sum to infinity of the series: $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots$
19. Find the Taylor series of $f(x) = e^{-5x}$ around $x = 0$ up to the term containing
20. Let $A = \begin{bmatrix} 2 & 1 & -2 \\ 3 & 0 & -1 \\ 2 & 1 & -3 \end{bmatrix}$. Find the determinant of A.
21. Find the values of x and y if A and B are equal , where $A = \begin{bmatrix} 0 & 2 & 8 \\ 2x+3 & 2 & 0 \end{bmatrix}$; $B = \begin{bmatrix} 0 & 2 & x+y+2 \\ 9 & x-1 & 0 \end{bmatrix}$
22. Find AB if $A = [1 \quad 2 \quad 0 \quad 2]$ and $B = \begin{bmatrix} 4 \\ 3 \\ 2 \\ 1 \end{bmatrix}$. What is the order of AB ?

(8 × 2 = 16 Marks)

SECTION – C

*Short essay type problems : Answer any **SIX** questions.*

23. Find the integral of $\log x$ using the rule, integration by parts.
24. Integrate $\frac{1}{\sqrt{9-16x^2}}$ with respect to x.
25. Using Taylor's series expansion, show that: $\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots$
26. Evaluate an approximate value of $\int_0^1 \sqrt{x^2+1}$ using trapezoidal rule.
27. If the marginal revenue function is given by $\frac{2}{(x+2)^2} + 3$, find the total revenue function and demand function in terms of x.
28. Find the sum to infinity of the series: $1 + \frac{2^2}{2!} + \frac{3^2}{3!} + \frac{4^2}{4!} + \cdots$

29. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix}$, check whether matrix multiplication is commutative.

30. Let $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 3 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 \\ 3 & 1 \\ 1 & 7 \end{bmatrix}$. Find AB.

31. Find the solution of the following system of equations using Cramer's Rule:

$$3x_1 + 5x_2 = 1\,, \quad 2x_1 - 3x_2 = 7$$

(6 × 4 = 24 Marks)

SECTION – D

*Long essay type problems : Answer any **TWO** questions.*

32. i) Evaluate $\int \frac{x-2}{x^2-4x+5}\, dx$

ii) Derive Domar's models for public debt and national income.

33. Use Simpson's rule with $n = 6$ to estimate $\int_1^4 \sqrt{1+x^3}\, dx$

34. Find the sum to infinity of the series: $\frac{1.3}{2!} + \frac{2.4}{3!} + \frac{3.5}{4!} + \cdots$

35. If $A = \begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix}$, verify the distributive laws:

i) $A(B+C) = AB + AC$, and ii) $(A+B)C = AC + BC$

(2 × 15 = 30 Marks)

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